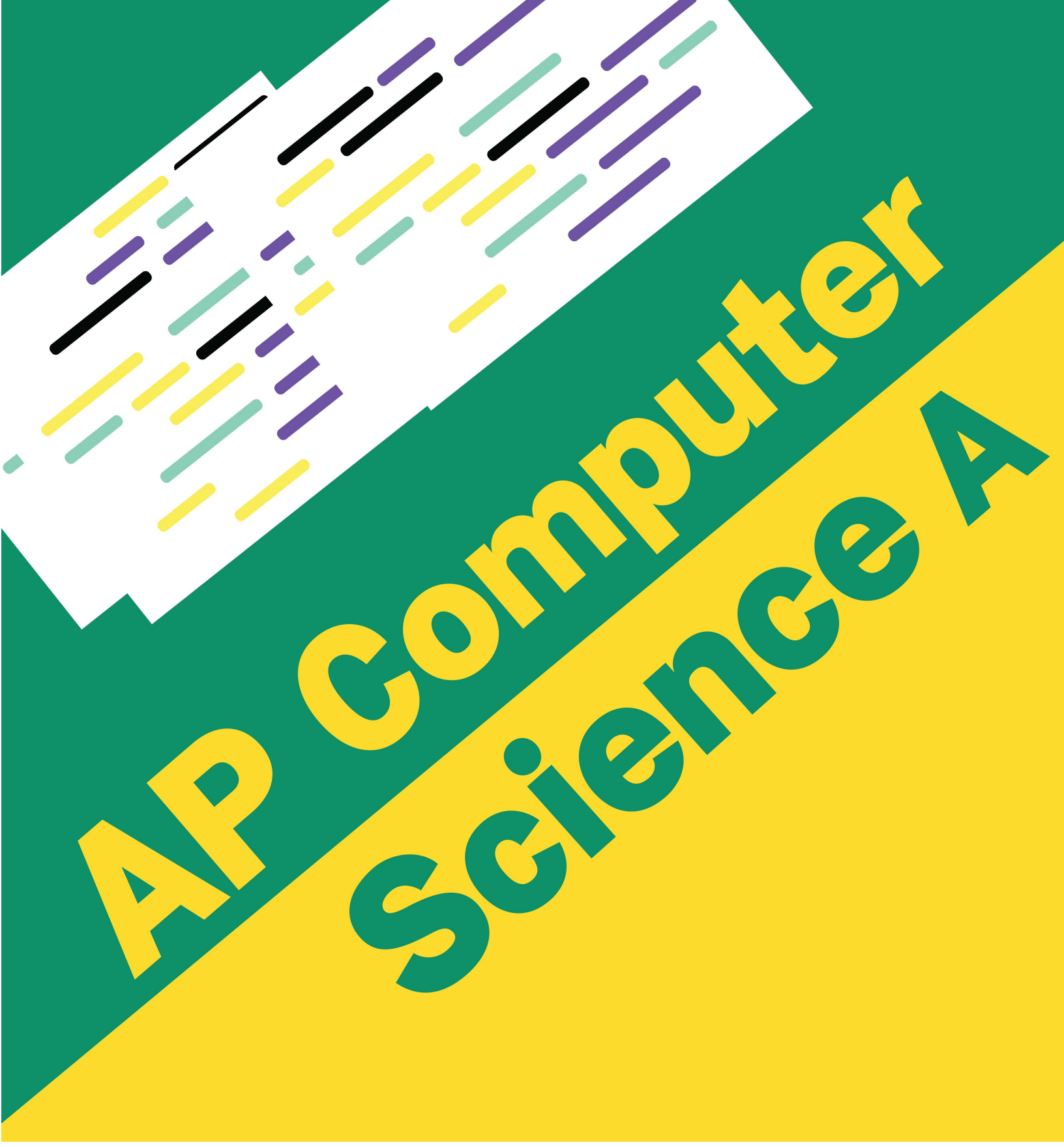

10 2024 Practice tests

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Practice Test 1

AP Computer Science A Exam - practice test 1

Section 1: Multiple-Choice Questions

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO.

At a glance
Total Time 1 hour 30 minutes **Number of Questions** 40 **Percent of Total Score** 50% **Writing Instrument** Pencil Required

Instructions

Section I of this examination contains 40 multiple-choice questions. Fill in only the ovals for numbers 1 through 40 on your answer sheet.

Indicate all of your answers to the multiple-choice questions on the answer sheet. No credit will be given for anything written in this exam booklet, but you may use the booklet for notes or scratch work. After you have decided which of the suggested answers is best, completely fill in the corresponding oval on the answer sheet. Give only one answer to each question. If you change an answer, be sure that the previous mark is erased completely. Here is a sample question and answer.

Sample Questions

Chicago is a

(A) state
(B) city
(C) country
(D) continent
(E) country

Sample Answers

Use your time effectively, working as quickly as you can without losing accuracy. Do not spend too much time on any one question. Go on to other questions and come back to the ones you have not answered if you have time. It is not expected that everyone will know the answers to all the multiple-choice questions.

About Guessing

Many candidates wonder whether or not to guess the answers to questions about which they are not certain. Multiple-choice scores are based on the number of questions answered correctly. Points are not deducted for incorrect answers, and no points are awarded for unanswered questions. Because points are not deducted for incorrect answers, you are encouraged to answer all multiple-choice questions. On any questions you do not know the answer to, you should eliminate as many choices as you can, and then select the best answer among the remaining choices.

COMPUTER SCIENCE A

SECTION I

TIME—-1 hour and 30 minutes

Number of Questions—-40

Percent of total exam grade—-50%

Directions: Determine the answer to each of the following questions or incomplete statements, using the available space for any necessary scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet. No credit will be given for anything written in the examination booklet. Do not spend too much time on any one problem.

Notes:

- Assume that the classes listed in the Quick Reference have been imported where appropriate.
- Assume that declarations of variables and methods appear within the context of an enclosing class.
- Assume that method calls that are not prefixed with an object or class name and are not shown within a complete class definition appear within the context of an enclosing class.
- Unless otherwise noted in the question, assume that parameters in the method calls are not null and that methods are called only when their preconditions are satisfied.

1. What will be the output as a result of executing the code segment?

```
int a = 10;
double b = 10.7;
double c = a + b;
int d = (int) (a + c);
System.out.println(c + " " + d);
```

(A) 20 20
(B) 20.0 30
(C) 20.7 30
(D) 20.7 30.7
(E) Nothing will be printed because of a compile-time error.

2. If x is a positive integer, which of the following could NOT be the value of i after the statement below executes?

```
int i = x % 50;
```

(A) 0
(B) 10
(C) 25
(D) 40
(E) 50

3. Given the code snippet:

```
public class Student {
    private String name;

    public void setName(String name) {
        this.name = name;
    }
}
```

What is the purpose of the 'this' keyword in Java?

(A) It refers to an external variable.
(B) It is used for conditional statements.
(C) It represents a static method.
(D) It refers to the current instance of the class.
(E) It initializes a constant variable.

4. Consider the class definition:

```
public class Square extends Rectangle {
    // class implementation
}
```

What is the purpose of the 'extends' keyword in the code below?

(A) It specifies a constant variable.
(B) It restricts access to the class.
(C) It denotes a method modifier.
(D) It indicates inheritance.
(E) It initializes a static variable.

5. In Java, what is the result of comparing two strings using the == operator?

```
String str1 = new String("Hello");
String str2 = new String("Hello");
boolean result = (str1 == str2);
```

What does the following expression evaluate to?

(A) true
(B) false
(C) It throws a compile-time error.
(D) It compares the contents of the strings and returns true if they are equal.
(E) It compares the references of the strings and returns true if they point to the same memory location.

6. Consider the following code segment:

```
boolean flag1 = true;
boolean flag2 = false;
boolean result = (flag1 && !flag2) || (flag2 && !flag1);
```

What is the value of 'result' after the code is executed?

(A) true
(B) false
(C) It throws a runtime error.
(D) It depends on the initial values of flag1 and flag2.
(E) It depends on the value of another variable.

7. Consider the following code segment:

```
int i = 0;
while (i < 5) {
  System.out.print(i + " ");
  i++;
  if (i == 3) {
    break;
  }
}
```

What is the output of the code?

(A) 0 1 2
(B) 0 1 2 3 4
(C) 0 1 2 3
(D) 0 1 2 3 4 5
(E) It causes an infinite loop.

8. Consider the following code snippet:

```
int a = 10;
int b = 20;
int c = 30;
boolean result = (a > b) && (b < c) || (a == b);
```

What is the value of 'result'?

(A) true
(B) false
(C) It throws a runtime error.
(D) It depends on the initial values of a, b, and c.
(E) It depends on the value of another variable.

9. Consider the following code snippet:

```
public class GradeCalculator {
  public static void main(String[] args) {
    int score = 85;
    char grade = calculateGrade(score);
    System.out.println("Grade: " + grade);
  }

  static char calculateGrade(int score) {
    if (score >= 90) {
      return 'A';
    } else if (score >= 80) {
      return 'B';
    } else if (score >= 70) {
      return 'C';
    } else if (score >= 60) {
      return 'D';
    } else {
      return 'F';
    }
  }
}
```

What is the output of the code?

(A) Grade: A
(B) Grade: B
(C) Grade: C
(D) Grade: D
(E) Grade: F

10. Consider the following code snippet:

```
public class TemperatureConverter {
  public static void main(String[] args) {
    double celsius = 25;
    double result = convertToFahrenheit(celsius);
    System.out.println("Temperature in Fahrenheit: " +
result);
  }

  static double convertToFahrenheit(double celsius) {
    if (celsius < -273.15) {
      return -459.67;
    } else {
      return 9.0 / 5.0 * celsius + 32;
    }
  }
}
```

What is the value of 'result'?

(A) Temperature in Fahrenheit: -459.67
(B) Temperature in Fahrenheit: 77.0
(C) Temperature in Fahrenheit: 86.0
(D) It throws a runtime error.
(E) It depends on the initial value of celsius.

11. Given the code:

```
for (int i = 3; i < 12; i += 2) {
    if (i % 5 == 0) {
        System.out.print(i + " ");
    }
}
```

What is the output of this code?

(A) 0
(B) 5
(C) 5 10
(D) 3 7 11
(E) Nothing is printed.

12. For boolean variables a, b, and c, what does the expression (a && b) || c evaluate to?

(A) true if at least one of the variables is true.
(B) true if all variables are true.
(C) true only if c is true.
(D) true only if both a and b are true.
(E) true if a is true.

13. What is the length of the array "values" after the following code executes?

```
String text = "Hello, World!";
int[] values = new int[text.length() + 2];
```

(A) 13
(B) 15
(C) 14
(D) 17
(E) The array will not be created due to a compile-time error.

14. Which of the following code segments will produce the following output?

1 2 3 4 5
2 4 6 8 10
3 6 9 12 15
4 8 12 16 20
5 10 15 20 25

(A)
```
for (int x = 1; x <= 5; x++) {
    for (int z = 1; z <= 5; z++) {
     System.out.print(x * z + " ");
    }
    System.out.println();
}
```

(B)
```
for (int x = 1; x <= 5; x++) {
   for (int z = 1; z <= x; z++) {
     System.out.print(x * z + " ");
    }
    System.out.println();
}
```

(C)
```
for (int x = 1; x < 6; x++) {
   for (int z = 1; z <= 5; z++) {
     System.out.print(x * z + " ");
    }
    System.out.println();
}
```

(D)
```
for (int x = 1; x <= 5; x++) {
   for (int z = x; z <= 5; z++) {
     System.out.print(x * z + " ");
    }
    System.out.println();
}
```

(E)
```
for (int x = 1; x <= 5; x++) {
   for (int z = 0; z < 5; z++) {
     System.out.print(x * (z + 1) + " ");
    }
```

```
    System.out.println();
}
```

15. A software project involves creating a complex video game. The development team decides to use an Object-Oriented Programming (OOP) approach. Which of the following are advantages of using OOP for this project?

```
I. Code can be organized into reusable classes and objects.
II. Encapsulation allows data and methods to be hidden and
protected, enhancing security.
III. Inheritance allows for the creation of new classes based
on existing ones, promoting code reusability.
```

(A) I only
(B) II only
(C) III only
(D) I and II only
(E) I, II, and III

16. Consider the code segment:

```
final String[] arr1 = {"apple", "banana"};
String[] arr2 = {"cherry", "date"};
arr1 = arr2;
System.out.print(arr1[0]);
```

What is printed as a result of executing the code segment?

(A) "apple"

(B) "banana"
(C) "cherry"
(D) "date"
(E) Nothing will be printed due to a compile-time error.

17. Given an array of integer values, which of the following code segments correctly swaps the values stored in data[0] and data[4]?

(A)
```
data[0] = 4;
data[4] = 0;
```
(B)
```
data[0] = data[4];
data[4] = data[0];
```
(C)
```
int tmp = data[4];
data[4] = data[0];
data[0] = tmp;
```
(D)
```
int tmp = data[4];
data[0] = data[4];
data[4] = tmp;
```
(E)
```
int tmp = data[0];
data[4] = data[0];
data[0] = tmp;
```

18. Which of the following best describes the draw method of the Circle class?

```
public class Shape {
    public void draw() {
        System.out.println("Drawing a shape.");
    }
}
```

```
public class Circle extends Shape {
    public void draw() {
        System.out.println("Drawing a circle.");
    }
}
```

(A) An inherited method
(B) An overridden method
(C) An overloaded method
(D) An interface method
(E) An abstract method

19. Which of the following code snippets will correctly print 'Drawing a circle'?

```
public class Shape {
    public void draw() {
        System.out.println("Drawing a shape");
    }
}

public class Circle extends Shape {
    public void draw() {
        System.out.println("Drawing a circle");
    }

    // ... rest of the code
}

public class Rectangle extends Shape {
    public void draw() {
        System.out.println("Drawing a rectangle");
    }
}
```

(A) Shape s = new Circle();
s.draw();
(B) Circle c = new Circle();
c.draw();
(C) Shape s = new Rectangle();
s.draw();
(D) Circle c = new Shape();
c.draw();
(E) Rectangle r = new Shape();
r.draw();

20. What will be the output of the following code?

```
public class Animal {
    public void makeSound() {
        System.out.println("Some generic sound");
    }

    // ... rest of the code
}

public class Cat extends Animal {
    public void makeSound() {
        System.out.println("Meow");
    }

    // ... rest of the code
}

public class Dog extends Animal {
    public void makeSound() {
        System.out.println("Woof");
    }

    // ... rest of the code
```

```
}

public static void main(String[] args) {
   Animal animal = new Cat();
   animal.makeSound();
}
```

(A) "Some generic sound"
(B) "Meow"
(C) "Woof"
(D) Compilation error
(E) "Some generic sound Meow"

21. Consider the following recursive method:

```
public int mystery(int n) {
     if (n == 0)
          return 0;
     else
          return n + mystery(n - 1);
}
```

What value is returned as a result of the call mystery(5)?
(A) 0
(B) 5
(C) 10
(D) 15
(E) 25

22. Which of the following statements correctly initializes a 2D array of integers named matrix with 3 rows and 4 columns in Java?

(A) `int matrix[][] = new int[3, 4];`
(B) `int matrix[][] = new int[3][4];`
(C) `int matrix[3][4] = new int[];`
(D) `int[3][4] matrix = new int[];`
(E) `int matrix[3][4] = new int[3][4];`

23. given the code segment

```
ArrayList fruits = new ArrayList<>();
fruits.add("Apple");
fruits.add("Banana");
fruits.add(0, "Cherry");
fruits.add("Date");
fruits.set(2, "Elderberry");
fruits.remove(1);
System.out.println(fruits);
```

What is printed as a result of executing the code segment?

(A) [Apple, Banana, Cherry, Date]
(B) [Apple, Cherry, Date, Elderberry]
(C) [Cherry, Elderberry, Date]
(D) [Apple, Date, Elderberry]
(E) [Apple, Cherry, Date, Elderberry]

24. The speed limit of a stretch of highway is 65 miles per hour (mph). The highway patrol issues speeding tickets to anyone caught going faster than 65 miles per hour. The fine for speeding is based on the following scale:

- Greater than 65 mph but less than 75 mph: $120
- Greater than or equal to 75 mph but less than 85 mph: $180
- Greater than or equal to 85 mph: $300

If the value of the int variable speed is the speed of a driver who was pulled over for going faster than 65 mph, which of the following code segments will assign the correct value to the int variable fine?

```
I.  if (speed >= 85) fine = 300;
if (speed >= 75 && speed < 85) fine = 180;
if (speed > 65 && speed < 75) fine = 120;

II. if (speed >= 85) fine = 300;
if (speed >= 75 and speed < 85) fine = 180;
if (speed > 65 && speed < 75) fine = 120;
if (speed < 65) fine = 0;

III. if (65 < speed && speed < 75) fine = 120;
if (75 <= speed && speed < 85) fine = 180;
if (speed >= 85) fine = 300;
```

(A) `I only`
(B) `II only`
(C) `III only`
(D) `I and II`
(E) `I and III`

25. Consider the code snippet:

```
while (p > q || q < r)
{
    System.out.print("*");
}
```

Which of the following must be true after the code segment has executed?

(A) p > q || q < r
(B) p <= q || q >= r
(C) p > q && q < r
(D) p < q && q <= r
(E) p <= q && q > r

26. Consider the code segment:

```
ArrayList numbers = new ArrayList<>();
numbers.add(5);
numbers.add(10);
numbers.add(15);
numbers.add(20);
numbers.set(1, 12);
numbers.remove(2);
System.out.println(numbers);
```

What is printed as a result of executing the code segment?

(A) [5, 15, 12, 20]
(B) [5, 12, 15, 20]
(C) [5, 12, 20]
(D) [5, 15, 20]
(E) [5, 12, 15, 12]

27. Consider the code segment:

```
ArrayList numbers = new ArrayList<>();
numbers.add(5);
numbers.add(10);
numbers.add(13);
numbers.remove(1);
numbers.add(20);
numbers.set(1, 5);
numbers.remove(2);
System.out.println(numbers);
```

What is printed as a result of executing the code segment?

(A) [5, 15, 12, 20]
(B) [5]
(C) [5, 5]
(D) [5, 13]
(E) [5, 12, 15, 12]

28. Given a 2D array grid in Java, which of the following code snippets correctly retrieves the value at row i and column j and stores it in a variable value?

(A) `int value = grid[i, j];`
(B) `int value = grid.get(i, j);`
(C) `int value = grid[i][j];`
(D) `int value = grid[i + 1][j + 1];`
(E) `int value = grid.get(i + 1, j + 1);`

29. What is the result of the following code segment?

```
int[][] matrix = {{1, 2}, {3, 4}, {5, 6}};
for (int i = 0; i < matrix.length; i++)
    for (int j = 0; j < matrix[i].length; j++)
      System.out.print(matrix[i][j] + " ");
```

(A) 1 2 3 5 4 6
(B) 1 3 5 2 4 6
(C) 1 2 3 4 5 6
(D) 1 4 5 6
(E) It will result in a compilation error.

30. Consider the following classes:

```
public class Test
{
   public void display(int x)
   {
      System.out.println("int");
   }
   public void display(double y)
   {
      System.out.println("double");
   }
}

Test t = new Test();
t.display(5);
```

What will be the result of executing the following code?

(A) "int"

(B) "double"
(C) Compile-time error
(D) Run-time error
(E) No output

31. Given the code:

```
int x = 0;
for (int i = 0; i < 7; i++) {
    for (int j = 0; j <= 2; j++) {
        for (int k = 1; k <= 4; k = k * 4) {
          x++;
        }
    }
}
```

What is the value of x after the code segment executes?

(A) 21
(B) 30
(C) 42
(D) 56
(E) 63

32. Consider the code segment:

```
int a = 20;
a = a / 4;
a = a % 3;
a--;
System.out.println(a);
```

What is printed as a result of executing the code segment above?

(A) 1
(B) 4
(C) 3
(D) 11
(E) 13

33. Consider the code segment:

```
int[] data = {70, 40, 50, 80};
for (int i = 0; i < data.length; i++) {
    if (data[i] > 60) {
        data[i] -= 30;
    }
}
for (int d : data) {
    System.out.print(d + " ");
}
```

What is printed as a result of executing the code segment?

(A) 40 40 50 80
(B) 40 40 50 50
(C) 60 40 20 80
(D) 70 40 20 50

(E) Nothing will be printed due to a compile-time error.

34. What is printed as a result of executing the code segment?

```
int[][] matrix = {{1, 2}, {3, 4, 5}, {6, 7}};

for (int i = 0; i < matrix.length; i++)
    for (int j = 0; j < matrix[i].length; j++)
      System.out.print(matrix[i][j] + " ");
System.out.println();
```

(A) 1 2 3 4 5 6 7
(B) 2 3 4 5 6 7 1
(C) 7 6 5 4 3 2 1
(D) 3 4 5 6 7 1 2
(E) An error message is printed.

35. Consider the following recursive method:

```
public int mystery(int n) {
  if (n < 10)
    return 1;
  else
    return 1 + mystery(n / 10);
}
```

How many digits are in the number returned by the call mystery(12345)?

(A) 1
(B) 2
(C) 3
(D) 4

(E) 5

36. Which of the following is true about the last line of code?

```
public class Vehicle {
    protected String type;

    Vehicle(String type) {
        this.type = type;
        System.out.println("A " + type + " vehicle is
created.");
    }

    public String getType() {
        return type;
    }
}

public class Car extends Vehicle {
    Car() {
        super("car");
        System.out.println("Cars are a popular mode of
transportation.");
    }
}

Car car = new Car();
```

(A) The following will be printed: "A car vehicle is created."
(B) The following will be printed: "A car vehicle is created. Cars are a popular mode of transportation."
(C) An error will occur because the type can be referenced only in the Vehicle class.

(D) An error will occur because there is no getType() method in the Car class.
(E) None of the above are true.

37. Which of the following design options is best suited for representing a school's student information, where you need to track a student's name, age, and grade?

(A) Use one class, Student, with data fields: String name, int age, int grade.
(B) Use three unrelated classes: Name, Age, and Grade, each with their respective data fields.
(C) Use one class, School, with three subclasses: Name, Age, and Grade.
(D) Use four classes: Student, Name, Age, and Grade, with Student containing instances of the other classes as attributes.
(E) Use one class, Student, with an ArrayList to store student information.

38. Consider the following code segment:

```
int a = 12, b = 8;
if (a > 10 && b < 15)
   a += 5;
else
   b -= 3;
```

What values are stored in variables a and b after the execution of the code?
(A) a = 12, b = 8
(B) a = 17, b = 8
(C) a = 12, b = 5
(D) a = 17, b = 5
(E) a = 12, b = 2

39. Consider the code segment:

```
String[] names = {"Alice", "Bob", "Charlie", "David", "Eve",
"Frank"};
int middle = names.length / 2 - 1;
for (int x = 0; x < middle; x++) {
     String temp = names[x];
     names[x] = names[names.length - x - 1];
     names[names.length - x - 1] = temp;
}
for (String name : names) {
     System.out.print(name + " ");
}
```

What is printed as a result of executing the code segment?

(A) Alice Bob Charlie David Eve Frank
(B) Alice Charlie Bob David Eve Frank
(C) Frank Eve Charlie Bob David Alice
(D) Frank Eve Charlie David Bob Alice
(E) Frank Bob Charlie David Alice Charlie

40. Consider the following classes:

```
public class Animal
{
   public void speak(String sound)
   {
    System.out.println("Animal says: " + sound);
   }
   public void speak(int volume)
   {
```

```
    System.out.println("Animal speaks at volume " + volume);
   }
}
```

```
Animal a = new Animal();
a.speak("Roar");
```

What will be the result of executing the following code?

(A) "Animal says: Roar"
(B) "Animal speaks at volume Roar"
(C) Compile-time error
(D) Run-time error
(E) No output

Answer Explanations - practice test 1

1. Code Segment Output:

```
int a = 10;
double b = 10.7;
double c = a + b;
int d = a + c;
System.out.println(c + " " + d);
```

Answer: (C) 20.7 30
Explanation: The result of c is a double, and when concatenated with d in the println statement, both values are converted to strings.

2. Value of i after int i = x % 50;:
Answer: (E) 50
Explanation: The remainder (%) operator ensures that i will always be less than 50.

3. Purpose of 'this' keyword:
Answer: (D) It refers to the current instance of the class.
Explanation: 'this' is used to refer to the current instance variable when there is a naming conflict with the parameters.

4. Purpose of 'extends' keyword:
Answer: (D) It indicates inheritance.
Explanation: 'extends' is used to establish an inheritance relationship between classes.

5. Result of comparing two strings using '==':
Answer: (B) false

Explanation: '==' compares references, and since the strings are created using the 'new' keyword, they are different objects.

6. Value of 'result' after the code execution:
Answer: (A) true
Explanation: The expression evaluates to (true && !false) || (false && !true), which is equivalent to (true || false).

7. Output of the code with a 'while' loop:
Answer: (A) 0 1 2
Explanation: The loop prints values until i becomes 3, and then it breaks.

8. Value of 'result' in a boolean expression:
Answer: (B) false
Explanation: The expression evaluates to (a > b) && (b < c) || (a == b), and since (a > b) is false, the overall result is false.

9. Output of the GradeCalculator code:
Answer: (B) Grade: B
Explanation: The score is 85, falls in the 'B' range.

10. Value of 'result' in the TemperatureConverter code:
Answer: (B) Temperature in Fahrenheit: 77.0
Explanation: Since 25 is not less than -273.15, it will go into the else statement and be evaluated to 77.0 (9.0 / 5.0 * celsius + 32)

11. Output of the code with a 'for' loop:
Answer: (B) 5
Explanation: Since a value is printed only if its remainder is equal to 0, the answer is 5.

12. Result of a boolean expression with '&&' and '||':

Answer: (A) true if at least one of the variables is true.
Explanation: The expression (a && b) || c evaluates to true if at least one of the conditions (a && b) or c is true. The && operator represents logical AND, and the || operator represents logical OR.

13. Length of the array "values":
Answer: (B) 15
Explanation: The length of the array is the length of the string "Hello, World!" plus 2.

14. Code for the specified output:
Answer: (A) Correct code segment.
Explanation: The code uses nested loops to produce the specified output.

15. Advantages of OOP for a video game project:
Answer: (E) I, II, III
Explanation: All of the options are advantages of OOP.

16. Result of the final assignment in the code segment:
Answer: (E) Nothing will be printed due to a compile-time error.
Explanation: The final assignment to arr1 violates the final keyword, leading to a compile-time error.

17. Correct code for swapping values in an array:
Answer: (C) int tmp = data[4]; data[4] = data[0]; data[0] = tmp;
Explanation: This code segment correctly swaps values between data[0] and data[4].

18. Description of the draw method in the Circle class:
Answer: (B) An overridden method
Explanation: The Circle class provides its own implementation for the draw method from the Shape class.

19. Code segment to correctly print 'Drawing a circle':
Answer: (B) Circle c = new Circle(); c.draw();
Explanation: The correct object type is used to invoke the draw method.

20. Output of the code with Animal, Cat, and Dog classes:
Answer: (B) "Meow"
Explanation: The last makeSound method called is from the Cat class, not the Dog class. Despite the reference variable being of type Animal, it refers to an instance of Cat due to polymorphism. During runtime, the overridden makeSound() method in the Cat class is invoked, resulting in the output "Meow."

21. Result of the recursive method call mystery(5):
Answer: (C) 15
Explanation: The method adds numbers from 1 to 5.

22. Correct initialization of a 2D array:
Answer: (B) int matrix[][] = new int[3][4];
Explanation: This correctly creates a 2D array with 3 rows and 4 columns.

23. Output of the ArrayList code segment:
Answer: (C) [Cherry, Elderberry, Date]
Explanation: The code adds, sets, and removes elements in the ArrayList.

24. Correct code for fine calculation based on speed:
Answer: (A) I only
Explanation: This code correctly calculates the fine based on speed.

25. True statement after a 'while' loop:
Answer: (A) $p > q \,||\, q < r$

Explanation: Because there are no modifications to the variables inside the loop, it creates an infinite loop. Therefore, the correct answer is (A)

26. Output of the ArrayList code segment:
Answer: (C) [5, 12, 20]
Explanation: The code adds, sets, and removes elements in the ArrayList.

27. Output of the ArrayList code segment:
Answer: (C) [5, 5]
Explanation: The code adds, sets, and removes elements in the ArrayList.

28. Code snippet to retrieve a value from a 2D array:
Answer: (C) int value = grid[i][j];
Explanation: This correctly retrieves the value at row i and column j.

29. Output of the code with a 2D array:
Answer: (C) 1 2 3 4 5 6
Explanation: The nested loops print each element in the 2D array.

30. Result of the method call display(5) in class Test:
Answer: (A) "int"
Explanation: The method with the int parameter is called.

31. Value of 'x' after the code execution:
Answer: (C) 42
Explanation: The code increments 'x' for each iteration of the loops.

32. Result of the code segment with int operations:
Answer: (A) 1
Explanation: The initial value of 'a' (20) is divided by 4, and then the remainder when divided by 3 is calculated. After that, 'a' is decremented by 1, and the final value (1) is printed. Therefore, the correct answer is (A) 1.

33. Result of the code segment with an array and loop:
Answer: (B) 40 40 50 50
Explanation: The code initializes an array data with values {70, 40, 50, 80}. The first loop iterates through each element in the array. If an element is greater than 60, it subtracts 30 from that element. After the first loop, the array becomes {40, 40, 50, 50}. The second loop prints each element of the modified array.

34. Output of the code with a 2D array:
Answer: (A) 1 2 3 4 5 6 7
Explanation: The code initializes a 2D array matrix with different lengths for its inner arrays: {{1, 2}, {3, 4, 5}, {6, 7}}. The nested loops iterate through each element in the 2D array and print them. The outer loop iterates through the three inner arrays, and the inner loop iterates through the elements of each inner array. The elements are printed in the order they appear in the array.

35. Number of digits in the result of mystery(12345):
Answer: (E) 5
Explanation: The recursive method counts the digits in the number.

36. Description of the last line in the given code:
Answer: (A) "The following will be printed: 'A car vehicle is created. Cars are a popular mode of transportation.'"
Explanation: The constructor of the Car class invokes the superclass constructor (Vehicle) using super("car"), which prints "A car vehicle is created." Then, the Car constructor prints "Cars are a popular mode of transportation."

37. Best design option for representing student information:
Answer: (A) Use one class, Student, with data fields: String name, int age, int grade.
Explanation: A single class with relevant data fields is suitable for representing a student.

38. Code segment modifying variables a and b based on a conditional statement:
Answer: (B) a = 17, b = 8\
Explanation: The given code segment uses an if-else statement to modify the values of variables a and b based on specific conditions.

39. Output of the code segment with a loop on array 'names':
Answer: (D) Frank Eve Charlie David Bob Alice
Explanation: The loop swaps elements in the 'names' array.

40. Result of executing the Animal speak method with different parameter types:
Answer: (A) "Animal says: Roar"
Explanation: a.speak will use the speak method of the Animal class.

Practice Test 2

AP Computer Science A Exam - practice test 2

Section 1: Multiple-Choice Questions

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO.

At a glance
Total Time 1 hour 30 minutes **Number of Questions** 40 **Percent of Total Score** 50% **Writing Instrument** Pencil Required

Instructions

Section I of this examination contains 40 multiple-choice questions. Fill in only the ovals for numbers 1 through 40 on your answer sheet.

Indicate all of your answers to the multiple-choice questions on the answer sheet. No credit will be given for anything written in this exam booklet, but you may use the booklet for notes or scratch work. After you have decided which of the suggested answers is best, completely fill in the corresponding oval on the answer sheet. Give only one answer to each question. If you change an answer, be sure that the previous mark is erased completely. Here is a sample question and answer.

Sample Questions

Chicago is a

(A) state
(B) city
(C) country
(D) continent
(E) country

Sample Answers

Use your time effectively, working as quickly as you can without losing accuracy. Do not spend too much time on any one question. Go on to other questions and come back to the ones you have not answered if you have time. It is not expected that everyone will know the answers to all the multiple-choice questions.

About Guessing

Many candidates wonder whether or not to guess the answers to questions about which they are not certain. Multiple-choice scores are based on the number of questions answered correctly. Points are not deducted for incorrect answers, and no points are awarded for unanswered questions. Because points are not deducted for incorrect answers, you are encouraged to answer all multiple-choice questions. On any questions you do not know the answer to, you should eliminate as many choices as you can, and then select the best answer among the remaining choices.

COMPUTER SCIENCE A

SECTION I

TIME—-1 hour and 30 minutes

Number of Questions—-40

Percent of total exam grade—-50%

Directions: Determine the answer to each of the following questions or incomplete statements, using the available space for any necessary scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet. No credit will be given for anything written in the examination booklet. Do not spend too much time on any one problem.

Notes:

- Assume that the classes listed in the Quick Reference have been imported where appropriate.
- Assume that declarations of variables and methods appear within the context of an enclosing class.
- Assume that method calls that are not prefixed with an object or class name and are not shown within a complete class definition appear within the context of an enclosing class.
- Unless otherwise noted in the question, assume that parameters in the method calls are not null and that methods are called only when their preconditions are satisfied.

1. Consider the following class:

```
public class Printer {
     public void print(Object obj) {
          System.out.println("Object: " + obj.toString());
     }
     public void print(String str) {
          System.out.println("String: " + str);
     }
}

Printer p = new Printer();
Object tmp = new String("Hello");
p.print(tmp);
```

What will be the result of executing the code?

(A) "Object: Hello"
(B) "String: Hello"
(C) Compile-time error
(D) Run-time error
(E) No output

2. Consider the code snippet:

```
int x = 25;
x = x / 5;
x = x % 4;
x++;
System.out.println(x);
```

What is printed as a result of executing the code segment above?

(A) 2
(B) 4
(C) 5
(D) 3
(E) 11

3. The call to initializeData(data) initializes the array data as follows:

```
int[][] data = new int[3][3];
initializeData(data);
```

1 2 3
4 5 6
7 8 9

What is the value of sum after the loop?

```
int sum = 0;
for (int i = 0; i < data.length; i++) {
    sum += data[i][i] * data[i][data[i].length - i - 1];
}
```

(A) 91
(B) 27
(C) 36
(D) 63
(E) 72

4. Consider the following code segment:

```
int x = 5, y = 10;
if (!(x == 5) || y > 15)
  x *= 2;
else
  y -= 3;
```

What values are stored in variables x and y after the execution of the code?

(A) x = 5, y = 7
(B) x = 10, y = 7

(C) x = 5, y = 10
(D) x = 10, y = 10
(E) x = 5, y = 13

5. Consider the following code snippet:

```
String text = "Hello, World!";
int length = text.length();
```

Which of the following statements is true about the value of the length variable?

(A) length will be 12.
(B) length will be 11.
(C) length will be 13.
(D) length will be 0.
(E) length will be null.

6. Given the code snippet:

```
String message = "AP Computer Science A";
String subMessage = message.substring(3, 12);
```

What will be the value of the subMessage variable?

(A) "Computer"
(B) "Computer "
(C) " Computer"
(D) "Compute"
(E) "AP Compute"

7. Which of the following represents the current values in the array?

```
int[][] numbers = {{1, 2, 3, 4},
                   {5, 6, 7, 8},
                   {9, 10, 11, 12}};

for (int r = 0; r < numbers.length - 1; r++) {
    for (int c = 0; c < numbers[r].length; c++) {
      numbers[r + 1][c] = numbers[r][c];
    }
}
```

(A) 1 2 3 4 1 2 3 4 9 10 11 12
(B) 9 10 11 12 5 6 7 8 1 2 3 4
(C) 1 2 3 4 1 2 3 4 1 2 3 4
(D) 9 10 11 12 9 10 11 12 9 10 11 12
(E) 4 3 2 1 8 7 6 5 12 11 10 9

8. Consider the following class declarations:

```
public class Shape
{
   protected int sides;
   public Shape(int numSides)
   {
      sides = numSides;
   }
   public int getSides( )
   {
      return sides;
   }
}
```

```
public class Triangle extends Shape
{
   public Triangle( )
   {
      super(3);
   }
}
```

You are developing a program to represent various shapes. Which of the following code segments will cause a compilation error?

(A) Shape s1 = new Triangle();
(B) Triangle t1 = new Triangle();
(C) Shape s2 = new Shape(4);
(D) Triangle t2 = new Shape();
(E) int numSides = s2.getSides();

9. What is the result of the following expression for String: "Java" + 5?

(A) "Java5"
(B) "5Java"
(C) "Java" + "5"
(D) "Java5" (as an integer)
(E) "Java" (as a string)

10. Consider the following recursive method:

```
public int mystery(int a, int b) {

  if (b == 0)
    return a;
  else
    return mystery(b, a % b);

}
```

What is the result of the call `mystery`(48, 18)?

(A) 3
(B) 6
(C) 9
(D) 12
(E) 24

11. Given the method:

```
public void removeEven(ArrayList<Integer> nums) {
     int i = 0;
     while (i < nums.size()) {
         if (nums.get(i) % 2 == 0) {
             nums.remove(i);
         } else {
             i++;
         }
     }
 }
```

If the ArrayList nums contains the values [1, 2, 3, 4, 5, 6, 7, 8], what will nums contain after executing the removeEven method?

(A) [1, 3, 5, 7]
(B) [2, 4, 6, 8]
(C) [1, 3, 5, 7, 2, 4, 6, 8]
(D) [1, 5, 3, 7]
(E) [1, 3, 5, 7, 8]

12. The following class, Matrix, is meant to represent a 2-dimensional array object. The constructor will initialize Matrix using the number of rows and columns that have been passed. Choose the statement that will initialize the array in the constructor.

```
public class Matrix {
   private int[][] data;

   Matrix(int rows, int columns) {
      /* missing code */
 }
}
```

(A) int[] data = new int[rows][columns];
(B) int[][] data = new int[rows - 1][columns - 1];
(C) data = new int[rows][columns];
(D) data = new int[rows - 1][columns - 1];
(E) int data[][] = new int[rows][columns];

13. Given the code segment:

```
String[] words = {"Alpha", "Beta", "Gamma", "Delta",
"Epsilon"};
int middle = words.length / 2;

for (int w = 0; w < middle; w++) {
     String swap = words[w];
     words[w] = words[words.length - w - 1];
     words[words.length - w - 1] = swap;
}
for (String word : words) {
     System.out.print(word + " ");
}
```

What is printed as a result of executing the code segment?

(A) Alpha Beta Gamma Delta Epsilon
(B) Alpha Gamma Beta Delta Epsilon
(C) Epsilon Delta Gamma Beta Alpha
(D) Epsilon Beta Gamma Delta Alpha
(E) Epsilon Beta Gamma Delta Epsilon

14. After executing the following code segment, what is the value of "value"?

```
final int[] numbers = {11, 12, 13};
numbers[2] = 14;
int value = numbers[2];
```

(A) 11
(B) 12
(C) 13
(D) 14
(E) Nothing will be printed due to a compile-time error.

15. Consider the code segment:

```
boolean[] flags1 = {true, false, true};
boolean[] flags2 = {false, true, false};
flags1 = flags2;
System.out.print(flags1[0]);
```

What is printed as a result of executing the code segment?

(A) true
(B) false
(C) Nothing will be printed due to a compile-time error.
(D) Nothing will be printed due to a run-time error.
(E) Nothing will be printed due to an array index out of bounds error.

16. What is the output of the following code segment?

```
for (int x = 1; x <= 4; x++) {
    for (int z = 0; z < x; z++) {
        System.out.print((x + z) + " ");
    }
    System.out.println();
}
```

(A)

```
1
2 3
3 4 5
4 5 6 7
```

(B)

```
 1
2 3
3 4 5
4 5 6 7
5 6 7 8
```

(C)

```
1
3 5
6 9 12
10 14 18 22
```

(D)

```
1
3 4
5 6 7
7 8 9 10
```

(E)

```
1
3 4
6 7 8
10 11 12 13
```

17. The speed limit of a stretch of highway is 65 miles per hour (mph). The highway patrol issues speeding tickets to anyone caught going faster than 65 miles per hour. The fine for speeding is based on the following scale:

- Greater than 65 mph but less than 75 mph: $120
- Greater than or equal to 75 mph but less than 85 mph: $180
- Greater than or equal to 85 mph: $300

If the value of the int variable speed is the speed of a driver who was pulled over for going faster than 65 mph, which of the following code segments will assign the correct value to the int variable fine?

I.

```
if (speed >= 85) fine = 300;
if (speed >= 75 && speed < 85) fine = 180;
if (speed > 65 && speed < 75) fine = 120;
```

II.

```
if (speed >= 85) fine = 300;
if (speed >= 75 and speed < 85) fine = 180;
if (speed > 65 && speed < 75) fine = 120;
if (speed < 65) fine = 0;
```

III.

```
if (65 < speed && speed < 75) fine = 120;
if (75 <= speed && speed < 85) fine = 180;
if (speed >= 85) fine = 300;
```

(A) I only
(B) II only
(C) III only

(D) `I and II`
(E) `I and III`

18. For boolean variables x, y, and z, what does the expression `x || (y && z)` evaluate to?

(A) true if either x is true or both y and z are true.
(B) true only if x is true.
(C) true only if y and z are both true.
(D) true if y is true, regardless of the value of x or z.
(E) false only if y and z are both false.

19. Consider the following code:

```
for (int i = 1; i <= 10; i++) {
    if (i % 2 == 0) {
        System.out.print(i + " ");
    }
}
```

What is the output of this code?

(A) 2 4 6 8 10
(B) 1 3 5 7 9
(C) 2 4 6 8
(D) 1 2 3 4 5 6 7 8 9 10
(E) Nothing is printed.

20. Consider the boolean expression: (p || q) && (!p || r). What is the simplified result of this expression?

(A) p || q
(B) p && r
(C) q || r
(D) p || r
(E) p && q

21. Consider the class Grid with the following constructor:

```
Grid(int rows, int columns) {
    grid = new char[rows][columns];
}
```

Which of the following correctly initializes a Grid object with 5 rows and 6 columns?

(A) Grid grid = new Grid(5, 6);
(B) Grid grid = new Grid(6, 5);
(C) Grid grid = new Grid(5, 5);
(D) Grid grid = new Grid(6, 6);
(E) Grid grid = new Grid();

22. Consider the class Table with the following constructor:

```
Table(int rows, int columns) {
     table = new double[rows][columns];
}
```

Which of the following correctly initializes a Table object with 4 rows and 3 columns?

(A) Table table = new Table(4, 3);
(B) Table table = new Table(3, 4);
(C) Table table = new Table(4, 4);
(D) Table table = new Table(3, 3);
(E) Table table = new Table();

23. Which of the following represents the current values in the array?

```
int[][] numbers = {{1, 2, 3, 4},
                   {5, 6, 7, 8},
                   {9, 10, 11, 12}};

for (int r = 0; r < numbers.length; r++) {
    for (int c = 0; c < numbers[r].length; c++) {
         numbers[r][c] = numbers[r][c] + 1;
    }
}
```

(A) 1 2 3 4 5 6 7 8 9 10 11 12
(B) 2 3 4 5 6 7 8 9 10 11 12 13
(C) 1 2 3 4 1 2 3 4 1 2 3 4
(D) 5 6 7 8 9 10 11 12 13 14 15 16
(E) 13 12 11 10 9 8 7 6 5 4 3 2

24. What is the value of total after the code has executed?

```
int[][] numbers = {{1, 2, 3}, {4, 5, 6}, {7, 8, 9}};

int total=0;
for (int r = 0; r < numbers.length; r++) {
    for (int c = 0; c < numbers[r].length; c++) {
         if (numbers[r][c] % 3 == 0) {
              total += numbers[r][c];
         }
     }
}
```

(A) 6
(B) 9
(C) 15
(D) 18
(E) 24

25. Consider the following class declarations:

```
public class Employee
{
   private String name;
   public Employee(String empName)
   {
      name = empName;
   }
   public String getName( )
   {
      return name;
   }
}

public class Manager extends Employee
```

```
{
   private double salary;
   public Manager(String empName, double empSalary)
   {
      super(empName);
      salary = empSalary;
   }
}
```

You are working on a project to represent different types of employees in a company. Which of the following code segments will cause a compilation error?

(A) Employee e1 = new Manager("John", 50000.0);
(B) Manager m1 = new Employee("Alice");
(C) Employee e2 = new Employee("Bob");
(D) Manager m2 = new Manager("Charlie", 60000.0);
(E) String managerName = m2.getName();

26. Consider the following classes.

```
public class Shape {
  public void draw() {
    System.out.println("Drawing a shape");
  }
}

public class Circle extends Shape {
  public void draw() {
    System.out.println("Drawing a circle");
  }
}
```

Which of the following code combinations will cause a compilation error?

(A) Shape s = new Shape();
(B) Shape t = new Circle();
(C) Circle u = new Circle();
(D) Circle v = new Shape();
(E) Shape w = new Circle();

27. Consider the following recursive method:

```
public static int mystery(int n) {
    if (n <= 1) {
      return 1;
    } else {
      return n * mystery(n - 1);
    }
}
```

What value is returned as a result of a call to mystery(5)?

(A) 1
(B) 5
(C) 20
(D) 120
(E) 720

28. Consider the following class:

```
public class Drawer
{
   public void draw(String shape)
   {
      System.out.println("Drawing shape: " + shape);
   }
   public void draw(int sides)
   {
      System.out.println("Drawing shape with " + sides + "
sides");
   }
}
```

```
Drawer d = new Drawer();
Object figure = "Circle";
d.draw(figure);
```

What will be the result of executing the following code?

(A) "Drawing shape: Circle"
(B) "Drawing shape with Circle sides"
(C) Compile-time error
(D) Run-time error
(E) No output

29. After the following code segment executes, what is the value of "value"?

```
final int[] nums1 = {7, 8, 9};
int[] nums2 = {10, 11, 12};
nums2 = nums1;
int value = nums2[1];
```

(A) 7
(B) 8
(C) 9
(D) 10
(E) Nothing will be printed due to a compile-time error.

30. Given the following code segment:

```
int[] values = {45, 63, 72, 55};
for (int v : values) {
     if (v < 60) {
        v += 10;
     }
}
for (int v : values) {
     System.out.print(v + " ");
}
```

What is printed as a result of executing the code segment?

(A) 45 63 72 55
(B) 45 63 72 65
(C) 55 73 82 65
(D) 55 73 82 75

(E) Nothing will be printed due to a compile-time error.

31. Given the code:

```
int x = 0;
for (int i = 0; i < 7; i++) {
    for (int j = 0; j <= 2; j++) {
        for (int k = 1; k <= 4; k = k * 4) {
          x++;
        }
    }
}
```

What is the value of x after the code segment executes?

(A) 21
(B) 30
(C) 42
(D) 56
(E) 63

32. Consider the code segment:

```
String[] fruits = {"Apple", "Banana", "Cherry", "Grapes",
"Kiwi"};
int middle = fruits.length / 2 - 1;
for (int f = 0; f < middle; f++) {
     String swap = fruits[f];
     fruits[f] = fruits[fruits.length - f - 1];
     fruits[fruits.length - f - 1] = swap;
}
for (String fruit : fruits) {
     System.out.print(fruit + " ");
}
```

What is printed as a result of executing the code segment?

(A) Apple Banana Cherry Grapes Kiwi
(B) Apple Cherry Banana Grapes Kiwi
(C) Kiwi Grapes Cherry Banana Apple
(D) Kiwi Banana Cherry Grapes Apple
(E) Kiwi Banana Cherry Grapes Kiwi

33. A store offers a discount on a customer's purchase based on the total purchase amount. The discount is calculated as follows:

- If the total purchase amount is greater than or equal to $100, the customer receives a 20% discount.
- If the total purchase amount is between $50 and $99 (inclusive), the customer receives a 10% discount.
- If the total purchase amount is less than $50, the customer receives no discount.
- If the double variable purchaseAmount represents the total purchase amount, which of the following code segments will assign the correct value to the double variable discountedAmount after applying the discount?

```
I. if (purchaseAmount >= 100) discountedAmount =
purchaseAmount * 0.8;

if (purchaseAmount >= 50 && purchaseAmount < 100)
discountedAmount = purchaseAmount * 0.9;

if (purchaseAmount < 50) discountedAmount = purchaseAmount;
```

```
II. if (purchaseAmount >= 100) discountedAmount =
purchaseAmount * 0.8;

if (purchaseAmount >= 50 && purchaseAmount < 100)
discountedAmount = purchaseAmount * 0.9;

if (purchaseAmount < 50) discountedAmount = purchaseAmount;

if (purchaseAmount < 0) discountedAmount = 0;
```

```
III. if (50 <= purchaseAmount && purchaseAmount < 100)
discountedAmount = purchaseAmount * 0.9;

if (purchaseAmount >= 100) discountedAmount = purchaseAmount
* 0.8;

if (purchaseAmount < 50) discountedAmount = purchaseAmount;
```

(A) I only
(B) II only
(C) III only
(D) I and II
(E) I and III

34. Given the code:

```
int x = 0;
for (int i = 0; i < 7; i++) {
     for (int j = 0; j <= 2; j++) {
          for (int k = 1; k <= 32; k = k * 2) {
               x++;
          }
     }
}
```

What is the value of x after the code segment executes?

(A) 112
(B) 126
(C) 144
(D) 160
(E) 176

35. Consider the following code:

```
int x = 5;
while (x > 0) {
     System.out.print(x + " ");
     x--;
}
```

What is the output of this code?

(A) 5 4 3 2 1
(B) 0 1 2 3 4 5
(C) 5 5 5 5 5 5
(D) 0 1 3 4 5 6
(E) 5 4 3 2 1 0

36. Consider the following code snippet:

```
int a = 3;
int b = 7;
boolean result = (a > b) && (b < a) || (a == b + 2) && (a % 2
== 0) || (b % 3 == 0);
```

What is the value of 'result'?

(A) true
(B) false
(C) It throws a runtime error.
(D) It depends on the initial values of a and b.

(E) It depends on the value of another variable.

37. Consider the following code snippet:

```
public class TaxCalculator {
  public static void main(String[] args) {
    double income = 45000;
    double tax = calculateTax(income);
    System.out.println("Tax to be paid: $" + tax);
  }

  static double calculateTax(double income) {
    double tax = 0;
    if (income > 50000) {
      tax = (income - 50000) * 0.2 + 10000;
    } else if (income > 30000) {
      tax = (income - 30000) * 0.15 + 5000;
    } else if (income > 10000) {
      tax = (income - 10000) * 0.1;
    }
    return tax;
  }
}
```

What is the output of the code?

(A) Tax to be paid: $6000.0
(B) Tax to be paid: $6550.0
(C) Tax to be paid: $6250.0
(D) Tax to be paid: $7000.0
(E) Tax to be paid: $7250.0

38. Consider the following code snippet:

```
public class LeapYearChecker {
  public static void main(String[] args) {
    int year = 2024;
    boolean result = isLeapYear(year);
    System.out.println("Leap year? " + result);
  }

  static boolean isLeapYear(int yr) {
    return (yr % 4 == 0 && yr % 100 != 0) || (yr % 400 == 0);
  }
}
```

What is the value of 'result'?

(A) Leap year? true
(B) Leap year? false
(C) Leap year? It throws a runtime error.
(D) Leap year? It depends on the initial value of year.
(E) Leap year? It depends on the value of another variable.

39. Which of the following is a valid way to concatenate two strings in Java?

(A) `str1.concat(str2);`
(B) `str1.join(str2);`
(C) `str1.append(str2);`
(D) `str1.add(str2);`
(E) `str1.combine(str2);`

40. Which of the following code snippets correctly initializes a 2D array and

fills it with sequential values starting from 1?

(A)

```
int[][] arr = new int[3][4];
for (int i = 1; i <= 3; i++) {
    for (int j = 1; j <= 4; j++) {
      arr[i][j] = i * j;
    }
}
```

(B)

```
int[][] arr = new int[3][4];
int value = 1;
for (int i = 0; i < 3; i++) {
    for (int j = 0; j < 4; j++) {
      arr[i][j] = value;
      value++;
    }
}
```

(C)

```
int[][] arr = new int[4][3];
for (int i = 0; i < 4; i++) {
    for (int j = 0; j < 3; j++) {
      arr[i][j] = i + j;
    }
}
```

(D)

```
int[][] arr = new int[3][4];
for (int i = 1; i <= 3; i++) {
    for (int j = 1; i <= 4; j++) {
      arr[i - 1][j - 1] = i * j;
    }
}
```

(E)

```
int[][] arr = new int[3][4];
for (int i = 1; i <= 3; i++) {
    for (int j = 1; j <= 4; j++) {
      arr[j][i] = i * j;
```

```
        }
    }
```

Answer Explanations - practice test 2

1. Result of Executing Code:

Answer: (B) "String: Hello"
Explanation: The reason is that when the print method is called with an Object argument, the toString method of the Object class is invoked. In this case, the tmp variable is of type String, so the toString method of the String class is called, resulting in the output "String: Hello." Therefore, option (B) is correct.

2. Result of Code Segment:

Answer: (A) 2
Explanation: The code calculates y as x / 5 (25 / 5 = 5) and z as x % 4 (25 % 4 = 1). Afterward, x is incremented by 1, resulting in the final value of x being 26. The System.out.println(x) statement prints this updated value of x, which is 26. Therefore, the correct answer is (A) 2.

3. Array Initialization:

Answer: (A) 91
Explanation: The array is initialized as a 3x3 array, and the sum is calculated using elements on the main diagonal and its opposite diagonal.

4. Printed Output from Code:

Answer: (A) x = 5, y = 7
Explanation: The condition in the if statement is false. Therefore, the else block is executed, and y is updated by subtracting 3, resulting in y = 7. The

value of x remains unchanged at 5. Thus, the correct answer is (A) x = 5, y = 7.

5. String Length Value:

Answer: (C) length will be 13.
Explanation: The length method returns the number of characters in the string, and "Hello, World!" has 13 characters.

6. Value of subMessage:

Answer: (A) "Computer"
Explanation: The substring method extracts a substring from the original string based on the provided indices (inclusive start, exclusive end).

7. Current Values in the Array:

Answer: (C) 1 2 3 4 1 2 3 4 1 2 3 4
Explanation: The nested loop shifts each row down by copying the values from the row above.

8. Invalid Class Instantiation:

Answer: (D) Triangle t2 = new Shape();
Explanation: This will cause a compilation error because you are trying to assign an instance of the superclass (Shape) to a reference of the subclass (Triangle) without using an explicit cast. The superclass cannot be automatically cast to a subclass.

9. Result of Expression "Java" + 5:

Answer: (A) "Java5"
Explanation: In Java, when you concatenate a string with a non-string, the non-string is automatically converted to a string.

10. Result of mystery(48, 18):

Answer: (B) 6
Explanation: The mystery method calculates the greatest common divisor using the Euclidean algorithm.

11. ArrayList After removeEven Method:

Answer: (A) [1, 3, 5, 7]
Explanation: The method removes even numbers from the ArrayList.

12. Matrix Constructor Initialization:

Answer: (C) data = new int[rows][columns];
Explanation: To initialize a 2D array in the constructor, you use the new keyword and specify the dimensions.

13. Result of Code Segment Swapping Elements:

Answer: (C) Epsilon Delta Gamma Beta Alpha
Explanation: The code swaps elements in the first half of the array with their corresponding elements in the second half.

14. Value After Array Modification:

Answer: (D) 14
Explanation: The array is modified, and the value of the element at index 2 is printed.

15. Value After Array Assignment:

Answer: (B) false

Explanation: The arrays are referenced to the same object, so changes to one array reflect in the other.

16. Output of Nested Loop:

Answer: (A)
Explanation: The nested loop prints values based on the sum of x and z.

17. Code for Speeding Ticket Fine:

Answer: (C) III only
Explanation: The first condition checks if the speed is greater than 65 and less than 75, assigning a fine of $120.
The second condition checks if the speed is greater than or equal to 75 and less than 85, assigning a fine of $180.
The third condition checks if the speed is greater than or equal to 85, assigning a fine of $300.
This set of conditions correctly covers the specified speed ranges and assigns the corresponding fines. The other code segments have issues such as redundant conditions or incorrect syntax.

18. Evaluation of Boolean Expression:

Answer: (A) true if either x is true or both y and z are true.
Explanation: The expression evaluates to true if at least one of the conditions is true.

19. Output of For Loop:

Answer: (A) 2 4 6 8 10
Explanation: The loop prints even numbers from 2 to 10.

20. Simplified Boolean Expression:

Answer: (D) p || r
Explanation: The expression can be simplified to the logical OR of p and r.

21. Grid Object Initialization:
Answer: (A) Grid grid = new Grid(5, 6);
Explanation: The provided constructor initializes a Grid object with the specified number of rows and columns.

22. Table Object Initialization:
Answer: (A) Table table = new Table(4, 3);
Explanation: The provided constructor initializes a Table object with the specified number of rows and columns.

23. Current Values in the Array After Modification:
Answer: (B) 2 3 4 5 6 7 8 9 10 11 12 13
Explanation: Each element in the array is incremented by 1.

24. Value of total After Code Execution:
Answer: (D) 18
Explanation: The total is incremented by the values that are multiples of 3 in the 2D array.

25. Invalid Class Instantiations with Inheritance:
Answer: (B) Manager m1 = new Employee("Alice");
Explanation: The instantiation is invalid for an Employee object.

26. Invalid Class Instantiations with Inheritance:
Answer: (D) Circle v = new Shape();
Explanation: Polymorphism allows an instance of a subclass to be assigned to a variable of the superclass type, but in this case, it requires an explicit cast. The given code attempts to assign an instance of the superclass (Shape) to a variable of the subclass type (Circle) without a cast, leading to a compilation error.

27. Result of mystery(5):

Answer: (D) 120

Explanation: The mystery method calculates the factorial of a number.

28. Output of Code Using Drawer Class:

Answer: (C) Compile-time error

Explanation: The draw method overloads with different parameter types, and there is no matching method for draw(Object).

29. Value After Array Reference Assignment:

Answer: (B) 8

Explanation: nums2 is assigned the reference of nums1, so modifications to nums2 affect nums1.

30. Output of Code Segment with Array Modification:

Answer: (A) 45 63 72 55

Explanation: The values less than 60 are incremented by 10.

31. Value of x After Code Execution:

Answer: (C) 42

Explanation: The nested loops modify the value of x.

32. Value After Code Execution:

Answer: (D) Kiwi Banana Cherry Grapes Apple

Explanation: The code initializes an array of fruits, swaps the first and last elements, and then prints the reversed array. The output is "Kiwi Grapes Cherry Banana Apple," so the correct answer is (C).

33. Conditional Statements:

Answer: (C) III only

Explanation: In segment III, the conditions are properly ordered to check for the discount based on the purchase amount.

First, it checks if the purchase amount is between $50 and $99 (inclusive) and applies a 10% discount.
Then, it checks if the purchase amount is greater than or equal to $100 and applies a 20% discount.
Lastly, if the purchase amount is less than $50, no discount is applied.
This arrangement ensures that only one discount is applied based on the given conditions. Options I and II have redundant checks and may apply more than one discount in certain cases. Therefore, the correct answer is (C) III only.

34. Result of Code with Nested Loop:

Answer: (B) 126
Explanation: The outer loop runs 7 times, the middle loop runs 3 times (0, 1, 2), and the inner loop runs 6 times (1, 2, 4, 8, 16, 32).

The total number of iterations is $7 \times 3 \times 6 = 126$.

35. While Loop:

Answer: (E) 5 4 3 2 1 0
Explanation: The loop starts with x equal to 5.
In the first iteration, it prints 5 and decrements x to 4.
In the second iteration, it prints 4 and decrements x to 3.
This process continues until x becomes 0, and it prints 0 in the last iteration.
The loop stops when x becomes less than or equal to 0.

36. Boolean Expression:

Answer: (B) false
Explanation: (a > b) && (b < a) is false.
(a == b + 2) && (a % 2 == 0) is false.

(b % 3 == 0) is false.
Now combining these with logical OR:

false || false || false evaluates to false.
Therefore, the correct value of result is: (B) false

37. Conditional Statement Evaluation:

Answer: (E) Tax to be paid: $7250.0
Explanation: The income is $45,000, which is greater than $30,000 but not greater than $50,000. Therefore, the second condition is true. The tax is calculated as

$(45,000-30,000)\times 0.15+5,000=15,000\times 0.15+5,000=2,250+5,000=7,250.$

38. Conditional Statement Evaluation:

Answer: (A) Leap year? true
Explanation: The conditions for a leap year are:

It is divisible by 4.
It is not divisible by 100, except when it is divisible by 400.
Let's check for the given year, 2024:

$2024\%4=0$ (divisible by 4)
$2024\%100\neq 0$ (not divisible by 100)
$2024\%400\neq 0$ (not divisible by 400)
Therefore, the conditions are satisfied, and the value of 'result' will be: (A) Leap year? true

39. String Maniulation:

Answer: (A) str1.concat(str2);

Explanation: The valid way to concatenate two strings in Java is using the concat method or the + operator. Among the options provided:

40. 2D Arrays:

Answer: (B)
Explanation: The code initializes a 2D array arr with dimensions 3x4.
It uses two nested loops to iterate through each element of the array.
The variable value is used to assign sequential values starting from 1 to each element.

Practice Test 3

AP Computer Science A Exam - practice test 3

Section 1: Multiple-Choice Questions

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO.

At a glance
Total Time 1 hour 30 minutes **Number of Questions** 40 **Percent of Total Score** 50% **Writing Instrument** Pencil Required

Instructions

Section I of this examination contains 40 multiple-choice questions. Fill in only the ovals for numbers 1 through 40 on your answer sheet.

Indicate all of your answers to the multiple-choice questions on the answer sheet. No credit will be given for anything written in this exam booklet, but you may use the booklet for notes or scratch work. After you have decided which of the suggested answers is best, completely fill in the corresponding oval on the answer sheet. Give only one answer to each question. If you change an answer, be sure that the previous mark is erased completely. Here is a sample question and answer.

Sample Questions

Chicago is a

(A) state
(B) city
(C) country
(D) continent
(E) country

Sample Answers

Use your time effectively, working as quickly as you can without losing accuracy. Do not spend too much time on any one question. Go on to other questions and come back to the ones you have not answered if you have time. It is not expected that everyone will know the answers to all the multiple-choice questions.

About Guessing

Many candidates wonder whether or not to guess the answers to questions about which they are not certain. Multiple-choice scores are based on the number of questions answered correctly. Points are not deducted for incorrect answers, and no points are awarded for unanswered questions. Because points are not deducted for incorrect answers, you are encouraged to answer all multiple-choice questions. On any questions you do not know the answer to, you should eliminate as many choices as you can, and then select the best answer among the remaining choices.

COMPUTER SCIENCE A

SECTION I

TIME—-1 hour and 30 minutes

Number of Questions—-40

Percent of total exam grade—-50%

Directions: Determine the answer to each of the following questions or incomplete statements, using the available space for any necessary scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet. No credit will be given for anything written in the examination booklet. Do not spend too much time on any one problem.

Notes:

- Assume that the classes listed in the Quick Reference have been imported where appropriate.
- Assume that declarations of variables and methods appear within the context of an enclosing class.
- Assume that method calls that are not prefixed with an object or class name and are not shown within a complete class definition appear within the context of an enclosing class.
- Unless otherwise noted in the question, assume that parameters in the method calls are not null and that methods are called only when their preconditions are satisfied.

1. Given the following 2D array:

```
int[][] grid = {
    {1, 2, 3},
    {4, 5, 6},
    {7, 8, 9}
};
```

What is the value of grid[1][2]?

(A) 2
(B) 5
(C) 6
(D) 4
(E) 8

2. You want to create a 2D array of integers named matrix with n rows and m columns in Java. Which of the following code snippets correctly initializes and declares this array in the constructor of a class?

(A) `int[][] matrix = new int[n][m];`
(B) `int[][] matrix = new int[m][n];`
(C) `matrix = new int[n][m];`
(D) `matrix = new int[m][n];`
(E) `int matrix[][] = an int[n][m];`

3. Consider the following code snippet:

```
public class DivisibilityChecker {
  public static void main(String[] args) {
    int number = 45;
    String result = checkDivisibility(number);
    System.out.println("Divisibility result: " + result);
  }

  static String checkDivisibility(int num) {
    if (num % 5 == 0 && num % 9 == 0) {
      return "Divisible by both 5 and 9";
    } else if (num % 5 == 0) {
      return "Divisible by 5";
    } else if (num % 9 == 0) {
      return "Divisible by 9";
    } else {
      return "Not divisible by 5 or 9";
    }
  }
}
```

What is the output of the code?

(A) Divisibility result: Divisible by both 5 and 9
(B) Divisibility result: Divisible by 5
(C) Divisibility result: Divisible by 9
(D) Divisibility result: Not divisible by 5 or 9
(E) Divisibility result: It throws a runtime error.

4. Consider the following code snippet:

```
int total = 0;
for (int i = 1; i <= 10; i++) {
  total += i;
  if (total > 15) {
    break;
  }
}
```

What is the value of 'total'?

(A) 15
(B) 21
(C) 28
(D) 36
(E) 55

5. Can a superclass have more than one subclass?

(A) Yes, a superclass can have multiple subclasses.
(B) No, a superclass can have only one subclass.
(C) It depends on the programming language.
(D) Yes, but each subclass must be unrelated to the others.
(E) No, a superclass cannot have any subclasses.

6. Consider the following classes.

```
public class Parent {
  public void printMessage() {
    System.out.println("Parent class");
  }
```

```
}

public class Child extends Parent {
  public void printMessage() {
    System.out.println("Child class");
  }
}

public class Main {
  public static void main(String[] args) {
    Parent obj = new Child();
    obj.printMessage();
  }
}
```

What will be the output of the following code?

(A) Parent class
(B) Child class
(C) Compilation error
(D) Runtime error
(E) No output

7. Consider the following classes.

```
public class Parent {
  protected int x;
  public Parent(int value) {
    x = value;
  }
}

public class Child extends Parent {
  private int y;
  public Child(int value1, int value2) {
```

```
    super(value1);
    y = value2;
  }
}
```

What is the purpose of the 'super()' call in the 'Child' class constructor?

(A) It initializes the 'x' variable in the 'Child' class.
(B) It initializes the 'y' variable in the 'Child' class.
(C) It creates a new instance of the 'Parent' class.
(D) It initializes both 'x' and 'y' variables in the 'Child' class.
(E) It causes a compilation error.

8. What is printed as a result of executing the code segment?

```
int a = 15;
int b = 4;
double x = 15.0;
double y = 4.0;
System.out.print(a % b);
System.out.print(", ");
System.out.print(x % y);
System.out.print(", ");
System.out.print(a % y);
```

(A) 3, 3.0, 3.0
(B) 3, 3.75, 3.75
(C) 4, 3.75, 4
(D) 4, 3.75, 3.75
(E) Nothing will be printed because of a compile-time error.

9. Given the code snippet:

```
String word = "abcdefg";
String mystery = "";
for (int i = word.length() - 1; i >= 0; i--) {
    mystery += word.charAt(i);
}
```

What is the value of the mystery variable after the loop?

(A) "gfedcba"
(B) "abcdefg"
(C) "cba"
(D) "gfe"
(E) "a"

10. Consider the following class:

```
public class Messenger
{
   public void send(String message)
   {
      System.out.println("Sending message: " + message);
   }
   public void send(int recipientId)
   {
      System.out.println("Sending message to recipient: " +
recipientId);
   }
}
```

```
Messenger m = new Messenger();
String msg = "Hello, World!";
m.send(msg);
```

What will be the result of executing the following code?

(A) "Sending message: Hello, World!"
(B) "Sending message to recipient: Hello, World!"
(C) Compile-time error
(D) Run-time error
(E) No output

11. Consider the following classes:

```
public class Animal {
  public void eat() {
    System.out.println("Animal is eating");
  }
}

public class Cat extends Animal {
  public void meow() {
    System.out.println("Meow");
  }
}
```

What is the relationship between 'Cat' and 'Animal' classes?

(A) 'Cat' is a superclass of 'Animal'.
(B) 'Cat' is a subclass of 'Animal'.
(C) 'Cat' and 'Animal' are unrelated classes.
(D) Both 'Cat' and 'Animal' are superclasses of each other.
(E) 'Cat' and 'Animal' are instances of the same class.

12. Consider the following recursive method:

```
 public static int mystery(int n) {
    if (n <= 1) {
      return n;
    } else {
      return mystery(n - 1) + mystery(n - 2);
    }
}
```

What value is returned as a result of a call to mystery(6)?

(A) 3
(B) 5
(C) 8
(D) 13
(E) 21

13. Given the code:

```
for (int x = 1; x <= 4; x++) {
    for (int z = 0; z <= x; z++) {
        System.out.print((x + z) + " ");
    }
    System.out.println();
}
```

What is the output of this code?

(A)

```
1 2
2 3 4
3 4 5 6
4 5 6 7 8
```

(B)

```
 1
2 3
3 4 5
4 5 6 7
5 6 7 8
```

(C)

```
1
3 5
6 9 12
10 14 18 22
```

(D)

```
1
3 4
5 6 7
7 8 9 10
```

(E)

```
1
3  4
6  7  8

10  11  12  13
```

14. A store offers a discount on a customer's purchase based on the total purchase amount. The discount is calculated as follows:

- If the total purchase amount is greater than or equal to $200, the customer receives a 15% discount.
- If the total purchase amount is between $100 and $199 (inclusive), the customer receives a 10% discount.
- If the total purchase amount is less than $100, the customer receives no discount.
- If the double variable purchaseAmount represents the total purchase amount, which of the following code segments will assign the correct value to the double variable discountedAmount after applying the discount?

```
I. if (purchaseAmount >= 200) discountedAmount =
purchaseAmount * 0.85;

if (purchaseAmount >= 100 && purchaseAmount < 200)
discountedAmount = purchaseAmount * 0.9;

if (purchaseAmount < 100) discountedAmount = purchaseAmount;

II. if (purchaseAmount >= 200) discountedAmount =
purchaseAmount * 0.85;

if (purchaseAmount >= 100 && purchaseAmount < 200)
discountedAmount = purchaseAmount * 0.9;
```

```
if (purchaseAmount < 100) discountedAmount = purchaseAmount;

if (purchaseAmount < 0) discountedAmount = 0;
```

```
III. if (100 <= purchaseAmount && purchaseAmount < 200)
discountedAmount = purchaseAmount * 0.9;

if (purchaseAmount >= 200) discountedAmount = purchaseAmount
* 0.85;

if (purchaseAmount < 100) discountedAmount = purchaseAmount;
```

(A) I only
(B) II only
(C) III only
(D) I and II
(E) I and III

15. Given the statement: boolean p = (a && b) || !(a || b);, when is the value of p true?

(A) Only when a is different than the value of b
(B) Only when a is the same as the value of b
(C) Only when a and b are both true
(D) Only when a and b are both false
(E) The value of p will be true for all values of a and b.

16. Consider the code segment:

```
String[] items = {"Shirt", "Jeans", "Hat", "Socks", "Shoes"};
int middle = items.length / 2 - 1;
```

```
for (int i = 0; i < middle; i++) {
     String temp = items[i];
     items[i] = items[items.length - i - 1];
     items[items.length - i - 1] = temp;
}
for (String item : items) {
     System.out.print(item + " ");
}
```

What is printed as a result of executing the code segment?

(A) Shirt Jeans Hat Socks Shoes
(B) Shirt Hat Jeans Socks Shoes
(C) Shoes Socks Hat Jeans Shirt
(D) Shoes Jeans Hat Socks Shirt
(E) Shoes Jeans Hat Socks Shoes

17. What is the result of executing the following code?

```
int[] array = new int[5];
System.out.println(array[3]);
```

(A) 0
(B) 3
(C) 5
(D) null
(E) Compilation error

18. Consider the following code segment:

```
String[] s = new String[2];
```

```
String[] t = {"Michael", "Megan", "Chelsea"};
s = t;
System.out.print(s.length);
```

What is printed as a result of executing the code segment?
(A) 1
(B) 2
(C) 3
(D) Nothing will be printed due to a compile-time error.
(E) Nothing will be printed due to a run-time error.

19. What is the output of the following code snippet?

```
String[] fruits = {"Apple", "Banana", "Orange"};
Arrays.sort(fruits);
for (String fruit : fruits) {
  System.out.print(fruit + " ");
}
```

(A) Apple Banana Orange
(B) Apple Orange Banana
(C) Banana Apple Orange
(D) Banana Orange Apple
(E) Compilation error

20. Consider the following classes.

```
public class Animal {
  public void eat() {
    System.out.println("Animal is eating");
  }
}

public class Cat extends Animal {
  public void meow() {
    System.out.println("Meow");
  }
}
```

What is the relationship between 'Cat' and 'Animal' classes?

(A) 'Cat' is a superclass of 'Animal'.
(B) 'Cat' is a subclass of 'Animal'.
(C) 'Cat' and 'Animal' are unrelated classes.
(D) Both 'Cat' and 'Animal' are superclasses of each other.
(E) 'Cat' and 'Animal' are instances of the same class.

21. How many classes can a given class extend?

(A) None
(B) 1
(C) 2
(D) 3
(E) As many as it needs to

22. Consider the following classes:

```
public class Employee {
  // class details
}

public class Manager extends Employee {
  // class details
}
```

Which of the following code combinations will NOT cause a compilation error?

(A) Employee emp1 = new Employee();
(B) Employee emp2 = new Employee("Jones", "Sales");
(C) Employee emp3 = new Manager("Jones", "Sales", 50000.0);
(D) Employee emp4 = new Manager(50000.0);
(E) Manager emp5 = new Employee("Jones", "Sales");

23. What will be printed to the console?

```
double x = 10.5;
double y = 2.0;
int z = (int) (x / y);
System.out.println(z);
```

(A) 5
(B) 5.0
(C) 5.0f
(D) 2.5
(E) Nothing will be printed because of a compile-time error.

24. Consider the following code:

```
String text = "Java Programming";
int index = text.indexOf("Class");
```

What will be the value of the index variable?

(A) -1
(B) 0
(C) 1
(D) 2
(E) 7

25. Given the following code, what is the final value stored in result?

```
String original = "programming";
String result = original.substring(5, 3);
```

(A) "p"
(B) "gr"
(C) "ra"
(D) An IndexOutOfBoundsException will occur.
(E) "og"

26. Given the code segment:

```
int x = 0;
for (int i = 0; i < 5; i++) {
    for (int j = 0; j <= 2; j++) {
        for (int k = 1; k <= 8; k = k * 2) {
         x++;
```

```
            }
        }
}
```

What is the value of x after the code segment executes?

(A) 12
(B) 16
(C) 20
(D) 24
(E) 60

27. Which of the following represents the current values in the array?

```
int[][] numbers = {{1, 2, 3, 4}, {5, 6, 7, 8}, {9, 10, 11,
12}};


for (int r = 0; r < numbers.length - 1; r++) {
    for (int c = 0; c < numbers[r].length - 1; c++) {
      numbers[r][c] = numbers[r + 1][c + 1];
    }
}
```

(A) 6 7 8 4 10 11 12
(B) 1 2 3 4 5 6 7 8 9
(C) 1 2 3 4 1 2 3 4 1
(D) 5 6 7 8 9 10 11 12
(E) 12 11 10 9 8 7 6

28.Consider the following code segment:

```
int[][] numbers = {{4, 3, 2}, {1, 6, 5}};
for (int[] nums : numbers)
    for (int n : nums)
        System.out.print(n + " "); System.out.print("\n");
```

What is printed as a result of executing the code segment?

(A) 4 3 2 1 6 5
(B) 4 3 2 1 4 6 5
(C) 4 3 2 165
(D) 146532
(E) A compiler error would occur.

29. Given the code segment:

```
ArrayList items = new ArrayList<>();
items.add("Shirt");
items.add("Jeans");
items.add("Hat");
items.add("Socks");
items.set(2, "Shoes");
items.remove(1);
System.out.println(items);
```

What is printed as a result of executing the code segment?

(A) [Shirt, Jeans, Hat, Socks, Shoes]
(B) [Shirt, Shoes, Socks]
(C) [Shirt, Shoes, Hat]
(D) [Shirt, Hat, Shoes]
(E) [Shirt, Hat, Shoes]

30. Consider the following code snippet:

```
public class ProfitCalculator {

  public static void main(String[] args) {
    double costPrice = 120.0;
    double sellingPrice = 150.0;
    String profitStatus = calculateProfitStatus(costPrice,
sellingPrice);
    System.out.println("Profit status: " + profitStatus);
  }

  static String calculateProfitStatus(double cost, double
selling) {
    double profit = selling - cost;
```

```
    if (profit > 0) {
      return "Profit of $" + profit;
    } else if (profit < 0) {
      return "Loss of $" + (-profit);
    } else {
      return "No profit, no loss.";
    }
  }
}
```

What is the output of the code?

(A) Profit status: Profit of $30.0
(B) Profit status: Loss of $30.0
(C) Profit status: No profit, no loss.
(D) Profit status: It throws a runtime error.
(E) Profit status: It depends on the initial values of costPrice and sellingPrice.

31. Consider the following code segment:

```
int count = 0;
for (int i = 1; i <= 5; i++) {
  if (i % 2 == 0) {
    count++;
  } else {
    continue;
  }
}
System.out.println(count);
```

What is the output of the code?
(A) 1
(B) 2
(C) 3

(D) 4
(E) 5

32. Consider the following code snippet:

```
int x = 7;
int y = 12;
boolean result = (x > 5 && y < 10) || (x < 10 && y > 15);
```

What is the value of 'result'?

(A) true
(B) false
(C) It throws a runtime error.
(D) It depends on the initial values of x and y.
(E) It depends on the value of another variable.

33. In the following code segment:

```
int b = 0;
for (int i = 0; i < 8; i++) {
    for (int j = 0; j <= 4; j++) {
        for (int k = 1; k <= 32; k = k * 2) {
          b++;
        }
    }
}
```

What is the value of b after the code segment executes?

(A) 64
(B) 80
(C) 96
(D) 112
(E) 240

34. Given the code:

```
int a = 18;
a = a / 6;
a = a % 5;
a--;
System.out.println(a);
```

What is printed as a result of executing the code segment above?

(A) 1
(B) 2
(C) 4

(D) 8
(E) 7

35. What is the purpose of an ordered list in a binary search?

Explain the significance of having an ordered list in a binary search.

(A) It ensures a faster sequential search
(B) It allows for random access to elements
(C) It prevents duplicate elements
(D) It enables more efficient searching
(E) It simplifies the insertion sort process

36. Consider the following class:

```
public class Sample {
  public void writeMe(Object obj) {
    System.out.println("object");
  }
  public void writeMe(String s) {
    System.out.println("string");
  }
}

Sample s = new Sample();
Object tmp = new String("hi");
s.writeMe(tmp);
```

What will be the result of executing the following?

(A) Compile-time error
(B) "hi"

(C) "object"
(D) "string"
(E) Run-time error

37. Consider the following code snippet:

```
int[] numbers = {1, 2, 3, 4, 5};
int total = 0;
for (int num : numbers) {
  if (num % 2 == 0) {
    total += num;
  }
}
```

What is the value of 'total'?

(A) 6
(B) 9
(C) 10
(D) 11
(E) 15

38. Consider the following code snippet:

```
int i = 0;
do {
  System.out.print(i + " ");
  i += 2;
} while (i < 10);
```

What is the output of the code?

(A) 0 2 4 6 8 10
(B) 0 2 4 6 8
(C) 2 4 6 8 10
(D) 2 4 6 8
(E) It causes an infinite loop.

39. Consider the following recursive method:

```
public static int mystery(int[] arr, int n) {
  if (n == 0) {
    return 0;
  } else if (arr[n - 1] % 2 == 0) {
    return 1 + mystery(arr, n - 1);
  } else {
    return mystery(arr, n - 1);
  }
}
```

What value is returned as a result of a call to `countEven(new int[]{2, 3, 4, 5, 6}, 5)`?

(A) 1
(B) 2
(C) 3
(D) 4
(E) 5

40. The call to initializeValues(values) initializes the array values as follows:

```
int[][] values = new int[4][4];
initializeValues(values);
```

1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 16

```
int total = 0;
for (int i = 0; i < values.length; i++) {
   total += values[i][i] + values[values[i].length - 1 -
i][i];
}
```

(A) 26
(B) 34
(C) 48
(D) 66
(E) 68

Answer Explanations - practice test 3

1. Value of grid[1][2]:

Answer: (C) 6
Explanation: The indices represent the row and column in the 2D array. So, grid[1][2] refers to the element in the second row and third column, which is 6.

2. 2D Array Initialization:

Answer: (A) int[][] matrix = new int[n][m];
Explanation: This initializes a 2D array with n rows and m columns.

3. Output of DivisibilityChecker Code:

Answer: (A) Divisibility result: Divisible by both 5 and 9
Explanation: The checkDivisibility method checks divisibility and returns the corresponding string.

4. Value of total after Loop:

Answer: (B) 21
Explanation: The loop adds values from 1 to 6 until the total exceeds 15.

5. Superclass and Subclass Relationship:

Answer: (A) Yes, a superclass can have multiple subclasses.
Explanation: Inheritance allows a superclass to have multiple subclasses.

6. Output of Polymorphic Code:

Answer: (B) Child class
Explanation: The printMessage method of the Child class is invoked due to polymorphism.

7. Purpose of super() in Child Class Constructor:

Answer: (C) It creates a new instance of the 'Parent' class.
Explanation: The super(value1) initializes the 'x' variable in the 'Parent' class.

8. Output of Code Segment with Modulo Operations:

Answer: (A) 3, 3.0, 3.0
Explanation: Modulo operations result in the remainders.

9. Reversing a String:

Answer: (A) "gfedcba"
Explanation: The loop iterates over the characters of the string in reverse order.

10. Result of Messenger Code:

Answer: (A) "Sending message: Hello, World!"
Explanation: The send(String message) method is called with a String object.

11. Relationship Between Animal and Cat Classes:

Answer: (B) 'Cat' is a subclass of 'Animal'.
Explanation: Inheritance relationship where 'Cat' inherits from 'Animal'.

12. Result of mystery(6):

Answer: (C) 8
Explanation: The recursive Fibonacci method calculates the value for n=6.

13. Output of Nested Loop:

Answer: (A)
Explanation: The nested loops print values based on the sum of x and z.

14. Discount Calculation Code:

Answer: (C) III only
Explanation: III correctly implements the discount logic according to the specified conditions. It uses else if to avoid unnecessary checks once a condition is met.

15. When is the value of p true?

Answer: (A) Only when a is different than the value of b
Explanation: The condition a != b is equivalent to a being different from the value of b.

16. Reversing Array Elements Code:

Answer: (D) Shoes Jeans Hat Socks Shirt
Explanation: The loop reverses the order of elements in the array.

17. Accessing Array Element Value:

Answer: (A) 0

Explanation: Arrays are zero-indexed, so array[3] represents the fourth element, which is initialized to 0.

18. Array Reference Assignment Code:

Answer: (C) 3
Explanation: The reference assignment (s = t;) makes s refer to the same array as t.

19. Sorting and Printing Array:

Answer: (A) Apple Banana Orange
Explanation: The array is sorted alphabetically, and then each element is printed.

20. Relationship Between Animal and Cat Classes:

Answer: (B) 'Cat' is a subclass of 'Animal'.
Explanation: Inheritance relationship where 'Cat' inherits from 'Animal'.

21. Number of Classes a Given Class Can Extend:

Answer: (B) 1
Explanation: In Java, a class can extend only one class (single inheritance).

22. Valid Class Instantiations:

Answer: (A) Employee emp1 = new Employee();
Explanation: Employee object instantiation is valid in option (A).

23. Printed Value from Modulo Operations:

Answer: (A) 5
Explanation: Modulo operations result in the remainders.

24. Value of index in String IndexOf:

Answer: (A) -1
Explanation: The indexOf method returns -1 if the specified substring is not found.

25. Value of result in Substring Operation:

Answer: (D) An IndexOutOfBoundsException will occur.
Explanation: The end index is less than the start index, causing an exception.

26. Value of x after Nested Loop:

Answer: (E) 60
Explanation: The nested loops increment x based on the conditions.

27. Array Modification in Nested Loop:

Answer: (A) 6 7 8 4 10 11 12
Explanation: The array is modified with values from the next row and column.

28. Output of 2D Array Print Loop:

Answer: (A) 4 3 2 1 6 5
Explanation: The loop prints each element of the 2D array.

29. ArrayList Operations Code:

Answer: (B) [Shirt, Shoes, Socks]
Explanation: Operations include setting, removing, and printing elements in an ArrayList.

30. Output of ProfitCalculator Code:

Answer: (A) Profit status: Profit of $30.0
Explanation: The calculateProfitStatus method computes the profit status based on cost and selling prices.

31. Output of Loop Code with Even Numbers:

Answer: (B) 2
Explanation: The loop increments the count only when the number is even.

32. Value of result in Logical Expression:

Answer: (B) false
Explanation: The expression evaluates to false since at least one of the conditions is false.

33. Value of b after Nested Loop:

Answer: (E) 240
Explanation: The nested loops increment b based on the conditions.

34. Value of a after operations:

Answer: (B) 2

35. Purpose of an Ordered List in Binary Search:

Answer: (D) It enables more efficient searching.
Explanation: Binary search relies on the order to efficiently locate elements.

36. Overloaded Method Invocation Code:

Answer: (C) "object"
Explanation: Overloaded method resolution is based on the most specific parameter type.

37. Total of Even Numbers in Array Code:

Answer: (A) 6
Explanation: The loop adds even numbers from the array to the total.

38. Output of do-while Loop Code:

Answer: (B) 0 2 4 6 8
Explanation: The loop prints even numbers from 0 to 8.

39. Counting Even Numbers in Array Code:

Answer: (C) 3
Explanation: The recursive method counts the even numbers in the array.

40. Sum of Diagonal Elements in 2D Array Code:

Answer: (E) 68

Explanation: The loop calculates the sum of diagonal elements in a 2D array.

Practice Test 4

AP Computer Science A Exam - practice test 4

Section 1: Multiple-Choice Questions

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO.

At a glance
Total Time 1 hour 30 minutes **Number of Questions** 40 **Percent of Total Score** 50% **Writing Instrument** Pencil Required

Instructions

Section I of this examination contains 40 multiple-choice questions. Fill in only the ovals for numbers 1 through 40 on your answer sheet.

Indicate all of your answers to the multiple-choice questions on the answer sheet. No credit will be given for anything written in this exam booklet, but you may use the booklet for notes or scratch work. After you have decided which of the suggested answers is best, completely fill in the corresponding oval on the answer sheet. Give only one answer to each question. If you change an answer, be sure that the previous mark is erased completely. Here is a sample question and answer.

Sample Questions

Chicago is a

(A) state
(B) city
(C) country
(D) continent
(E) country

Sample Answers

Use your time effectively, working as quickly as you can without losing accuracy. Do not spend too much time on any one question. Go on to other questions and come back to the ones you have not answered if you have time. It is not expected that everyone will know the answers to all the multiple-choice questions.

About Guessing

Many candidates wonder whether or not to guess the answers to questions about which they are not certain. Multiple-choice scores are based on the number of questions answered correctly. Points are not deducted for incorrect answers, and no points are awarded for unanswered questions. Because points are not deducted for incorrect answers, you are encouraged to answer all multiple-choice questions. On any questions you do not know the answer to, you should eliminate as many choices as you can, and then select the best answer among the remaining choices.

COMPUTER SCIENCE A

SECTION I

TIME—-1 hour and 30 minutes

Number of Questions—-40

Percent of total exam grade—-50%

Directions: Determine the answer to each of the following questions or incomplete statements, using the available space for any necessary scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet. No credit will be given for anything written in the examination booklet. Do not spend too much time on any one problem.

Notes:

- Assume that the classes listed in the Quick Reference have been imported where appropriate.
- Assume that declarations of variables and methods appear within the context of an enclosing class.
- Assume that method calls that are not prefixed with an object or class name and are not shown within a complete class definition appear within the context of an enclosing class.
- Unless otherwise noted in the question, assume that parameters in the method calls are not null and that methods are called only when their preconditions are satisfied.

1.Which of the following is the correct way to declare and initialize a double variable with the value 3.14 in Java?

(A) double pi = 3.14;
(B) double pi = 3.14f;
(C) double pi = (double) 3.14;
(D) pi = 3.14;
(E) double pi = "3.14";

2. What will be printed to the console?

```
int a = 3;
double b = 1.5;
double c = a % b;
int d = a % b;
System.out.println(c + " " + d);
```

(A) 1.5 1
(B) 1.0 1
(C) 0.5 0
(D) 1.5 0
(E) Nothing will be printed because of a compile error.

3. Given the array declaration: String[] names = new String[3]; What is the initial value of each element in the array?

```
String[] names = new String[3];
```

(A) null
(B) 0
(C) ''
(D) 'undefined'
(E) 'empty'

4. What is the output of the following code snippet?

```
int[] arr = {1, 2, 3, 4, 5};
for (int i = 0; i < arr.length; i++) {
    System.out.print(arr[i] + " ");
}
```

(A) 1 2 3 4 5
(B) 5 4 3 2 1
(C) 1 3 5 7 9
(D) 9 7 5 3 1
(E) Compilation error

5. Consider the following classes:

```
public class A {
  protected int x;
  public A(int value) {
    x = value;
```

```
  }
}

public class B extends A {
  private int y;
  public B(int value1, int value2) {
    super(value1);
    y = value2;
  }
}
```

What is the purpose of the 'super()' call in the 'B' class constructor?

(A) It initializes the 'x' variable in class 'A'.
(B) It initializes the 'y' variable in class 'B'.
(C) It invokes the default constructor of class 'A'.
(D) It is not necessary, and its removal won't affect the code.
(E) It causes a compilation error.

6. Consider the following code segment:

```
int u = 15, v = 7;
if (u >= 10 && v <= 5)
   u -= 8;
else
   v += 3;
```

What values are stored in variables u and v after the execution of the code?
(A) u = 15, v = 7
(B) u = 7, v = 7
(C) u = 15, v = 10
(D) u = 7, v = 10

(E) u = 7, v = 10

7. The call to initializeMatrix(matrix) initializes the array matrix as follows:

```
int[][] matrix = new int[4][5];
initializeMatrix(matrix);
```

2 4 6 8 10
1 3 5 7 9
11 13 15 17 19
12 14 16 18 20

```
int sum = 0;
for (int row = 0; row < matrix.length; row++) {
   for (int col = 0; col < matrix[0].length; col += 3) {
      sum += matrix[row][col];
   }
}
```

(A) 36
(B) 42
(C) 40
(D) 66
(E) 76

8. What is the value of total after the code has executed?

```
int[][] numbers = {{1, 2}, {3, 4}, {5, 6}};
int total = 0;
for (int r = 0; r < numbers.length; r++) {
    for (int i = 0; i < numbers[i].length; i++) {
        total += numbers[r][i];
    }
}
```

(A) 0
(B) 6
(C) 10
(D) 15
(E) 21

9. In a 2D integer array in Java, what is the correct way to access the element at row 2, column 3?
(A) array[2][3]
(B) array[3][2]
(C) array[1][2]
(D) array[2][1]
(E) array[3][4]

10. Consider the following class declarations:

```
public class Shape {
    public void draw() {
        System.out.println("Drawing a shape");
    }
}

public class Circle extends Shape {
    public void draw() {
        System.out.println("Drawing a circle");
    }
}
```

Which of the following code segments will cause a compilation error?

(A)
```
Shape s1 = new Circle();
s1.draw();
```

(B)
```
Circle c1 = new Shape();
c1.draw();
```

(C)
```
Shape s2 = new Shape();
s2.draw();
```

(D)
```
Circle c2 = new Circle();
c2.draw();
```

(E)
```
Shape s3 = new Circle();
((Circle) s3).draw();
```

11. You are developing a program for a library to manage books, where each book has a title, author, and publication year. Which design option is the most appropriate for this scenario?

(A) Use three unrelated classes: Title, Author, and Year, each with their respective data fields.
(B) Use one class, Library, with three subclasses: Title, Author, and Year.
(C) Use one class, Book, with data fields: String title, String author, int year.
(D) Use three classes—Title, Author, and Year—each with a subclass Library.
(E) Use four classes: Book, Title, Author, and Year, with Book containing instances of the other classes as attributes.

12. Given the code snippet:

```
String word = "abcdefgh";
String part1 = word.substring(0, 4);
String part2 = word.substring(4, 8);
```

What will be the value of the part1 and part2 variables?

(A) part1 will be "abcd" and part2 will be "efgh".
(B) part1 will be "abcdefgh" and part2 will be an empty string.
(C) part1 will be "abce" and part2 will be "dfgh".
(D) part1 will be "ab" and part2 will be "cd".
(E) part1 will be "ab" and part2 will be "cdefgh".

13. In Java, what is the result of comparing two strings using the compareTo method?

(A) It compares the contents of the strings in a case-insensitive manner.
(B) It compares the references of the strings.
(C) It compares the contents of the strings in a case-sensitive manner.
(D) It returns true if the lengths of the strings are equal.
(E) It throws a compile-time error.

14. Given the code below, what will be the final value stored in result?

```
String text = "programming";
int index = text.indexOf("gram");
String result = text.substring(index, index + 4);
```

(A) `"gram"`
(B) `"gramm"`
(C) `"gramm"`
(D) `"ammi"`
(E) `An exception will be thrown.`

15. Consider the code segment:

```
ArrayList numbers = new ArrayList<>();
numbers.add(1);
numbers.add(2);
numbers.add(0, 3);
numbers.add(4);
numbers.set(2, 5);
numbers.remove(1);
```

```
System.out.println(numbers);
```

What is printed as a result of executing the code segment?

(A) [1, 2, 3, 4]
(B) [1, 3, 5, 4]
(C) [3, 5, 4]
(D) [1, 5, 4]
(E) [1, 3, 4, 5]

16. Given the method:

```
public static void removeSmaller(ArrayList<Integer> nums, int
threshold) {
    int i = 0;
    while (i < nums.size()) {
        if (nums.get(i) < threshold) {
            nums.remove(i);
        } else {
            i++;
        }
    }
}
```

If the ArrayList nums contains the values [3, 7, 1, 5, 2, 8, 4], and threshold is 4, what will nums contain after executing the removeSmaller method?

(A) [7, 5, 8]
(B) [3, 1, 2, 4]
(C) [3, 7, 1, 5, 2, 8, 4]
(D) [7, 5, 8, 4]
(E) []

17. Consider the following nonrecursive method:

```
public static int sumOfSquares(int n) {
  int sum = 0;
  for (int i = 1; i <= n; i++) {
    sum += i * i;
  }
    return sum;
  }
```

Which of the following recursive methods are equivalent to the method above?

```
I. public static int recursiveSumOfSquares(int n) {
      if (n == 0) {
        return 0;
      } else {
        return n * n + recursiveSumOfSquares(n - 1);
      }
    }

II. public static int recursiveSumOfSquares2(int n) {
      if (n == 0) {
         return 0;
      } else {
         return n * n + recursiveSumOfSquares2(n - 1);
      }
   }

III. public static int recursiveSumOfSquares3(int n, int
sum) {
       if (n == 0) {
```

```
            return sum;
          } else {
            return recursiveSumOfSquares3(n - 1, sum + n *
n);
          }
        }
```

(A) I only
(B) II only
(C) III only
(D) I and II only
(E) I, II, and III

18. In the following code segment:

```
int b = 0;
for (int i = 0; i < 8; i++) {
   for (int j = 0; j <= 4; j++) {
      for (int k = 1; k <= 32; k = k * 2) {
         b++;
      }
   }
}
```

What is the value of b after the code segment executes?

(A) 960
(B) 480
(C) 240

(D) 144
(E) 160

19. Given the code:

```
int p = 15;
double q = 2.8;
int r = 3;
int x = (int) (p + q);
double y = (double) p / r;
double z = (double) (p / r);
double w = x + y + z;
System.out.println(w);
```

What is printed as a result of evaluating the code above?

(A) 27.0
(B) 27.5
(C) 28.0
(D) 28.5
(E) 29.0

20. Given the following code segment:

```
String[] words = {"Apple", "Banana", "Cherry", "Date"};
int middle = words.length / 2;

for (int x = 0; x < middle; x++) {
     String temp = words[x];
     words[x] = words[words.length - x - 1];
     words[words.length - x - 1] = temp;
}
for (String word : words) {
     System.out.print(word + " ");
}
```

What is printed as a result of executing the code segment?

(A) Apple Banana Cherry Date
(B) Apple Cherry Banana Date
(C) Date Cherry Banana Apple
(D) Date Banana Cherry Apple
(E) Date Banana Cherry Date

21. What is the result of the following code snippet?

```
int[] arr = {1, 2, 3, 4, 5};
int sum = 0;
for (int num : arr) {
     sum += num;
}

System.out.println(sum);
```

(A) 15

(B) 10
(C) 25
(D) 5
(E) Compilation error

22. Consider the array declaration.

```
int[] nums = new int[5];
```

What is the default value for each element in the array?

(A) 0
(B) 1
(C) null
(D) -1
(E) 'undefined'

23. Consider the following code snippet:

```
for (int i = 1; i <= 5; i++) {
  for (int j = 5; j >= i; j--) {
    System.out.print(j + " ");
  }
  System.out.println();
}
```

What is the output of the code?

(A) 5 4 3 2 1

5 4 3 2
5 4 3
5 4
5

(B) 1 2 3 4 5
1 2 3 4
1 2 3
1 2
1

(C) 4 3 2 1 0
4 3 2 1
4 3 2
4 3
4

(D) 1 1 1 1 1
1 1 1 1
1 1 1
1 1
1

(E) It causes an infinite loop.

24. Consider the following code snippet:

```
public class BonusCalculator {
  public static void main(String[] args) {
    int sales = 120000;
    int yearsWorked = 3;
    double result = calculateBonus(sales, yearsWorked);
    System.out.println("Bonus amount: $" + result);
  }

  static double calculateBonus(int sales, int years) {
    double bonus = 0;
```

```
    if (sales > 100000) {
      if (years >= 5) {
        bonus = 0.1 * sales;
      } else {
        bonus = 0.07 * sales;
      }
    } else {
      bonus = 0.05 * sales;
    }
    return bonus;
  }
}
```

What is the value of 'result'?

(A) Bonus amount: $5000.0
(B) Bonus amount: $8000.0
(C) Bonus amount: $8400.0
(D) Bonus amount: $8600.0
(E) Bonus amount: $8800.0

25. Consider the following code segment:

```
int x = 10;
int y = 3;
boolean b = true;
for (int i = 0; i < 15; i += 5) {
  x = x + y;
  b = (x % y == 2);
  if (!b) {
    y++;
    i += 5;
  }
}
```

What is the value of x after the code segment executes?

(A) 10
(B) 15
(C) 17
(D) 22
(E) 25

26. Consider the following code snippet:

```
public class GradeAllocator {
  public static void main(String[] args) {
    int marks = 88;
    String grade = allocateGrade(marks);
    System.out.println("Grade: " + grade);
  }

  static String allocateGrade(int score) {
    if (score >= 90) {
```

```
      return "A";
    } else if (score >= 80) {
      return "B";
    } else if (score >= 70) {
      return "C";
    } else if (score >= 60) {
      return "D";
    } else {
      return "F";
    }
  }
}
```

What is the output of the code?

(A) Grade: A
(B) Grade: B
(C) Grade: C
(D) Grade: D
(E) Grade: F

27. Consider the following code snippet:

```
int n = 10;
int sum = 0;
while (n >= 0) {
    sum += n;
    n--;
}
System.out.println(sum);
```

What is the output of this code?

(A) 10
(B) 15
(C) 45
(D) 55
(E) 0

28. When assessing the design of a program, what does it mean if clients know how data is stored in a class?

(A) It signifies a well-designed program as it enhances data accessibility.
(B) It is a sign of poor design as it exposes the implementation details to clients.
(C) It ensures that data is securely stored within the class.
(D) It simplifies the testing of the class.
(E) It allows for easy modification of the data storage structure.

29. Which of the following code snippets correctly initializes a 2D array and fills it with sequential values starting from 1?

(A)
```
int[][] arr = new int[3][4];
for (int i = 1; i <= 3; i++) {
    for (int j = 1; j <= 4; j++) {
      arr[i][j] = i * j;
    }
}
```
(B)
```
int[][] arr = new int[3][4];
int value = 1;
for (int i = 0; i < 3; i++) {
    for (int j = 0; j < 4; j++) {
      arr[i][j] = value;
      value++;
    }
}
```
(C)
```
int[][] arr = new int[4][3];
for (int i = 0; i < 4; i++) {
    for (int j = 0; j < 3; j++) {
      arr[i][j] = i + j;
    }
}
```
(D)
```
int[][] arr = new int[3][4];
for (int i = 1; i <= 3; i++) {
    for (int j = 1; i <= 4; j++) {
      arr[i - 1][j - 1] = i * j;
    }
}
```
(E)
```
int[][] arr = new int[3][4];
```

```
for (int i = 1; i <= 3; i++) {
    for (int j = 1; j <= 4; j++) {
      arr[j][i] = i * j;
    }

}
```

30. Consider the following code snippet:

```
public class NumberClassifier {
  public static void main(String[] args) {
    int number = 27;
    String result = classifyNumber(number);
    System.out.println(result);
  }

  static String classifyNumber(int num) {
    if (num % 2 == 0) {
      return "Even";
    } else {
      if (isPrime(num)) {
        return "Odd Prime";
      } else {
        return "Odd Composite";
      }
    }
  }

  static boolean isPrime(int n) {
    for (int i = 2; i <= Math.sqrt(n); i++) {
      if (n % i == 0) {
        return false;
      }
    }
    return true;
  }
```

```
}
```

What is the value of 'result'?

(A) Even
(B) Odd Prime
(C) Odd Composite
(D) Prime
(E) Composite

31. Consider the following code snippet:

```
public class RectangleChecker {
  public static void main(String[] args) {
    int width = 5, height = 10;
    boolean result = isRectangle(width, height);
    System.out.println("Is rectangle? " + result);
  }

  static boolean isRectangle(int w, int h) {
    return w > 0 && h > 0 && w != h;
  }
}
```

What is the value of 'result'?

(A) Is rectangle? true
(B) Is rectangle? false
(C) Is rectangle? It throws a runtime error.
(D) Is rectangle? It depends on the initial values of width and height.
(E) Is rectangle? It depends on the value of another variable.

For questions 32–33, consider the following classes:

```
public class Bread {
  public String toString() {
    return "Freshly baked bread smells good";
  }
}

public class Pastry extends Bread {
  public String toString() {
    return "Baking pastry is an art";
  }
}

public class Croissant extends Pastry {
  public String toString() {
    return "Croissants taste buttery";
  }
}
```

If a client program executes the following statement:

```
Croissant c = new Croissant();
System.out.println(c.toString());
```

32. Which of the following represents the resulting output?

(A) Freshly baked bread smells good
(B) Croissants taste buttery
(C) Croissants taste buttery Freshly baked bread smells good
(D) Freshly baked bread smells good Baking pastry is an art Croissants taste buttery

(E) Croissants taste buttery Baking pastry is an art Freshly baked bread smells good

33. If a client program executes the following statements:

```
Bread b  = new Pastry();
System.out.println(b);
```

Which of the following is true about the last line of code?

(A) The following will be printed: “Baking pastry is an art”
(B) The following will be printed: “Freshly baked bread smells good”
(C) An error will occur because name can be referenced only in Bread class.
(D) An error will occur because there is no toString() method in the Croissant class.
(E) None of the above are true.

34. Consider the following recursive method to compute exponentiation:

```
public int mystery(int base, int exponent) {
  if (exponent == 0) {
    return 1;
  } else {
    return base * mystery(base, exponent - 1);
  }
}
```

What is the value of power(2, 3)?

(A) 2
(B) 4

(C) 6
(D) 8
(E) 16

35. Consider the code snippet:

```
int p = 22;
double q = 2.4;
int r = 5;
int x = (int) (p + q);
double y = (double) p / r;
double z = (double) (p / r);
double w = x + y + z;
System.out.println(w);
```

What is printed as a result of evaluating the code above?

(A) 31
(B) 31.4
(C) 32
(D) 32.4
(E) 33

36. Which of the following code segments will run without error?

I.

```
int a = 15;
int b = 30;
int c = 0;
if (a < b && 10 < b/c) {
    System.out.println("Marge");
} else {
   System.out.println("Lisa");
}
```

II.

```
int x = 10;
int y = 20;
int z = 0;

if (x > y && 10 < y/z)
    System.out.println("Homer");
else
    System.out.println("Bart");
```

III.

```
int p = 25;
int q = 35;
int r = 5;

if (p > q || 10 < q/r)
     System.out.println("Maggie");
else
     System.out.println("Bart");
```

(A) I only
(B) II only
(C) III only

(D) II and III
(E) I, II, and III

37. The speed limit of a stretch of highway is 55 miles per hour (mph). Which of the following code segments correctly assigns the fine based on the speed?

```
I. if (speed >= 75) fine = 300;
   if (speed >= 65 && speed < 75) fine = 150;
   if (speed > 55 && speed < 65) fine = 100;
   if (speed >= 75) fine = 300;

II. if (65 <= speed < 75) fine = 150;
    if (55 < speed < 65) fine = 100;
    if (speed >= 75) fine = 300;
    if (speed >= 65) fine = 150;
    if (speed > 55) fine = 100;

III. if (speed >= 75) fine = 300;
     if (speed >= 65) fine = 150;
     if (speed > 55) fine = 100;
```

(A) I only
(B) II only
(C) III only
(D) I and II
(E) I and III

38. In the following statement, a and b are boolean variables:

```
boolean c = (a && b) || !(a || b);
```

Under what conditions will the value of c be true?

(A) Only when the value of a is different than the value of b
(B) Only when the value of a is the same as the value of b
(C) Only when a and b are both true
(D) Only when a and b are both false
(E) The value of c will be true for all values of a and b.

39. Consider the following code segment:

```
int result = 0;
for (int i = 1; i <= 5; i++) {
  result += i * i;
}

result *= 2;
```

What is the value of 'result' after the code is executed?

(A) 55
(B) 110
(C) 165
(D) 220
(E) 275

40. Consider the following code segment:

```
int x = 10;

while (x > 0) {
  System.out.print(x + " ");
  x -= 3;
}

System.out.println();
```

What is the output of the code segment?

(A) 10 7 4 1
(B) 10 7 4 1 -2
(C) 10 7 4 1 -2 -5
(D) 10 7 4 1 -2 -5 -8
(E) Compilation error

Answer Explanations - practice test 4

1. Correct way to declare and initialize a double variable:

Answer: (A) double pi = 3.14;
Explanation: Option (A) correctly declares and initializes a double variable with the value 3.14.

2. Output of the code with int and double:

Answer: (E) Nothing will be printed because of a compile error.
Explanation: The result of the integer division (a % b) is a double, which cannot be assigned to a int variable.

3. Initial value of elements in the array:

Answer: (A) null
Explanation: In Java, the default initial value for elements in an array of reference types (like String) is null.

4. Output of the array print loop:

Answer: (A) 1 2 3 4 5
Explanation: The loop prints each element of the array arr in order.

5. Purpose of 'super()' call in class B constructor:

Answer: (C) It invokes the default constructor of class 'A'.
Explanation: The super() call in the constructor of class 'B' invokes the default constructor of class 'A', ensuring that any initialization code in 'A' is executed before the constructor code in 'B'.

6. Conditional Statements:

Answer: (C) u = 15, v = 10

7. Output of initializeMatrix and sum calculation:

Answer: (E) 76
Explanation: The initializeMatrix method initializes the matrix, and the sum is calculated based on specific conditions.

8. Value of 'total' after execution:

Answer: (E) 21
Explanation: The loop iterates through the diagonal elements of the 2D array and adds them to 'total'.

9. Correct way to access element at row 2, column 3:

Answer: (A) array[2][3]
Explanation: Arrays are zero-indexed, so to access row 2, column 3, it is (A) array[2][3].

10. Code segments causing compilation error:

Answer: (B) Circle c1 = new Shape(); c1.draw();
Explanation: The declared type of c1 is Circle, but it is assigned a new Shape object, causing a compilation error.

11. Appropriate design option for managing books:

Answer: (C) Use one class, Book, with data fields: String title, String author, int year.
Explanation: The Book class with attributes for title, author, and year is appropriate for managing books.

12. Value of 'part1' and 'part2' after substring operations:

Answer: (A) part1 will be "abcd" and part2 will be "efgh".
Explanation: The substring method extracts portions of the original string based on the specified indices.

13. Result of comparing two strings using compareTo:

Answer: (C) It compares the contents of the strings in a case-sensitive manner.
Explanation: compareTo compares strings.

14. Final value stored in 'result' after substring operation:

Answer: (A) `"gram"`
Explanation: The substring operation extracts a portion of the original string based on the specified indices.

15. Output of ArrayList operations:

Answer: (C) [3, 5, 4]
Explanation: The code demonstrates various ArrayList operations, resulting in the given output.

16. Result of ArrayList modification using removeSmaller method:

Answer: (D) [7, 5, 8, 4]

Explanation: The removeSmaller method removes elements less than the threshold, resulting in the updated ArrayList.

17. Equivalent recursive methods for sumOfSquares:

Answer: (E) I, II, and III
Explanation: All three recursive methods correctly compute the sum of squares.

18. Value of 'b' after nested loops:

Answer: (C) 240
Explanation: The nested loops increment 'b' based on specific conditions.

19. Result of evaluating arithmetic expressions:

Answer: (A) 27.0
Explanation: The code involves various arithmetic operations, resulting in the calculated value of 'w'.

20. Output of reversing elements in the array:

Answer: (C) Date Cherry Banana Apple
Explanation: The code segment swaps elements of the array, resulting in the specified output.

21. Result of summing elements in the array:

Answer: (A) 15
Explanation: The loop iterates through the array and adds each element to the 'sum'.

22. Default value for elements in an int array:

Answer: (A) 0
Explanation: In Java, the default initial value for elements in an array of primitive types (like int) is 0.

23. Output of nested loop with decreasing values:

Answer: (A)
Explanation: The nested loop prints decreasing values from 5 to 1.

24. Value of 'result' in BonusCalculator code:

Answer: (C) Bonus amount: $8400.0
Explanation: The code calculates the bonus based on sales and years worked.

25. Value of 'x' after loop execution:

Answer: (C) 17
Explanation: The loop iterates and modifies 'x' based on specific conditions.

26. Output of GradeAllocator code:

Answer: (B) Grade: B
Explanation: The code assigns a grade based on the marks provided.

27. Output of while loop with decreasing values:

Answer: (D) 55
Explanation: The while loop calculates the sum of decreasing values from 10 to 0.

28. Meaning of clients knowing how data is stored in a class:

Answer: (B) It is a sign of poor design as it exposes the implementation details to clients.
Explanation: Encapsulation is violated if clients know and rely on the internal representation of data.

29. Correct way to initialize and fill a 2D array:

Answer: ((B)

```
int[][] arr = new int[3][4];
int value = 1;
for (int i = 0; i < 3; i++) {
    for (int j = 0; j < 4; j++) {
      arr[i][j] = value;
      value++;
    }
}
```

Explanation: The code initializes a 2D array and fills it with sequential values starting from 1.

30. Value of 'result' in NumberClassifier code:

Answer: (C) Odd Composite
Explanation: The code classifies a number as 'Odd Composite' based on the provided conditions.

31. Value of 'result' in RectangleChecker code:

Answer: (A) Is rectangle? true
Explanation: The method checks if the provided width and height represent a rectangle.

32. Resulting output of Croissant instantiation:

Answer: (B) Croissants taste buttery
Explanation: The Croissant class extends Pastry, which in turn extends Bread, and each class prints a message.

33. Result of printing Croissant object:

Answer: (A) The following will be printed: “Baking pastry is an art”
Explanation: The default toString() method of the Pastry class is called.

34. Value of mytery(2, 3)' in recursive exponentiation:

Answer: (D) 8
Explanation: The recursive method correctly computes 2^3, resulting in 8.

35. Result of evaluating arithmetic expressions:

Answer: (D) 32.4
Explanation: The code involves various arithmetic operations, resulting in the calculated value of 'w'.

36. Correctly running code segments:

Answer: (D) II and III
Explanation: Segment II and III are correctly written and won't cause compilation errors.

37. Correct representation of fine assignment based on speed:

Answer: (C) III only
Explanation: Option III correctly assigns fines based on specific speed ranges.

38. Conditions for 'c' to be true in a boolean expression:

Answer: (D) Only when a and b are both false
Explanation: The expression evaluates to true only when both a and b are false.

39. Value of 'result' after loop and multiplication:

Answer: (B) 110
Explanation: The loop calculates the sum of squares, and the result is multiplied by 2.

40. Output of while loop with decreasing values:

Answer: (A) 10 7 4 1
Explanation: The while loop prints decreasing values of 'x' until it becomes less than or equal to 0.

Practice Test 5

AP Computer Science A Exam - practice test 4

Section 1: Multiple-Choice Questions

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO.

At a glance
Total Time 1 hour 30 minutes **Number of Questions** 40 **Percent of Total Score** 50% **Writing Instrument** Pencil Required

Instructions

Section I of this examination contains 40 multiple-choice questions. Fill in only the ovals for numbers 1 through 40 on your answer sheet.

Indicate all of your answers to the multiple-choice questions on the answer sheet. No credit will be given for anything written in this exam booklet, but you may use the booklet for notes or scratch work. After you have decided which of the suggested answers is best, completely fill in the corresponding oval on the answer sheet. Give only one answer to each question. If you change an answer, be sure that the previous mark is erased completely. Here is a sample question and answer.

Sample Questions

Chicago is a

(A) state
(B) city
(C) country
(D) continent
(E) country

Sample Answers

Use your time effectively, working as quickly as you can without losing accuracy. Do not spend too much time on any one question. Go on to other questions and come back to the ones you have not answered if you have time. It is not expected that everyone will know the answers to all the multiple-choice questions.

About Guessing

Many candidates wonder whether or not to guess the answers to questions about which they are not certain. Multiple-choice scores are based on the number of questions answered correctly. Points are not deducted for incorrect answers, and no points are awarded for unanswered questions. Because points are not deducted for incorrect answers, you are encouraged to answer all multiple-choice questions. On any questions you do not know the answer to, you should eliminate as many choices as you can, and then select the best answer among the remaining choices.

COMPUTER SCIENCE A

SECTION I

TIME—-1 hour and 30 minutes

Number of Questions—-40

Percent of total exam grade—-50%

Directions: Determine the answer to each of the following questions or incomplete statements, using the available space for any necessary scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet. No credit will be given for anything written in the examination booklet. Do not spend too much time on any one problem.

Notes:

- Assume that the classes listed in the Quick Reference have been imported where appropriate.
- Assume that declarations of variables and methods appear within the context of an enclosing class.
- Assume that method calls that are not prefixed with an object or class name and are not shown within a complete class definition appear within the context of an enclosing class.
- Unless otherwise noted in the question, assume that parameters in the method calls are not null and that methods are called only when their preconditions are satisfied.

1. Consider the following code segment:

```
int x = 10;
int y = 3;
boolean b = true;
for (int i = 0; i < 15; i += 5) {
  x = x + y;
  b = (x % y == 2);
  if (!b) {
    y++;
    i += 5;
  }
}
```

What is the value of x after the code segment executes?

(A) 10
(B) 15
(C) 17
(D) 22
(E) 25

2. Consider the following code segment:

```
int a = 10;
double b = 3.7;
int c = 4;
int x = (int) (a + b);
double y = (double) a / c;
double z = (double) (a / c);
double w = x + y + z;
System.out.println(w);
```

What is printed as a result of evaluating the code above?

(A) 10
(B) 15
(C) 15.5
(D) 17
(E) 17.5

3. Given the following classes:

```
public class Example
{
   public void print(String str)
   {
      System.out.println("String: " + str);
   }
   public void print(Object obj)
   {
      System.out.println("Object: " + obj);
   }
}
```

```
Example ex = new Example();
ex.print("Hello");
```

What will be the result of executing the following code?

(A) "String: Hello"
(B) "Object: Hello"
(C) Compile-time error
(D) Run-time error

(E) No output

4. Given the code:

```
int sum = 0;
for (int i = 2; i <= 7; i += 2) {
    sum += i;
}

System.out.println(sum);
```

What is the output of this code?

(A) 2
(B) 6
(C) 12
(D) 14
(E) 7

5. Given the boolean variables `hasTicket` and `hasID`, what does the expression `hasTicket && !hasID` represent in the context of attending an event?

(A) It represents having both a ticket and an ID.
(B) It represents not having a ticket but having an ID.
(C) It represents having a ticket but not having an ID.
(D) It represents not having either a ticket or an ID.
(E) It always evaluates to false.

6. Consider the following code snippet:

```
public class VoteChecker {
  public static void main(String[] args) {
    int age = 22;
    boolean isEligibleToVote = checkVotingEligibility(age);
    System.out.println("Is eligible to vote? " +
isEligibleToVote);
  }

  static boolean checkVotingEligibility(int personAge) {
    return personAge >= 18;
  }
}
```

What is the output of the code?

(A) Is eligible to vote? true
(B) Is eligible to vote? false
(C) Is eligible to vote? It throws a runtime error.
(D) Is eligible to vote? It depends on the initial value of age.
(E) Is eligible to vote? It depends on the value of another variable.

7. Consider the following class declarations:

```
public class Vehicle {
  private int maxPassengers;
  public Vehicle() {
    maxPassengers = 1;
  }
  public Vehicle(int x) {
    maxPassengers = x;
  }
  public int maxPassengers() {
    return maxPassengers;
  }
}

public class Motorcycle extends Vehicle {
  public Motorcycle() {
    super(2);
  }
}
```

Which of the following code segments will cause a compilation error?

(A) Motorcycle m1 = new Motorcycle(3);
(B) Vehicle v1 = new Motorcycle(4);
(C) Motorcycle m2 = new Vehicle();
(D) Vehicle v2 = new Motorcycle();
(E) Vehicle v3 = new Vehicle(); int max = v3.maxPassengers();

8. Consider the following class declarations:

```
public class Shape
{
   private String type;
   public Shape(String shapeType)
   {
      type = shapeType;
   }
   public String getType( )
   {
      return type;
   }
}

public class Circle extends Shape
{
   private double radius;
   public Circle(String shapeType, double circleRadius)
   {
      super(shapeType);
      radius = circleRadius;
   }
}
```

You are developing a program to represent different types of shapes. Which of the following code segments will cause a compilation error?

(A) Shape s1 = new Circle("Circle", 5.0);
(B) Circle c1 = new Circle("Sphere", 8.0);
(C) Shape s2 = new Shape("Rectangle");
(D) Circle c2 = new Shape("Oval", 6.0);
(E) double circleRadius = c2.radius;

9. Consider the following code:

```
String sentence = "The quick brown fox jumps over
the lazy dog.";
int index1 = sentence.indexOf("fox");
int index2 = sentence.lastIndexOf("fox");
int index3 = sentence.indexOf("wolf");
```

What will be the value of the index1, index2, and index3 variables, respectively?

(A) 16, 16, -1
(B) 16, 24, 0
(C) 24, 16, -1
(D) 16, 16, 0
(E) An exception will be thrown.

10. Given the following recursive method:

```
public int mystery(int a, int b) {
   if (b == 0) {
     return a;
   } else {
     return mystery(b, a % b);
   }
 }
```

What is the result of `mystery`(36, 48)?

(A) 6
(B) 12
(C) 18
(D) 24
(E) 72

11. Consider the following class:

```
public class A {
  protected int x;
  public A(int value) {
    x = value;
  }
}

public class B extends A {
  private int y;
  public B(int value1, int value2) {
    super(value1);
    y = value2;
  }
}
```

What is the purpose of the 'super()' call in the 'B' class constructor?

(A) It initializes the 'x' variable in the 'B' class.
(B) It initializes the 'y' variable in the 'B' class.
(C) It creates a new instance of the 'A' class.
(D) It initializes both 'x' and 'y' variables in the 'B' class.
(E) It causes a compilation error.

12. Which of the following statements correctly initializes and fills a 2D array named table with values such that `table[i][j]` contains the product of `i` and `j` for `0 <= i < m` and `0 <= j < n`?

(A)

```
for (int i = 0; i < m; i++) {
    for (int j = 0; j < n; j++) {
```

```
      table[i][j] = i + j;
    }
}
```

(B)

```
for (int i = 0; i < m; i++) {
    for (int j = 0; j < n; j++) {
      table[i][j] = i * j;
    }
}
```

(C)

```
for (int i = 0; i < m; i++) {
    for (int j = 0; j < n; j++) {
      table[i][j] = i / j;
    }
}
```

(D)

```
for (int i = 1; i <= m; i++) {
    for (int j = 1; j <= n; j++) {
      table[i][j] = i * j;
    }
}
```

(E)

```
for (int i = 0; i < m; i++) {
    for (int j = 0; j < n; j++) {
      table[i][j] = i - j;
    }
}
```

13. How do you access the length of the third row in a 2D array named data in Java?

(A) `data.length`
(B) `data[2].length`
(C) `data[3].length`
(D) `data[0].length`
(E) `data.rows()`

14. Given the following code segment:

```
int[][] grid = {{1, 2, 3}, {4, 5, 6}, {7, 8, 9}};
int sum = 0;

for (int[] row : grid)
    for (int element : row)
      sum += element;

System.out.println("Sum: " + sum);
```

(A) 15
(B) 45
(C) 36
(D) 6
(E) An error message is printed.

15. Consider the following code snippet:

```
public class TrafficLightSimulator {
  public static void main(String[] args) {
    int timeInSeconds = 25;
    String lightColor = simulateTrafficLight(timeInSeconds);
    System.out.println("Traffic light color: " + lightColor);
  }

  static String simulateTrafficLight(int time) {
    if (time % 15 >= 0 && time % 15 < 5) {
      return "Red";
    } else if (time % 15 >= 5 && time % 15 < 10) {
      return "Yellow";
    } else {
      return "Green";
    }
  }
}
```

What is the output of the code?

(A) Traffic light color: Red
(B) Traffic light color: Yellow
(C) Traffic light color: Green
(D) Traffic light color: It throws a runtime error.
(E) Traffic light color: It depends on the initial value of timeInSeconds.

16. Given the following code, what is the value stored in the 'position' variable after execution?

```
String text = "mississippi";
int position = text.indexOf("si");
position = text.indexOf("si", position + 1);
```

(A) 4
(B) 5
(C) 6
(D) 7
(E) 8

17. Given the method:

```
public void removeShorter(ArrayList<String>, int
length) {
   int i = 0;
   while (i < words.size()) {
      if (words.get(i).length() < length) {
          words.remove(i);
      } else {
          i++;
      }
   }
}
```

If the `ArrayList` words contains the values `["cat", "dog", "elephant", "lion", "tiger"]`, and length is 4, what will words contain after executing the removeShorter method?

(A) ["elephant", “lion”]
(B) ["elephant", “lion”,"tiger"]
(C) ["cat", "lion", "tiger"]
(D) ["cat", "elephant", "lion", "tiger"]
(E) []

18. Consider the following code segment:

```
ArrayList numbers = new ArrayList<>();
numbers.add(3);
numbers.add(6);
numbers.add(9);
numbers.remove(2);
System.out.println(numbers);
```

What is printed as a result of executing the code segment?

(A) [3, 6]
(B) [3, 6, 9]
(C) [6, 9]
(D) [9]
(E) []

19. Consider the following recursive method:

```
public int mystery(int n) {
  if (n == 0)
    return 1;
  else
    return 2 * mystery(n - 1);
}
```

What value is returned as a result of the call mystery(3)?

(A) 2
(B) 4
(C) 8
(D) 16
(E) 32

20. Given the code:

```
for (int x = 2; x <= 5; x++) {
    for (int z = 1; z <= x; z++) {
        System.out.print((x * z) + " ");
    }
    System.out.println();
}
```

What is the output of this code?

(A)

```
2
3 4
4 6 8
5 8 10 12
```

(B)

```
2
3 6
4 8 12
5 10 15 20
```

(C)

```
2
3 4
4 5 6
5 6 7 8
```

(D)

```
2 4
3 6 9
4 8 12 16
5 10 15 20 25
```

(E)

```
2
4  6
6  8  10
8  10  12  14
```

21. Given the statement: `boolean x = (p || q) && !(p && q);`, under what conditions will the value of `x` be true?

(A) Only when p is different than the value of q
(B) Only when p is the same as the value of q
(C) Only when p and q are both true
(D) Only when p and q are both false
(E) The value of x will be true for all values of p and q.

22. Consider the code snippet:

```
int a = 0;
for (int i = 0; i < 6; i++) {
    for (int j = 0; j <= 3; j++) {
        for (int k = 1; k <= 4; k = k * 3) {
         a++;
        }
    }
}
```

What is the value of a after the code segment executes?

(A) 40
(B) 48

(C) 56
(D) 64
(E) 72

23. After the following code executes, what is the length of the array "arr"?

```
String message = "Java is fun!";
int[] arr = new int[message.length() * 2];
```

What is the length of the array "values" after the following code executes?

(A) 24
(B) 22
(C) 23
(D) 44
(E) The array will not be created due to a compile-time error.

24. Given an array data of integer values, which of the following code segments correctly swaps the values stored in `data[2]` and `data[6]`?

(A)
```
data[2] = 6;
data[6] = 2;
```

(B)
```
data[2] = data[6];
data[6] = data[2];
```

(C)
```
int tmp = data[6];
data[6] = data[2];
data[2] = tmp;
```

(D)
```
int tmp = data[6];
data[2] = data[6];
data[6] = tmp;
```

(E)
```
int tmp = data[2];
data[6] = data[2];
data[2] = tmp;
```

25. Given the code segment:

```
int[] data = {15, 30, 40, 20};
for (int d : data) {
    if (d < 25) {
        d += 5;
    }
}
for (int d : data) {
    System.out.print(d + " ");
}
```

What is printed as a result of executing the code segment?

(A) 15 30 40 20
(B) 20 30 40 20
(C) 20 35 45 25
(D) 15 35 45 25
(E) Nothing will be printed due to a compile-time error.

26. What will be printed to the console?

```
double x = 10.0;
double y = 3.0;
int z = (int) (x / y);
System.out.println(z);
```

(A) 3
(B) 3.0
(C) 3.0f
(D) 0.3333333333333333

(E) Nothing will be printed because of a compile-time error.

27. What is the result of the following expression: 9 / 4.0?

(A) 2
(B) 2.25
(C) 2.0
(D) 2.0f
(E) 2.25f

28. Consider the code:

```
int sum = 0;
for (int i = 1; i <= 5; i++) {
    sum += i * i;
}
System.out.println(sum);
```

What is the output of this code?

(A) 5
(B) 15
(C) 30
(D) 55
(E) 25

29. Consider the following code snippet:

```
int x = 10;
int y = 20;
boolean result = (x > 5 || y < 15) && (x < 15 || y > 10);
```

What is the value of 'result'?

(A) true
(B) false
(C) It throws a runtime error.
(D) It depends on the initial values of x and y.
(E) It depends on the value of another variable.

30. Which of the following code segments will run without error?

I.

```
int a = 10;
int b = 20;
int c = 5;

if (a < b && 5 < b/c) {
     System.out.println("Marge");
} else {
     System.out.println("Lisa");
}
```

II.

```
int x = 10;
int y = 20;
int z = 5;
```

```
if (x > y && 0 < y/z)
     System.out.println("Homer");
else
     System.out.println("Bart");
```

```
III.
int p = 10;
int q = 20;
int r = 0;

if (p < q || 0 < q/r)
     System.out.println("Maggie");
else
     System.out.println("Bart");
```

(A) I only
(B) II only
(C) III only
(D) II and III
(E) I, II, and III

31. A software project involves creating a complex video game. The development team decides to use an Object-Oriented Programming (OOP) approach. Which of the following are advantages of using OOP for this project?

```
I. Code can be organized into reusable classes and
objects.
II. Encapsulation allows data and methods to be hidden
and protected, enhancing security.
III. Inheritance allows for the creation of new
```

```
classes based on existing ones, promoting code
reusability.
```

(A) I only
(B) II only
(C) III only
(D) I and II only
(E) I, II, and III

32. If a client program executes the following statements:

```
Banana banana = new Banana();
System.out.println(banana.getName());
```

Which of the following is true about the last line of code?

```
public class Fruit {
    protected String name;

    Fruit(String name) {
        this.name = name;
        System.out.println("A " + name + " is a type of
fruit.");
    }

    public String getName() {
        return name;
    }
}

public class Banana extends Fruit {
    Banana() {
```

```
        super("banana");
        System.out.println("Bananas are a great source of
potassium.");
    }
}
```

(A) The following will be printed: "banana"
(B) The following will be printed: "Bananas are a great source of potassium.
banana"
(C) The following will be printed: "A banana is a type of fruit.
Bananas are a great source of potassium.
banana”
(D) An error will occur because there is no getName() method in the Banana class.
(E) None of the above are true.

33. Which of the following statements about Java's substring method is correct?

(A) The method always returns a new string.
(B) The first parameter in the method specifies the starting index, and the second parameter specifies the ending index.
(C) If the ending index is equal to the starting index, the method returns an empty string.
(D) You can use negative indices as arguments to substring to count backward from the end of the string.
(E) The substring method can throw a NullPointerException if called on a null string.

34. Consider the following code segment:

```
int product = 1;
for (int i = 1; i <= 5; i++) {
  if (i % 2 == 0) {
     continue;
  }
  product *= i;
}
```

What is the value of 'product' after the code is executed?

(A) 1
(B) 3
(C) 5
(D) 15
(E) 30

35. A software program assigns access levels to users based on their roles:

- Users with 'admin' roles have full access.
- Users with 'manager' roles have limited access.
- Users with 'employee' roles have restricted access.
- Users with any other role have no access.

If the String variable role represents a user's role, which of the following code segments will assign the correct access level to the String variable accessLevel?

```
I. if (role.equals("admin")) accessLevel = "Full
Access";

if (role.equals("manager")) accessLevel = "Limited
Access";

if (role.equals("employee")) accessLevel = "Restricted
Access";
```

```
II. if (role.equals("admin")) accessLevel = "Full
Access";

if (role.equals("manager")) accessLevel = "Limited
Access";

if (role.equals("employee")) accessLevel = "Restricted
Access";

if (!role.equals("admin") && !role.equals("manager")
&& !role.equals("employee")) accessLevel = "No
Access";
```

```
III. if (role.equals("admin")) accessLevel = "Full
Access";

if (role.equals("manager")) accessLevel = "Limited
Access";

if (role.equals("employee")) accessLevel = "Restricted
Access";

if (!role.equals("admin") || !role.equals("manager")
|| !role.equals("employee")) accessLevel = "No
Access";
```

(A) I only
(B) II only
(C) III only
(D) I and II
(E) I and III

36. Consider the following code segment:

```
int count = 0;
for (int i = 0; i < 10; i++) {
  if (i % 2 == 0) {
    continue;
  }
  count++;
}
```

How many times will the 'continue' statement be executed?

(A) 5
(B) 10
(C) 4
(D) 1
(E) 0

37. Consider the code:

```
int n = 3;
while (n > 0) {
    System.out.print(n * 2 + " ");
    n--;
}
```

What is the output of this code?

(A) 2 4 6
(B) 6 4 2
(C) 12
(D) 6
(E) 4 2

38. What is the output of the following code snippet?

```
int[][] matrix = {{1, 2, 3}, {4, 5, 6}, {7, 8, 9}};
System.out.println(matrix[1][2]);
```

(A) 3
(B) 6
(C) 8
(D) 9
(E) Compilation error

39. Consider the following array declaration:

```
int[] numbers = new int[]{1, 2, 3, 4, 5};
```

What is the difference between this declaration and

```
int[] numbers = {1, 2, 3, 4, 5};?
```

(A) The first declaration is incorrect; it should be `int[] numbers = new int[5]{1, 2, 3, 4, 5};`
(B) There is no difference; both declarations are equivalent.
(C) The first declaration explicitly specifies the size of the array.
(D) The second declaration is incorrect; it should be `int numbers[] = {1, 2, 3, 4, 5};`
(E) The second declaration uses dynamic memory allocation.

40. What is printed as a result of executing the code segment?

```
int [] scores = {75, 63, 52, 80};

for (int s : scores)
{
   if (s < 75) { s += 5; }
}
for (int s : scores)
{
   System.out.print(s + " ");
}
```

(A) 75 63 52 80
(B) 75 68 57 80
(C) 80 68 57 80

(D) 80 68 57 85
(E) Nothing will be printed due to a compile-time error.

Answer Explanations - practice test 5

1. Value of 'x' after the loop:

Answer: (C) 17
Explanation: The loop runs three times, and 'x' is incremented by 'y' each time.

2. Result printed by evaluating code segment:

Answer: (E) 17.5
Explanation: 'x' is the sum of an integer and a double division, resulting in a double value.

3. Result of executing code with Example class:

Answer: (A) "String: Hello"
Explanation: The overloaded print method prints "String: Hello" as it takes a String parameter.

4. Output of the code with a for loop:

Answer: (C) 12
Explanation: The loop sums even numbers from 2 to 6.

5. Meaning of 'hasTicket && !hasID' expression:

Answer: (C) It represents having a ticket but not having an ID.
Explanation: It checks for having a ticket (hasTicket) and not having an ID (!hasID).

6. Output of VoteChecker code:

Answer: (A) Is eligible to vote? true
Explanation: The checkVotingEligibility method returns true for age >= 18.

7. Invalid class declarations for Vehicle and Motorcycle:

Answer: (C) Motorcycle m2 = new Vehicle();
Explanation: A parent object cannot be constructed to a child class.

8. Invalid Shape and Circle class instances:

Answer: (D) Circle c2 = new Shape("Oval", 6.0);
Explanation: A parent object cannot be constructed to a child class.

9. Values of indexOf variables in a string:

Answer: (A) 16, 16, -1
Explanation: indexOf("fox") gives the first occurrence, lastIndexOf("fox") gives the last, and indexOf("wolf") gives -1.

10. Result of findGCD(36, 48):

Answer: (B) 12
Explanation: The method calculates the greatest common divisor using recursion.

11. Purpose of 'super()' call in 'B' class constructor:

Answer: (A) It initializes the 'x' variable in the 'B' class.
Explanation: 'super(value1)' calls the constructor of the superclass 'A' with the value passed to 'B'.

12. Correct initialization of a 2D array with products:

Answer: (B) for (int i = 0; i < m; i++) { for (int j = 0; j < n; j++) { table[i][j] = i * j; } }
Explanation: This correctly fills the 2D array with the product of row and column indices.

13. Accessing the length of the third row in a 2D array:

Answer: (B) `data[2].length`
Explanation: The length of a row in a 2D array can be accessed using 'data[rowIndex].length'.

14. Sum of elements in a 2D array:

Answer: (B) 45
Explanation: The nested loops iterate over the 2D array, summing its elements.

15. Output of TrafficLightSimulator code:

Answer: (C) Traffic light color: Green
Explanation: The simulation maps time to traffic light colors.

16. Value stored in 'position' variable:

Answer: (C) 6
Explanation: The 'indexOf' method finds occurrences of "si," and the variable 'position' is updated accordingly.

17. Result of removeShorter method:

Answer: (B) ["elephant", “lion”,"tiger"]
Explanation: Words shorter than 4 characters are removed from the list.

18. Output of ArrayList manipulation code:

Answer: (A) [3, 6]
Explanation: The element at index 2 (9) is removed from the ArrayList.

19. Result of mystery(3) method call:

Answer: (D) 8
Explanation: The method uses recursion to calculate 2^3.

20. Output of nested loops:

Answer: (D)
Explanation: The nested loops print the product of 'x' and 'z' for each iteration.

21. Conditions for true value of 'x':

Answer: (A) Only when p is different than the value of q
Explanation: The expression evaluates to true when 'p' and 'q' have different values.

22. Value of 'a' after nested loops:

Answer: (B) 48
Explanation: Three nested loops increment 'a' multiple times.

23. Length of array after array declaration:

Answer: (A) 24
Explanation: The array's length is twice the length of the string.

24. Correct swapping of array values:

Answer: (C) int tmp = data[6]; data[6] = data[2]; data[2] = tmp;
Explanation: This uses a temporary variable to swap values.

25. Output of scores array manipulation:

Answer: (A) 15 30 40 20
Explanation: The loop doesn't modify the array 'scores'.

26. Output of double division code snippet:

Answer: (A) 3
Explanation: The result is assigned to an integer variable, truncating the decimal part.

27. Result of expression: 9 / 4.0

Answer: (B) 2.25
Explanation: When one operand is a double, the result is a double.

28. Output of sum of squares code:

Answer: (D) 55
Explanation: The loop calculates the sum of squares.

29. Value of 'result' boolean expression:

Answer: (A) true

Explanation: The expression evaluates to true based on the initial values of 'x' and 'y'.

30. Correctly running code segments:

Answer: (E) I, II, and III
Explanation: I, II and III have correct syntax and will run without error.

31. Advantages of using OOP in a video game project:

Answer: (E) I, II, and III
Explanation: OOP allows for organized code and encapsulation for security.

32. Result of calling getName() on Banana object:

Answer: (C) The following will be printed: "A banana is a type of fruit.
Bananas are a great source of potassium.
banana”
Explanation: The getName method is called from the Banana class.

33. Correct statement about Java's substring method:

Answer: (A) The method always returns a new string.
Explanation: The substring method returns a new string.

34. Value of 'product' after loop execution:

Answer: (D) 15
Explanation: The loop multiplies odd numbers from 1 to 5.

35. Assigning access levels based on user roles:

Answer: (A) I only
Explanation: I correctly assigns access levels based on user roles.

36. Number of times 'continue' statement is executed:

Answer: (A) 5
Explanation: The 'continue' statement is executed for even values of 'i.'

37. Output of while loop code:

Answer: (A) 6 4 2
Explanation: The loop prints double of 'n' in reverse order.

38. Value of matrix[1][2] in a 2D array:

Answer: (B) 6
Explanation: Accessing the element in the second row and third column.

39. Difference between array declarations:

Answer: (B) There is no difference; both declarations are equivalent.
Explanation: Both declarations are valid and create the same array.

40. Output of array manipulation code segment:

Answer: (A) 75 63 52 80
Explanation: The loop doesn't modify the array 'scores'.

Practice Test 6

AP Computer Science A Exam - practice test 6

Section 1: Multiple-Choice Questions

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO.

At a glance
Total Time 1 hour 30 minutes **Number of Questions** 40 **Percent of Total Score** 50% **Writing Instrument** Pencil Required

Instructions

Section I of this examination contains 40 multiple-choice questions. Fill in only the ovals for numbers 1 through 40 on your answer sheet.

Indicate all of your answers to the multiple-choice questions on the answer sheet. No credit will be given for anything written in this exam booklet, but you may use the booklet for notes or scratch work. After you have decided which of the suggested answers is best, completely fill in the corresponding oval on the answer sheet. Give only one answer to each question. If you change an answer, be sure that the previous mark is erased completely. Here is a sample question and answer.

Sample Questions

Chicago is a

(A) state
(B) city
(C) country
(D) continent
(E) country

Sample Answers

Use your time effectively, working as quickly as you can without losing accuracy. Do not spend too much time on any one question. Go on to other questions and come back to the ones you have not answered if you have time. It is not expected that everyone will know the answers to all the multiple-choice questions.

About Guessing

Many candidates wonder whether or not to guess the answers to questions about which they are not certain. Multiple-choice scores are based on the number of questions answered correctly. Points are not deducted for incorrect answers, and no points are awarded for unanswered questions. Because points are not deducted for incorrect answers, you are encouraged to answer all multiple-choice questions. On any questions you do not know the answer to, you should eliminate as many choices as you can, and then select the best answer among the remaining choices.

COMPUTER SCIENCE A

SECTION I

TIME—-1 hour and 30 minutes

Number of Questions—-40

Percent of total exam grade—-50%

Directions: Determine the answer to each of the following questions or incomplete statements, using the available space for any necessary scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet. No credit will be given for anything written in the examination booklet. Do not spend too much time on any one problem.

Notes:

- Assume that the classes listed in the Quick Reference have been imported where appropriate.
- Assume that declarations of variables and methods appear within the context of an enclosing class.
- Assume that method calls that are not prefixed with an object or class name and are not shown within a complete class definition appear within the context of an enclosing class.
- Unless otherwise noted in the question, assume that parameters in the method calls are not null and that methods are called only when their preconditions are satisfied.

1. What is printed as a result of executing the code segment?

```
String [] names = {"Abi", "Brianna", "Jada", "Kiara",
"Tiffany", "Vanessa"};

int middle = names.length/2 - 1;

for (int x = 0; x < middle; x++)
{
  String hold = names[x];
  names[x] = names [names.length - x - 1];
  names[names.length - x - 1] = hold;
}

for (String n: names)
{
  System.out.print(n + " ");
}
```

(A) Abi Brianna Jada Kiara Tiffany Vanessa
(B) Abi Jada Brianna Vanessa Kiara Tiffany
(C) Vanessa Tiffany Kiara Jada Brianna Abi
(D) Vanessa Tiffany Jada Kiara Brianna Abi
(E) Vanessa Brianna Jada Kiara Tiffany Abi

2. In a binary search, what happens if the desired element is not found?

(A) An infinite loop occurs
(B) The method returns -1
(C) The method returns the index of the last element
(D) The array is automatically reordered
(E) The method returns the length of the array

3. What is the result of the following code snippet?

```
int[] arr = {1, 2, 3, 4, 5};
int[] reversed = new int[arr.length];
for (int i = 0; i < arr.length; i++) {
    reversed[i] = arr[arr.length - 1 - i];
}

System.out.println(Arrays.toString(reversed));
```

(A) [5, 4, 3, 2, 1]
(B) [1, 2, 3, 4, 5]
(C) [5, 5, 5, 5, 5]
(D) [1, 1, 1, 1, 1]
(E) Compilation error

4. Consider the following classes:

```
public class X {
  public void print() {
    System.out.println("X");
  }
}

public class Y extends X {
  public void print() {
    super.print();
    System.out.println("Y");
  }
}
```

```
public class Z extends Y {
  public void print() {
    super.print();
    System.out.println("Z");
  }
}

public class Main {
  public static void main(String[] args) {
    Y obj = new Z();
    obj.print();
  }
}
```

What will be the output of the following code?

(A)

X
Y
Z

(B)

Z
Y
X

(C)

Z
Y

(D) Compilation error
(E) Runtime error

5. Which of the following code snippets is a correct way to traverse a 2D array in Java and calculate the sum of all elements?

(A)

```
int sum = 0;
for (int i = 0; i < arr.length; i++) {
    for (int j = 0; j < arr[0].length; j++) {
     sum += arr[i][j];
    }
}
```

(B)

```
int sum = 0;
for (int i = 0; i < arr.length; i++) {
    for (int j = 0; j < arr.length; j++) {
     sum += arr[i][j];
    }
}
```

(C)

```
int sum = 0;
for (int i = 1; i <= arr.length; i++) {
    for (int j = 1; j <= arr[0].length; j++) {
     sum += arr[i][j];
    }
}
```

(D)

```
int sum = 0;
for (int i = 0; i <= arr.length; i++) {
    for (int j = 0; j <= arr[0].length; j++) {
     sum += arr[i][j];
    }
}
```

(E)

```
int sum = 0;
for (int i = 0; i < arr[0].length; i++) {
    for (int j = 0; j < arr.length; j++) {
```

```
      sum += arr[i][j];
    }
}
```

6. Consider the following code snippet:

```
public class AgeClassifier {
  public static void main(String[] args) {
    int personAge = 63;
    String classification = classifyAge(personAge);
    System.out.println("Age classification: " +
classification);
  }

  static String classifyAge(int age) {
    if (age < 0) {
      return "Invalid age";
    } else if (age < 18) {
      return "Child";
    } else if (age < 65) {
      return "Adult";
    } else {
      return "Senior";
    }
  }
}
```

What is the output of the code?
(A) Age classification: Child
(B) Age classification: Adult
(C) Age classification: Senior
(D) Age classification: Invalid age

(E) Age classification: It depends on the initial value of personAge.

7. Consider the following code snippet:

```
int num1 = 10;
int num2 = 5;
boolean result = (num1 > num2) ? (num1 < 15) :
(num2 > 0);
```

What is the value of 'result'?

(A) true
(B) false
(C) It throws a runtime error.
(D) It depends on the initial values of num1 and num2.
(E) It depends on the value of another variable.

8. Consider the following code snippet:

```
for (int i = 0; i < 5; i++) {
  if (i % 2 == 0) {
    continue;
  }
  System.out.print(i + " ");
}
```

What is the output of the code?

(A) 1 3
(B) 1 3 5

(C) 0 2 4
(D) 0 2 4 6
(E) It causes an infinite loop.

9. Consider the following class declarations:

```
public class Book
{
   protected String title;
   public Book(String bookTitle)
   {
      title = bookTitle;
   }
   public String getTitle( )
   {
      return title;
   }
}

public class FictionBook extends Book
{
   private String genre;
   public FictionBook(String bookTitle, String
bookGenre)
   {
      super(bookTitle);
      genre = bookGenre;
   }
}
```

You are working on a project to represent different types of books in a library. Which of the following code segments will cause a compilation error?

(A) `Book b1 = new FictionBook("The Hobbit", "Fantasy");`
(B) `FictionBook f1 = new FictionBook("1984", "Dystopian");`
(C) `Book b2 = new Book("To Kill a Mockingbird");`
(D) `FictionBook f2 = new Book("The Catcher in the Rye", "Fiction");`
(E) `String fictionGenre = b2.title;`

10. What is the relationship between a superclass and a subclass?

(A) A subclass can have multiple superclasses.
(B) A superclass can have multiple subclasses.
(C) A subclass can have only one superclass.
(D) A superclass can have only one subclass.
(E) A subclass can have an unlimited number of superclasses.

11. Given the code segment

```
ArrayList fruits = new ArrayList<>();
fruits.add("Apple");
fruits.add("Banana");
fruits.add(0, "Cherry");
fruits.add("Date");
fruits.set(2, "Elderberry");
fruits.remove(1);
System.out.println(fruits);
```

What is printed as a result of executing the code segment?

(A) [Apple, Banana, Cherry, Date]
(B) [Apple, Cherry, Date, Elderberry]

(C) [Cherry, Elderberry, Date]
(D) [Apple, Date, Elderberry]
(E) [Apple, Cherry, Date, Elderberry]

12. Given the following method:

```
public void removeA(ArrayList words) {
   int i = 0;
   while (i < words.size()) {
      if (words.get(i).equals("A")) {
          words.remove(i);
      }
      i++;
   }
}
```

If the ArrayList words contains the values ["A", "B", "A", "C", "D"], what will words contain after executing the removeA method?

(A) ["B", "C", "D"]
(B) ["A", "B", "A", "C", "D"]
(C) ["B", "A", "C", "D"]
(D) ["A", "A", "B", "C", "D"]
(E) ["B", "C", "D", “E”]

13. What does the expression matrix.length return when matrix is a 2D array in Java?

(A) The number of rows in the matrix.
(B) The number of columns in the matrix.
(C) The total number of elements in the matrix.
(D) The sum of all elements in the matrix.
(E) The maximum value in the matrix.

14. What is the length of the array arr after the following code is executed?

```
int[][] arr = new int[4][];
for (int i = 0; i < arr.length; i++)
    arr[i] = new int[i + 1];
```

(A) 4
(B) 6
(C) 10
(D) 3
(E) 5

15. Consider the following recursive method:

```
public int mystery(int a, int b) {
  if (b == 0)
    return 0;
  else
    return a + mystery(a, b - 1);
}
```

What is the result of the call `mystery`(6, 3)?

(A) 0
(B) 6
(C) 12
(D) 18
(E) 36

16. Consider the code segment:

```
int[] data = {50, 60, 70, 80};
for (int d : data) {
    if (d <= 70) {
        d += 20;
    }
}
for (int d : data) {
    System.out.print(d + " ");
}
```

What is printed as a result of executing the code segment?

(A) 50 60 70 80
(B) 50 80 90 80
(C) 70 80 90 80
(D) 70 60 70 80
(E) Nothing will be printed due to a compile-time error.

17. Given the code snippet:

```
Car myCar = new Car();
```

What is the purpose of the 'new' keyword in Java?

(A) It creates a new instance of the Car class.
(B) It refers to an existing instance of the Car class.
(C) It is used for mathematical operations.
(D) It initializes a static variable.
(E) It represents an abstract class.

18. Consider the code snippet:

```
public String toString() {
    // code block
}
```

What does the 'toString' method do in Java?

(A) It converts a string to uppercase.
(B) It returns the length of the string.
(C) It converts an object to its string representation.
(D) It checks for the equality of two strings.

(E) It initializes a constant variable.

19. What will be printed to the console?

```
int a = 15;
double b = 3.0;
int c = (int) (a / b);
System.out.println(c);
```

(A) 5
(B) 5.0
(C) 5.0f
(D) 3.0
(E) Nothing will be printed because of a compile-time error.

20. Which of the following data types is used to store a single character in Java?

(A) int
(B) boolean
(C) double
(D) char
(E) byte

21. Consider the following output:

2 4 6
2 4 6 8 10
2 4 6 8 10 12 14
2 4 6 8 10 12 14 16 18

(A)
```
for (int x = 2; x <= 5; x++) {
    for (int z = 2; z <= x * 2; z += 2) {
        System.out.print(z + " ");
    }
    System.out.println();
}
```

(B)
```
for (int x = 2; x <= 5; x++) {
    for (int z = 2; z <= 2 * x; z += 2) {
        System.out.print(z + " ");
    }
    System.out.println();
}
```

(C)
```
for (int x = 2; x < 6; x++) {
    for (int z = 2; z < x * 3; z += 2) {
        System.out.print(z + " ");
    }
    System.out.println();
}
```

(D)
```
for (int x = 2; x <= 5; x++) {
    for (int z = 2; z < x * 3; z += 2) {
        System.out.print(z + " ");
    }
    System.out.println();
}
```

(E)
```
for (int x = 2; x <= 5; x++) {
    for (int z = 2; z < x * 4; z += 2) {
        System.out.print(z + " ");
    }
    System.out.println();
}
```

22. In the following code segment:

```
int m = 8;
int n = m / 2;
int o = m % 3;
m--;
System.out.println(o);
```

What is printed as a result of executing the code segment above?

(A) 1
(B) 2
(C) 3
(D) 4
(E) 5

23. Consider the code snippet:

```
int a = 7;
double b = 5.2;
int c = 2;
int x = (int) (a + b);
double y = (double) a / c;
double z = (double) (a / c);
double w = x + y + z;
System.out.println(w);
```

What is printed as a result of evaluating the code above?

(A) 16
(B) 16.5
(C) 17
(D) 17.5
(E) 18.5

24. Which of the following code segments will run without error?

I.

```
int a = 10;
int b = 20;
int c = 0;

if (a < b && 5 < b/c) {

    System.out.println("Marge");

}
```

```
else {

    System.out.println("Lisa");

}
```

II.

```
int x = 10;
int y = 20;
int z = 0;

if (x > y && 5 < y/z)

    System.out.println("Homer");

else

    System.out.println("Bart");
```

III.

```
int p = 10;
int q = 20;
int r = 5;

if (p < q || 5 < q/r)

    System.out.println("Maggie");

else

    System.out.println("Bart");
```

(A) I only
(B) II only
(C) III only
(D) II and III
(E) I, II, and III

25. Given the code:

```
for (int i = 1; i < 10; i++) {
    if (i % 3 == 0) {
        continue;
    }
    System.out.print(i + " ");
}
```

What is the output of this code?

(A) 1 2 3 4 5 6 7 8 9
(B) 1 2 4 5 7 8
(C) 3 6 9
(D) 1 4 7
(E) 2 5 8

26. Consider the following code snippet:

```
public class EvenOddChecker {
  public static void main(String[] args) {
    int number = 37;
    String result = checkEvenOdd(number);
    System.out.println("Number is: " + result);
  }

  static String checkEvenOdd(int num) {
    return (num % 2 == 0) ? "Even" : "Odd";
  }
}
```

What is the value of 'result'?

(A) Number is: Even
(B) Number is: Odd
(C) Number is: It throws a runtime error.
(D) Number is: It depends on the initial value of number.
(E) Number is: It depends on the value of another variable.

27. Consider the following code:

```
for (int x = 1; x <= 5; x++) {
    for (int z = 1; z <= x; z++) {
        System.out.print((x * z) + " ");
    }
    System.out.println();
}
```

What is the output of this code?

(A)

```
1
2 3
3 6 9
4 8 12 16
5 10 15 20 25
```

(B)

```
1
2 4
3 6 9
4 8 12 16
5 10 15 20 25
```

(C)

```
1
2 3
3 4 5
4 5 6 7
5 6 7 8 9
```

(D)

```
1
2 4
```

```
3 6 12
4 8 16 32
5 10 20 40 80
```
(E)
```
1
2 3
3 6 9
4 8 12 16
5 10 15 20 25
```

28. Consider the statement: `boolean m = (x && y) || !(x || y);`. When is the value of m true?

(A) Only when x is different than the value of y
(B) Only when x is the same as the value of y
(C) Only when x and y are both true
(D) Only when x and y are both false
(E) The value of m will be true for all values of x and y.

29. What is the purpose of the 'break' statement in the following code snippet?

```
int[] numbers = {2, 4, 6, 8, 10};

for (int num : numbers) {
    if (num == 6) {
        break;
    }
    System.out.print(num + " ");
}
```

(A) Ends the program execution.
(B) Skips the current iteration of the loop.
(C) Jumps to the next iteration of the loop.
(D) Exits the loop when the condition 'num == 6' is true.
(E) Generates a compilation error.

30. Consider the following classes:

```
public class A {
  protected int x;
  public A(int value) {
    x = value;
  }
}

public class B extends A {
  private int y;
  public B(int value1, int value2) {
    super(value1);
    y = value2;
  }
  public int calculateTotal() {
    return super.x + y;
  }
}

public class Main {
  public static void main(String[] args) {
    B obj = new B(3, 5);
    int total = obj.calculateTotal();
  }
```

```
}
```

What will be the value of 'total' after the following code is executed?

(A) 8
(B) 15
(C) 0
(D) Compilation error
(E) Runtime error

31. Can a subclass have multiple superclasses?

(A) Yes, a subclass can have multiple superclasses.
(B) No, a subclass can have only one superclass.
(C) It depends on the programming language.
(D) Yes, but each superclass must be unrelated to the others.
(E) No, a subclass cannot have any superclasses.

32. Consider the following recursive method:

```
public static int mystery(int n) {
  if (n == 1) {
    return 1;
  } else {
    return n + mystery(n - 1);
  }
}
```

What value is returned as a result of a call to `mystery`(4)?

(A) 1
(B) 4
(C) 10
(D) 15
(E) 24

33. Consider the code segment:

```
int[] data = {70, 40, 50, 80};
for (int d : data) {
    if (d > 60) {
        d -= 30;
    }
}
for (int d : data) {
    System.out.print(d + " ");
}
```

What is printed as a result of executing the code segment?

(A) 70 40 50 80
(B) 70 40 50 50
(C) 70 40 20 80
(D) 70 40 20 50
(E) Nothing will be printed due to a compile-time error.

34. Given an array data of integer values, which of the following code segments correctly swaps the values stored in `data[2]` and `data[6]`?|

(A)
```
data[2] = 6;
data[6] = 2;
```
(B)
```
data[2] = data[6];
data[6] = data[2];
```
(C)
```
int tmp = data[6];
data[6] = data[2];
data[2] = tmp;
```
(D)
```
int tmp = data[6];
data[2] = data[6];
data[6] = tmp;
```
(E)
```
int tmp = data[2];
data[6] = data[2];
data[2] = tmp;
```

35. Given the code:

```
int result = 1;
for (int i = 0; i < 4; i++) {
    result *= 2;
}
System.out.println(result);
```

What is the output of this code?

(A) 4
(B) 8
(C) 16
(D) 32
(E) 64

36. Given the code:

```
int x = 0;
for (int i = 0; i < 7; i++) {
    for (int j = 0; j <= 2; j++) {
        for (int k = 1; k <= 64; k = k * 4) {
           x++;
        }
    }
}
```

What is the value of x after the code segment executes?

(A) 96
(B) 84
(C) 72
(D) 144
(E) 160

37. Given the code:

```
int x = 16;
double y = 3.7;
int z = 2;
int a = (int) (x + y);
double b = (double) x / z;
double c = (double) (x / z);
double d = a + b + c;
System.out.println(d);
```

What is printed as a result of evaluating the code above?

(A) 30.0
(B) 32.0
(C) 33.0
(D) 34.0
(E) 35.0

38. In Java, what is the result of comparing two strings using the == operator?
(A) It compares the contents of the strings and returns true if they are equal.
(B) It compares the references of the strings and returns true if they point to the same memory location.
(C) It always returns true for any pair of strings.
(D) It returns true if the lengths of the strings are equal.
(E) It throws a compile-time error.

39. Consider the code snippet:

```
String message = "Java Programming";
String subMessage = message.substring(5, 15);
```

What will be the value of the subMessage variable?

(A) "Programming"
(B) "Programmin"
(C) "g"
(D) "Java"
(E) An IndexOutOfBoundsException will occur.

40. In Java, what is the result of calling substring(2, 2) on a string?

(A) An empty string.
(B) The original string.
(C) A NullPointerException.
(D) A compile-time error.
(E) A runtime error.

Answer Explanations - practice test 6

1. Result of Code Segment:

Answer: (D) Vanessa Tiffany Jada Kiara Brianna Abi
Explanation: The code reverses the order of elements in the names array. The correct order after reversal is (D).

2. Binary Search Behavior:

Answer: (B) The method returns -1
Explanation: In a binary search, if the desired element is not found, the method typically returns -1 to indicate that the element is not present in the array.

3. Result of Code Snippet:

Answer: (A) [5, 4, 3, 2, 1]
Explanation: The code snippet reverses the order of elements in the arr array, resulting in [5, 4, 3, 2, 1].

4. Output of Code with Classes:

Answer: (A)

X
Y
Z

Explanation: The main method creates an object of class Z and calls its print method. The output is "X Y Z".

5. Correct 2D Array Traversal:

Answer: (A) Correct
Explanation: The code snippet correctly traverses a 2D array and calculates the sum of all elements using nested loops.

6. Output of Age Classification Code:

Answer: (B) Age classification: Adult
Explanation: The classifyAge method is called with an age of 63, and it falls into the "Adult" category.

7. Value of 'result' in Ternary Operation:

Answer: (A) true
Explanation: The expression evaluates to true as both conditions (num1 > num2) and (num1 < 15) are true.

8. Output of Code with 'continue' Statement:

Answer: (A) 1 3
Explanation: The code prints odd numbers in the range 0 to 4, skipping even numbers using continue.

9. Valid Book Class Declarations:

Answer: (D) FictionBook f2 = new Book("The Catcher in the Rye", "Fiction");
Explanation: This is an invalid declaration of a FictionBook object, which is a subclass of Book.

10. Superclass-Subclass Relationship:

Answer: (C) A subclass can have only one superclass.
Explanation: In Java, a subclass can have only one superclass, implementing single inheritance.

11. Output of ArrayList Operations:

Answer: (C) [Cherry, Elderberry, Date]
Explanation: The code adds, modifies, and removes elements in the ArrayList fruits accordingly.

12. Result of removeA Method:

Answer: (E) ["B", "C", "D", “E”]
Explanation: The method removes all occurrences of "A" from the ArrayList words.

13. Expression matrix.length in 2D Array:

Answer: (A) The number of rows in the matrix.
Explanation: matrix.length returns the number of rows in a 2D array.

14. Length of 2D Array after Initialization:

Answer: (A) 4
Explanation: The code initializes a 2D array with varying row lengths, resulting in 4 rows.

15. Result of Recursive Method Call:

Answer: (D) 18
Explanation: The product method recursively adds 6 three times, resulting in 18.

16. Output of Code with Conditional Statement:

Answer: (A) 50 60 70 80
Explanation: The code modifies values based on conditions and prints the final array.

17. Purpose of 'new' Keyword:

Answer: (A) It creates a new instance of the Car class.
Explanation: The new keyword is used to create a new object instance.

18. Purpose of 'toString' Method:

Answer: (C) It converts an object to its string representation.
Explanation: The toString method is used to represent an object as a string.

19. Printed Output of Arithmetic Operations:

Answer: (A) 5
Explanation: The result of integer division a / b is 5.

20. Data Type for a Single Character:

Answer: (D) char
Explanation: The char data type is used to store a single character in Java.

21. Code for Given Output:

Answer: (E)
Explanation: The code prints the specified pattern.

22. Output of Code Segment with Increment/Decrement:

Answer: (B) 2
Explanation: The code decrements m before printing its value.

23. Printed Result of Arithmetic Operations:

Answer: (E) 18.5
Explanation: The code performs various arithmetic operations and prints the result.

24. Correct Code Segments:

Answer: (D) II and III
Explanation: Only the second and third code segments will run without error.

25. Output of Loop with 'continue' Statement:

Answer: (B) 1 2 4 5 7 8
Explanation: The loop skips printing multiples of 3 using continue.

26. Value of 'result' in Method Call:

Answer: (B) Number is: Odd
Explanation: The checkEvenOdd method is called with an odd number (37).

27. Printed Output of Nested Loops:

Answer: (B)

28. Comparison with Logical Operators:

Answer: (A) Only when x is different than the value of y
Explanation: The value of m will be true only when x is different than the value of y.

29. Purpose of 'break' Statement:

Answer: (D) Exits the loop when the condition 'num == 6' is true.
Explanation: The break statement exits the loop when the condition is true.

30. Value of 'total' in Class Inheritance:

Answer: (A) 8
Explanation: The calculateTotal method adds the values from the superclass and subclass.

31. Subclass-Superclass Relationship:

Answer: (B) No, a subclass can have only one superclass.
Explanation: Multiple inheritance is allowed in some programming languages, but not in Java.

32. Result of Recursive Method:

Answer: (C) 10
Explanation: The mystery method recursively adds numbers from 1 to 4.

33. Printed Output of Loop with Conditional Statement:

Answer: (C) 70 40 20 80
Explanation: The code modifies values based on conditions and prints the final array.

34. Correct Array Value Swapping:

Answer: (C)
Explanation: The code correctly swaps the values stored in data[2] and data[6].

35. Output of Loop with Multiplication Operation:

Answer: (C) 16
Explanation: The loop multiplies result by 2 four times, resulting in 16.

36. Value of 'x' after Nested Loop Execution:

Answer: (B) 84
Explanation: The code increments x multiple times within nested loops.

37. Printed Result of Arithmetic Operations:

Answer: (E) 35.0
Explanation: The code performs various arithmetic operations and prints the result.

38. Comparison of Strings with '==' Operator:

Answer: (B) It compares the references of the strings and returns true if they point to the same memory location.
Explanation: The == operator checks if two string references point to the same memory location.

39. Value of 'subMessage' in Substring Operation:

Answer: (B) "Programmin"

Explanation: The substring method extracts a portion of the original string.

40. Result of Calling substring(2, 2) on a String:

Answer: (A) An empty string.
Explanation: When the start and end indices are the same, an empty string is returned.

Practice Test 7

AP Computer Science A Exam - practice test 7

Section 1: Multiple-Choice Questions

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO.

At a glance
Total Time 1 hour 30 minutes **Number of Questions** 40 **Percent of Total Score** 50% **Writing Instrument** Pencil Required

Instructions

Section I of this examination contains 40 multiple-choice questions. Fill in only the ovals for numbers 1 through 40 on your answer sheet.

Indicate all of your answers to the multiple-choice questions on the answer sheet. No credit will be given for anything written in this exam booklet, but you may use the booklet for notes or scratch work. After you have decided which of the suggested answers is best, completely fill in the corresponding oval on the answer sheet. Give only one answer to each question. If you change an answer, be sure that the previous mark is erased completely. Here is a sample question and answer.

Sample Questions

Chicago is a

(A) state
(B) city
(C) country
(D) continent
(E) country

Sample Answers

Use your time effectively, working as quickly as you can without losing accuracy. Do not spend too much time on any one question. Go on to other questions and come back to the ones you have not answered if you have time. It is not expected that everyone will know the answers to all the multiple-choice questions.

About Guessing

Many candidates wonder whether or not to guess the answers to questions about which they are not certain. Multiple-choice scores are based on the number of questions answered correctly. Points are not deducted for incorrect answers, and no points are awarded for unanswered questions. Because points are not deducted for incorrect answers, you are encouraged to answer all multiple-choice questions. On any questions you do not know the answer to, you should eliminate as many choices as you can, and then select the best answer among the remaining choices.

COMPUTER SCIENCE A

SECTION I

TIME—-1 hour and 30 minutes

Number of Questions—-40

Percent of total exam grade—-50%

Directions: Determine the answer to each of the following questions or incomplete statements, using the available space for any necessary scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet. No credit will be given for anything written in the examination booklet. Do not spend too much time on any one problem.

Notes:

- Assume that the classes listed in the Quick Reference have been imported where appropriate.
- Assume that declarations of variables and methods appear within the context of an enclosing class.
- Assume that method calls that are not prefixed with an object or class name and are not shown within a complete class definition appear within the context of an enclosing class.
- Unless otherwise noted in the question, assume that parameters in the method calls are not null and that methods are called only when their preconditions are satisfied.

1. Consider the following code snippet:

```
int x = 5;
int y = 8;

if ((x > 3 && y < 10) || (x == 5 && y > 5)) {
  System.out.println("A");
} else if (x <= 3 && y >= 10) {
  System.out.println("B");
} else {
  System.out.println("C");
}
```

What is the output of the code?

(A) A
(B) B
(C) C
(D) A and C
(E) B and C

2. What is the output of the following code segment?

```
for (int x = 1; x <= 3; x++) {
    for (int z = 1; z <= 5; z += 2) {
        System.out.print((x + z) + " ");
    }
    System.out.println();
}
```

(A)

```
2  4  6
4  6  8
6  8  10
```

(B)

```
2  4  6
3  5  7
4  6  8
```

(C)

```
2  4  6
3  5  7
4  6  8
5  7  9
```

(D)

```
2  4  6
3  6  9
4  8  12
```

(E)

```
2  4  6
3  6  9
4  7  10
```

3. Which of the following code segments will produce the following output?

1 2 3 4 5
2 4 6 8 10
3 6 9 12 15
4 8 12 16 20
5 10 15 20 25

(A)
```
for (int x = 1; x <= 5; x++) {
    for (int z = 1; z <= 5; z++) {
        System.out.print(x * z + " ");
    }
    System.out.println();
}
```

(B)
```
for (int x = 1; x <= 5; x++) {
    for (int z = 1; z <= x; z++) {
        System.out.print(x * z + " ");
    }
    System.out.println();
}
```

(C)
```
for (int x = 1; x < 6; x++) {
    for (int z = 1; z <= 5; z++) {
        System.out.print(x * z + " ");
    }
    System.out.println();
}
```

(D)
```
for (int x = 1; x <= 5; x++) {
    for (int z = x; z <= 5; z++) {
        System.out.print(x * z + " ");
    }
    System.out.println();
}
```

(E)
```
for (int x = 1; x <= 5; x++) {
    for (int z = 0; z < 5; z++) {
        System.out.print(x * (z + 1) + " ");
    }
    System.out.println();
}
```

4. In Java, which of the following methods can be used to check if two strings have the same content?

(A) equals
(B) equalsIgnoreCase
(C) compare
(D) contentEquals
(E) similarTo

5. Consider the following code segment:

```
int a = 15, b = -25;

if (a < 0) {
    if (a > -50) {
        b = a * 2;
    if (b > 30) {
        a += 5;
        b = a - 10;
    } else {
        a = -a;
    }
  }
}
```

What values are stored in variables a and b after the execution of the code?

(A) `a = 15, b = 5`
(B) `a = 20, b = -20`
(C) `a = 15, b = -25`
(D) `a = -15, b = 15`
(E) `a = 10, b = -20`

6. What is printed as a result of executing the code segment?

```
int a = 11;
int b = 4;
double x = 11;
double y = 4;
System.out.print(a / b);
System.out.print(", ");
System.out.print(x / y);
System.out.print(", ");
System.out.print(a / y);
```

(A) 3, 2.75, 3
(B) 3, 2.75, 2.75
(C) 2, 3, 2
(D) 2, 2.75, 2.75
(E) Nothing will be printed because of a compile-time error.

7. Consider the following classes:

```
public class Printer
{
```

```
    public void print(int num)
    {
       System.out.println("int: " + num);
    }
    public void print(String str)
    {
       System.out.println("String: " + str);
    }
}


Printer p = new Printer();
p.print(42);
```

What will be the result of executing the following code?

(A) "int: 42"
(B) "String: 42"
(C) Compile-time error
(D) Run-time error
(E) No output

8. Consider the following recursive method:

```
public static void mystery(int n) {
  if (n > 0) {
    System.out.print(n + " ");
    mystery(n - 1);
  }
}
```

What is printed from the method call mystery(4)?

(A) 4 3 2 1
(B) 1 2 3 4
(C) 4 4 4 4
(D) 1 1 1 1
(E) Compilation error

9. What is the primary reason for using class inheritance in Java?

(A) To allow a class to have multiple parents
(B) To enable the creation of multiple instances of a class
(C) To promote code reusability and establish an 'is-a' relationship
(D) To add new methods to a class
(E) To restrict access to certain class members

10. What is the relationship between a superclass and a subclass?

(A) A subclass can have multiple superclasses.
(B) A superclass can have multiple subclasses.
(C) A subclass can have only one superclass.
(D) A superclass can have only one subclass.
(E) A subclass can have an unlimited number of superclasses.

11. Which of the following code combinations correctly calculate the final price of a discounted product with a 20% discount?

```
public class Product {
    protected double price;
```

```
    // ... rest of the code
}

public class DiscountedProduct extends Product {
    private double discount;

    // ... rest of the code
}
```

(A)
```
Product prod1 = new Product(100.0);
System.out.println(prod1.getPrice());
```
(B)
```
DiscountedProduct discountProd1 = new
DiscountedProduct(80.0, 0.2);
System.println(discountProd1.getPrice();
```
(C)
```
Product prod2 = new DiscountedProduct(120.0, 0.25);
System.println(prod2.getPrice());
```
(D)
```
DiscountedProduct discountProd2 = new
DiscountedProduct(50.0, 0.1);
System.println(discountProd2.getPrice());
```
(E)
```
DiscountedProduct discountProd3 = new
DiscountedProduct(100.0, 0.2);
System.out.println(discountProd3.getPrice());
```

12. In Java, you want to create a 2D array of integers named matrix with 4 rows and 3 columns and initialize it in the constructor of a class. Which of the following code snippets accomplishes this correctly?

(A) `int[][] matrix = new int[4][3];`

(B) `int matrix[][] = new int[3][4];`

(C) `matrix = a new int[4, 3];`

(D) `matrix = new int[][]{{1, 2, 3}, {4, 5, 6}, {7, 8, 9}, {10, 11, 12}};`

(E) `int[][] matrix = new int[][]{{1, 2, 3}, {4, 5, 6}, {7, 8, 9}, {10, 11, 12}};`

13. Given the code segment:

```
ArrayList names = new ArrayList<>();
names.add("Alice");
names.add("Bob");
names.add(0, "Cathy");
names.add("David");
names.set(2, "Ella");
names.remove(1);
System.out.println(names);
```

What is printed as a result of executing the code segment?

(A) [Alice, Bob, Cathy, David, Ella]
(B) [Alice, Cathy, David, Ella]
(C) [Cathy, Ella, David]
(D) [Alice, David, Ella]
(E) [Alice, Cathy, David, Ella]

14. Consider the following array declaration: int[] numbers = {3, 1, 4, 1, 5};
What will be the output of the code?

```
int sum = 0;
for (int num : numbers) {
    sum += num;
    if (num == 4) {
        break;
    }
}
System.out.println(sum);
```

(A) 8
(B) 9
(C) 10
(D) 11
(E) Compilation error

15. Method mod3 is intended to return the number of integers in the array numbers that are evenly divisible by 3. Which of the following code segments could be used to replace the mystery code so that mod3 will work as intended?

```
public static int mod3(int[] numbers)
{
   int count = 0;
   for (int i = 0; i < numbers.length; i++)
   {
      /* mystery code */
   }
   return count;
}
```

```
I. if (i % 3 == 0) { count++; }
II. if (numbers[i] % 3 == 0) { count++; }
III. while (numbers[i] % 3 == 0) { count++; }
```

(A) I only
(B) II only
(C) III only
(D) I and II
(E) II and III

16. What is the output of the following code snippet?

```
String[] fruits = {"Apple", "Banana", "Orange"};
for (String fruit : fruits) {
  System.out.print(fruit.substring(0, 2) + " ");
}
```

(A) Ap Ba Or
(B) Ap Ba Oran
(C) Ap Ba O
(D) A Ba O
(E) Compilation error

17. Consider the following code:

```
String str1 = "Hello";
String str2 = "World";
String result = str1 + str2;
System.out.println(result);
```

What is the output of the following code snippet?

(A) Hello
(B) World
(C) HelloWorld
(D) Hello World
(E) Error

18. Consider the following code snippet:

```
int sum = 0;
for (int i = 0; i < 10; i++) {
  for (int j = 0; j < 5; j++) {
    if (i % 2 == 0 && j % 2 == 1) {
      sum += i + j;
    }
  }
}
System.out.println(sum);
```

What is the output of the code?

(A) 60
(B) 70
(C) 75
(D) 80
(E) 85

19. Consider the following code snippet:

```
int x = 8;
int y = 5;
boolean result = (x > 5 && y < 10) || (x == 8 && y
> 5) && (x % 2 == 0);
```

What is the value of 'result'?

(A) true
(B) false
(C) It throws a runtime error.
(D) It depends on the initial values of x and y.
(E) It depends on the value of another variable.

20. Consider the following code segment:

```
int a = 12, b = 8;
if (a > 10 && b < 15)
  a += 5;
else
  b -= 3;
int a = 12, b = 8;
```

What values are stored in variables a and b after the execution of the code?

(A) `a = 12, b = 8`
(B) `a = 17, b = 8`
(C) `a = 12, b = 5`
(D) `a = 17, b = 5`
(E) `a = 12, b = 2`

21. Consider the following code segment:

```
int numbers[] = {2, 6, 4, 8, 10};

if (numbers[2] % 2 == 0)
   numbers[2] += 3;

else
   numbers[2] -= 2;
```

What is the value of numbers[2] after the execution of the code?

(A) 4
(B) 7
(C) 2
(D) 6
(E) 10

22. Consider the following code segment:

```
int matrix[][] = {{1, 2, 3}, {4, 5, 6}, {7, 8, 9}};

if (matrix[2][1] % 2 == 0)
  matrix[2][1] += 4;
else
  matrix[2][1] -= 2;
```

What is the value of matrix[2][1] after the execution of the code?

(A) 6
(B) 12
(C) 8
(D) 10
(E) 4

23. Consider the following code segment:

```
int a = 15, b = 7;

if (a % 2 == 0)
   a += 3;
else
   a *= 2;

b = a / 4;
```

What is the value of variable 'b' after the execution of the code?

(A) 4
(B) 5
(C) 6
(D) 7
(E) 8

24. Write a class named '`Rectangle`' that has attributes length and width. Include a method '`calculateArea()`' that computes and returns the area of the rectangle as a decimal value.

Which of the following code snippets correctly defines the '`Rectangle`' class and its '`calculateArea()`' method?

(A)
```
public class Rectangle {
  int length, width;
  public int calculateArea() {
    return length * width;
```

```
  }
}
```

(B)

```
public class Rectangle {
  int length, width;
  public void calculateArea() {
    return length * width;
  }
}
```

(C)

```
public class Rectangle {
  int length, width;
  public int calculateArea() {
    return 2 * (length + width);
  }
}
```

(D)

```
public class Rectangle {
  int length, width;
  public int calculateArea() {
    return length + width;
  }
}
```

(E)

```
public class Rectangle {
```

```
  int length, width;
  public double calculateArea() {
    return length * width;
  }
}
```

25. Consider the following code snippet:

```
public class TriangleTypeChecker {

  public static void main(String[] args) {
    int a = 3, b = 4, c = 5;
    String result = checkTriangleType(a, b, c);
    System.out.println(result);
  }

  static String checkTriangleType(int side1, int
side2, int side3) {
    if (side1 == side2 && side2 == side3) {
      return "Equilateral";
    } else if (side1 == side2 || side2 == side3 ||
side3 == side1) {
      return "Isosceles";
    } else {
      return "Scalene";
    }
  }
}
```

What is the value of 'result'?

(A) Equilateral

(B) Isosceles
(C) Scalene
(D) It throws a runtime error.
(E) It depends on the initial values of a, b, and c.

26. Consider the following code segment:

```
int g = 5, h = 12;

if (g < 10 && h > 15)
  g += 3;
else
  h -= 5;
```

What values are stored in variables g and h after the execution of the code?

(A) g = 5, h = 12
(B) g = 8, h = 7
(C) g = 8, h = 12
(D) g = 5, h = 7
(E) g = 8, h = 5

27. Consider the code segment:

```
ArrayList values = new ArrayList<>();
values.add(10);
values.add(20);
values.add(30);
values.add(40);
values.set(1, 25);
values.remove(2);
System.out.println(values);
```

What is printed as a result of executing the code segment?

(A) [10, 30, 40, 25]
(B) [10, 25, 30, 40]
(C) [10, 25, 40]
(D) [10, 30, 25]
(E) [10, 25, 30, 25]

28. Which of the following Java code snippets correctly initializes and fills a 2D array named table such that each element `table[i][j]` contains the product of `i` and `j` for `0 <= i < m` and `0 <= j < n`?

(A)

```
for (int i = 0; i < m; i++) {
    for (int j = 0; j < n; j++) {
     table[i][j] = i + j;
    }
```

(B)

```
for (int i = 0; i < m; i++) {
    for (int j = 0; j < n; j++) {
     table[i][j] = i * j;
    }
```

(C)

```
for (int i = 0; i < m; i++) {
    for (int j = 0; j < n; j++) {
     table[i][j] = i / j;
    }
```

(D)

```
for (int i = 1; i <= m; i++) {
    for (int j = 1; j <= n; j++) {
     table[i][j] = i * j;
    }
```

(E)

```
for (int i = 0; i < m; i++) {
    for (int j = 0; j < n; j++) {
     table[i][j] = i - j;
    }
```

29. Consider the following recursive method:

```
public static int mystery(int num) {
  if (num <= 0) {
    return 0;
  }
  return num + mystery(num - 1);
}
```

What is the output of the method call `mystery`(5)?

(A) 15
(B) 10
(C) 25
(D) 5
(E) Compilation error

30. Consider the following code segment:

```
int m = 25, n = -30;

if (m < 30) {
    if (m > 20) {
        n = m * 3;
        if (n > 60) {
            m -= 10;
        }
        n = m + 5;
        } else {
            m = -m;
        }
    }
}
```

What values are stored in variables m and n after the execution of the code?

(A) `m = 15, n = 20`
(B) `m = 15, n = 35`
(C) `m = 25, n = 20`
(D) `m = 15, n = -5`
(E) `m = -25, n = -5`

31. What will be printed to the console?

```
int x = 5;
int y = 2;
int z = x / y;
System.out.println(z);
```

(A) 2
(B) 2.0
(C) 2.5
(D) 5
(E) Nothing will be printed because of a compile-time error.

32. Which of the following is the correct way to declare an array of integers with a size of 5 in Java?

(A) `int arr[5];`
(B) `arr[5] int;`
(C) `int[5] arr;`
(D) `int[] arr = new int[5];`
(E) `int arr[] = new int[5];`

33. Which of the following is the correct way to declare and initialize a float variable with the value 3.14 in Java?

(A) `float pi = 3.14;`
(B) `float pi = 3.14f;`

(C) `float pi = (float) 3.14;`
(D) `pi = 3.14f;`
(E) `float pi = "3.14";`

34. Consider the following code segment:

```
int array[][] = {{5, 10, 15}, {20, 25, 30}};
if (array[0][2] > array[1][1])
    array[1][1] += 8;
else
    array[0][2] -= 5;
```

What is the value of array[1][1] after the execution of the code?

(A) 10
(B) 18
(C) 25
(D) 33
(E) 15

35. Given the code snippet:

```
String message = "AP Computer Science A";
String subMessage = message.substring(3, 12);
```

What will be the value of the variable 'subMessage'?

(A) "Computer"
(B) "Computer "
(C) " Computer"
(D) "Compute"
(E) "AP Compute"

36. Consider the following method:

```
public void eliminateDuplicates(ArrayList numbers) {
   int i = 0;
   while (i < numbers.size() - 1) {
      if (numbers.get(i).equals(numbers.get(i + 1))) {
          numbers.remove(i + 1);
   }
   i++;
  }
}
```

If the ArrayList numbers contains the values [3, 2, 2, 1, 1, 4, 4, 4], what will numbers contain after executing the eliminateDuplicates method?

(A) [3, 2, 1, 4]
(B) [3, 2, 1, 4, 4]
(C) [3, 2, 1, 1, 4]
(D) [3, 2, 1, 1, 4, 4]

(E) [3, 2, 1, 1, 4, 4, 4]

37. Which of the following is true regarding 2D arrays in Java?

(A) All rows in a 2D array must have the same length.
(B) A 2D array can be resized after its initial declaration.
(C) You can use a for-each loop to modify elements within a 2D array.
(D) A 2D array can contain elements of different data types.
(E) You can declare a 2D array without specifying the number of rows and columns.

38. If a client program executes the following statement: `Bicycle bicycle = new Bicycle();` Which of the following represents the resulting output?

```
public class Vehicle {
    protected String type;

    Vehicle(String type) {
        this.type = type;
        System.out.println("A " + type + " vehicle is
created.");
    }

    public String getType() {
        return type;
    }
}

public class Car extends Vehicle {
    Car() {
        super("car");
```

```
        System.out.println("Cars are a popular mode of
transportation.");
    }
}

public class Bicycle extends Vehicle {
    Bicycle() {
        super("bicycle");
        System.out.println("Bicycles are eco-friendly.");
    }
}
```

(A) A bicycle vehicle is created.
(B) Bicycles are eco-friendly.
(C) Bicycles are eco-friendly. A bicycle vehicle is created.
(D) A bicycle vehicle is created. Bicycles are eco-friendly.
(E) A bicycle vehicle is created. Bicycles are eco-friendly. Bicycles are eco-friendly.

39. What is the result of the following expression: 7 / 3?

(A) 2
(B) 2.33
(C) 3
(D) 2.0
(E) 2.333

40. Consider the following code segment:

```
int k = 10, l = -15;
if (k > 5) {
    if (k < 15) {
        l = k * 2;
        if (l > -10) {
            k -= 5;
        }
        l = k + 3;
        } else {
            k = -k;
        }
    }
}
```

What values are stored in variables k and l after the execution of the code?

(A) k = 5, l = 8
(B) k = 5, l = 3
(C) k = 10, l = 8
(D) k = 5, l = -2
(E) k = -10, l = -2

Answer Explanations - practice test 7

1. Output of the Code Snippet:

Answer: (A) A
Explanation: The condition (x > 3 && y < 10) || (x == 5 && y > 5) is true, so "A" is printed. Hence, (A) is correct

2. Output of Nested For Loop:

Answer: (B)
Explanation: The nested loop prints the sum of x and z for each iteration, resulting in the given output.

3. Code for Given Output:

Answer: (E)
Explanation: The nested loop with conditions generates the specified output.

4. String Comparison in Java:

Answer: (A) equals
Explanation: equals is used for comparing strings.

5. Values of Variables After Execution:

Answer: (C) `a = 15, b = -25`
Explanation: The conditional statements modify the values of 'a' and 'b' accordingly.

6. Output of Arithmetic Operations:

Answer: (D) 2, 2.75, 2.75
Explanation: The code prints the results of integer and double division.

7. Result of Method Invocation:

Answer: (A) "int: 42"
Explanation: The method print(int num) is called, resulting in the specified output.

8. Output of Recursive Method:

Answer: (A) 4 3 2 1
Explanation: The method recursively prints numbers in decreasing order.

9. Primary Use of Class Inheritance:

Answer: (C) To promote code reusability and establish an 'is-a' relationship
Explanation: Inheritance is primarily used for code reuse and to model "is-a" relationships.

10. Relationship Between Superclass and Subclass:

Answer: (C) A subclass can have only one superclass.
Explanation: In Java, a class can extend only one superclass.

11. Calculating Final Price with Discount:

Answer: (E)
Explanation: The DiscountedProduct class extends the Product class and has a constructor that takes the original price and discount as parameters.
In option (E), a DiscountedProduct object discountProd3 is created with an original price of 100.0 and a discount of 20% (0.2).

The getPrice() method of the DiscountedProduct class is then called, which calculates and returns the final discounted price.
The System.out.println() statement prints the final price to the console.

12. Array Manipulation

Answer: (A)
Explanation: Option (A) initializes a 2D array matrix with 4 rows and 3 columns using the syntax new int[4][3].

13. ArrayList Manipulation Output:

Answer: (C) [Cathy, Ella, David]
Explanation: The ArrayList is manipulated with various methods, resulting in the given output.

14. Output of For Loop with Break Statement:

Answer: (A) 8
Explanation: The loop iterates until the value 4 is encountered and then breaks.

15. Code Segments for mod3 Method:

Answer: (B) II only
Explanation: Option (II) correctly checks if the element at the current index i in the array numbers is evenly divisible by 3 (numbers[i] % 3 == 0) and increments the count accordingly. This is suitable for counting the number of integers in the array that are divisible by 3. Options (I) and (III) do not correctly achieve the intended functionality.

16. Output of String Array Loop:

Answer: (A) Ap Ba Or
Explanation: It prints the first two characters of each string in the array.

17. Output of String Concatenation:

Answer: (C) HelloWorld

Explanation: The strings "Hello" and "World" are concatenated.

18. Nested Loop and Conditional Sum:

Answer: (A) 60

Explanation: The nested loop adds values (i + j) only when i is even and j is odd.

19. Boolean Expression Evaluation:

Answer: (A) true

Explanation: The value of result is false because the given boolean expression evaluates to true.

20. Values of Variables After Execution:

Answer: (B) `a = 17, b = 8`

Explanation: The values of a and b remain unchanged because the condition in the if statement is false.

21. Array Element Manipulation:

Answer: (B) 7

Explanation: The code adds 3 to the original value of numbers[2], resulting in 7.

22. 2D Array Element Modification:

Answer: (B) 12

Explanation: The value of matrix[2][1] is modified by adding 4 to the original value.

23. Variable 'b' After Execution:

Answer: (D) 7

Explanation: The value of 'b' is calculated based on the conditional statements.

24. Correct Rectangle Class Definition:

Answer: (E)
Explanation: The method calculateArea() returns a double, which is consistent with the definition of the area for a rectangle.

25. Triangle Type Determination:

Answer: (C) Scalene
Explanation: The given sides (3, 4, 5) form a Scalene triangle.

26. Values of Variables After Execution:

Answer: (D) g = 5, h = 7
Explanation: The conditional statements modify the values of 'g' and 'h' accordingly.

27. ArrayList Manipulation Output:

Answer: (C) [10, 25, 40]
Explanation: The ArrayList is manipulated by adding, setting, and removing elements, resulting in the given output.

28. 2D Array Initialization for Product:

Answer: (B)
Explanation: The code initializes a 2D array and fills it with the product of indices (i * j).

29. Output of Recursive Method:

Answer: (A) 15
Explanation: The method recursively sums the numbers from 1 to 5.

30. Values of Variables After Execution:
Answer: (A) `m = 15, n = 20`
Explanation: The conditional statements modify the values of 'm' and 'n' accordingly.

31. Output of Arithmetic Operation:
Answer: (A) 2
Explanation: The integer division of 7 by 3 results in 2.

32. Correct Array Declaration in Java:
Answer: (D) int[] arr = new int[5];
Explanation: This correctly declares an array of integers with a size of 5.

33. Correct Float Variable Initialization:
Answer: (B) float pi = 3.14f;
Explanation: Adding 'f' at the end specifies the literal as a float.

34. 2D Array Element Modification:
Answer: (C) 25
Explanation: The value of array[1][1] is modified based on the condition.

35. Substring Value from a String:
Answer: (A) "Computer"
Explanation: The substring is obtained from index 3 to 11.

36. ArrayList Duplicates Elimination:
Answer: (B) [3, 2, 1, 4, 4]
Explanation: Duplicates are eliminated, resulting in the given output.

37. True Statements About 2D Arrays:
Answer: (A) All rows in a 2D array must have the same length.
Explanation: In Java, all rows in a 2D array must have the same length.

38. Output of Object Instantiation:
Answer: (D) A bicycle vehicle is created. Bicycles are eco-friendly.
Explanation: The constructors are called in the specified order.

39. Result of Arithmetic Expression:
Answer: (A) 2
Explanation: The division of two integers results in an int value.

40. Values of Variables After Execution:
Answer: (A) k = 5, l = 8
Explanation: The conditional statements modify the values of 'k' and 'l' accordingly.

Practice Test 8

AP Computer Science A Exam - practice test 8

Section 1: Multiple-Choice Questions

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO.

At a glance
Total Time 1 hour 30 minutes **Number of Questions** 40 **Percent of Total Score** 50% **Writing Instrument** Pencil Required

Instructions

Section I of this examination contains 40 multiple-choice questions. Fill in only the ovals for numbers 1 through 40 on your answer sheet.

Indicate all of your answers to the multiple-choice questions on the answer sheet. No credit will be given for anything written in this exam booklet, but you may use the booklet for notes or scratch work. After you have decided which of the suggested answers is best, completely fill in the corresponding oval on the answer sheet. Give only one answer to each question. If you change an answer, be sure that the previous mark is erased completely. Here is a sample question and answer.

Sample Questions

Chicago is a

(A) state
(B) city
(C) country
(D) continent
(E) country

Sample Answers

Use your time effectively, working as quickly as you can without losing accuracy. Do not spend too much time on any one question. Go on to other questions and come back to the ones you have not answered if you have time. It is not expected that everyone will know the answers to all the multiple-choice questions.

About Guessing

Many candidates wonder whether or not to guess the answers to questions about which they are not certain. Multiple-choice scores are based on the number of questions answered correctly. Points are not deducted for incorrect answers, and no points are awarded for unanswered questions. Because points are not deducted for incorrect answers, you are encouraged to answer all multiple-choice questions. On any questions you do not know the answer to, you should eliminate as many choices as you can, and then select the best answer among the remaining choices.

COMPUTER SCIENCE A

SECTION I

TIME—-1 hour and 30 minutes

Number of Questions—-40

Percent of total exam grade—-50%

Directions: Determine the answer to each of the following questions or incomplete statements, using the available space for any necessary scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet. No credit will be given for anything written in the examination booklet. Do not spend too much time on any one problem.

Notes:

- Assume that the classes listed in the Quick Reference have been imported where appropriate.
- Assume that declarations of variables and methods appear within the context of an enclosing class.
- Assume that method calls that are not prefixed with an object or class name and are not shown within a complete class definition appear within the context of an enclosing class.
- Unless otherwise noted in the question, assume that parameters in the method calls are not null and that methods are called only when their preconditions are satisfied.

1. Consider the following code:

```
double num = 7.5;
System.out.println((int) num);
```

What will be printed as output?

(A) 7
(B) 7.5
(C) 8
(D) num
(E) 0

2. Consider the following code:

```
String s1 = "Hello ";
String s2 = "World";
System.out.println(s1.concat(s2));
```

What will be printed as output?

(A) HelloWorld
(B) Hello World
(C) s1 + s2
(D) null
(E) Hello

3. How does a subclass inherit properties and methods from its superclass in Java?

(A) By creating new properties and methods
(B) By automatically inheriting all members without any declaration
(C) By explicitly copying them from the superclass
(D) By overriding them with new implementations
(E) By blocking access to them

4. Which of the following code snippets will correctly print 'Drawing a circle'?

```
public class Shape {
    public void draw() {
        System.out.println("Drawing a shape");
    }
}

public class Circle extends Shape {
    public void draw() {
        System.out.println("Drawing a circle");
    }

    // ... rest of the code
}

public class Rectangle extends Shape {
    public void draw() {
        System.out.println("Drawing a rectangle");
    }
}
```

(A) Shape s = new Circle(); s.draw();
(B) Circle c = new Circle(); c.draw();
(C) Shape s = new Rectangle(); s.draw();
(D) Circle c = new Shape(); c.draw();
(E) Rectangle r = new Shape(); r.draw();

For questions 5–6, consider the following classes:

```
public class Bread {
  public String smell() {
    return "Freshly baked bread smells good";
  }
}

public class Pastry extends Bread {
  public String taste() {
    return "Pastries taste sweet";
  }
}

public class Croissant extends Pastry {
  public String art() {
    return "Baking croissants is an art";
  }

  @Override
  public String toString() {
    return "Croissant";
  }
}
```

5. If a client program executes the following statement:

```
Croissant c = new Croissant();
System.out.println(c.art());
```

Which of the following represents the resulting output?

(A) Freshly baked bread smells good
(B) Pastries taste sweet
(C) Baking croissants is an art
(D) Freshly baked bread smells good Pastries taste sweet
(E) Pastries taste sweet Baking croissants is an art Freshly baked bread smells good

6. If a client program executes the following statements:

```
Croissant c = new Croissant();
System.out.println(c);
```

(A) Freshly baked bread smells good
(B) Croissant
(C) Baking croissants is an art
(D) Freshly baked bread smells good Pastries taste sweet
(E) Pastries taste sweet Baking croissants is an art Freshly baked bread smells good

7. Consider the following code segment:

```
final int[] a1 = {1, 2};
int[] b1 = {3, 4};
a1 = b1;
System.out.print(a1[1]);
```

What is printed as a result of executing the code segment?

(A) 2
(B) 3
(C) 4
(D) Nothing will be printed due to a compile-time error.
(E) Nothing will be printed due to a run-time error.

8. What is the result of the following code snippet?

```
int[] arr = {5, 3, 7, 1, 8};
int mystery = arr[0];
for (int i = 1; i < arr.length; i++) {
  if (arr[i] > mystery) {
    mystery = arr[i];
  }
}
System.out.println(mystery);
```

(A) 5
(B) 8
(C) 7
(D) 1

(E) Compilation error

9. What does a merge sort do during the sorting process?

(A) It rearranges elements randomly
(B) It selects elements in a sorted order
(C) It recursively divides, sorts, and merges smaller subarrays
(D) It moves elements to the end of the array

10. Consider the following array declaration:

int[][] matrix = new int[3][4];

What is the size of the matrix?

(A) 3
(B) 4
(C) 7
(D) 12
(E) Compilation error

11. Consider the following recursive method:

```
public static void mystery(int num) {
  if (num >= 0) {
    System.out.print(num + " ");
    mystery(num - 1);
  }
}
```

What is the output of the method call `mystery(3)`?

(A) 3 2 1 0
(B) 0 1 2 3
(C) 1 1 1 1
(D) 3 3 3 3
(E) Compilation error

12. Consider the following code snippet:

```
public class LeapYearChecker {
  public static void main(String[] args) {
    int year = 2020;
    boolean isLeapYear = checkLeapYear(year);
    System.out.println("Is " + year + " a leap
year? " + isLeapYear);
  }

  static boolean checkLeapYear(int year) {
    if (year % 4 == 0) {
      if (year % 100 != 0 || (year % 100 == 0 &&
year % 400 == 0)) {
        return true;
      }
    }
    return false;
  }
}
```

What is the output of the code?

(A) Is 2020 a leap year? true
(B) Is 2020 a leap year? false
(C) Is 2020 a leap year? It throws a runtime error.
(D) Is 2020 a leap year? It depends on the initial value of the year.
(E) Is 2020 a leap year? It depends on the value of another variable.

13. Given the code snippet:

```
for (int i = 1; i <= 5; i++) {
    if (i % 2 == 0) {
        System.out.print(i + " ");
        continue;
    }
    System.out.print("* ");
}
```

What is the output of this code?

(A) `"1 * 2 * 3 * 4 * 5 "`
(B) `"1 2 3 4 5 "`
(C) `"1 * 2 * 3 * 4 * 5"`
(D) `"1 * 2 * 3 4 5 "`
(E) `"* 2 * 4 * "`

14. Given the boolean expression:

```
!(true || false) && (true && false)
```

what is the result of this expression?

(A) true
(B) false
(C) true in some cases and false in others
(D) It results in a runtime error.
(E) It depends on the order of evaluation.

15. Consider the class definition:

```
public class Rectangle {
    private int width;
    private int height;

    public Rectangle(int w, int h) {
        width = w;
        height = h;
    }
}
```

What is the purpose of the 'public' keyword in the code below?

(A) It defines a method accessible only within the class.
(B) It specifies a constant variable.
(C) It denotes the main method of the class.
(D) It makes the class accessible from other classes.
(E) It represents an abstract method.

16. In Java, what is the result of comparing two strings using the == operator?

```
String str1 = new String("Hello");
String str2 = new String("Hello");
boolean result = (str1 == str2);
```

What does the following expression evaluate to?

(A) true
(B) false
(C) It throws a compile-time error.
(D) It compares the contents of the strings and returns true if they are equal.
(E) It compares the references of the strings and returns true if they point to the same memory location.

17. Given the code:

```
for (int x = 3; x <= 6; x++) {
    for (int z = 1; z <= x; z++) {
        System.out.print((x * z) + " ");
    }
    System.out.println();
}
```

What is the output of this code?

(A)
```
3 6 9
9 12 15
12 15 18 21
```

(B)
```
3  6  9
9  12 15
12 16 20 24
```
(C)
```
3  6  9
9  12 15
12 16 20 24
16 20 24 28
```
(D)
```
3  6  9
9  12 15
12 15 18 21
15 18 21 24
```
(E)
```
3  6  9
4  8  12 16
5  10 15 20 25
6  12 18 24 30 36
```

18. Consider the code snippet:

```
int a = 0;
for (int i = 0; i < 6; i++) {
    for (int j = 0; j <= 3; j++) {
        for (int k = 1; k <= 16; k = k * 2) {
         a++;
        }
    }
}
```

What is the value of a after the code segment executes?

(A) 120
(B) 130
(C) 140
(D) 150
(E) 160

19. In the following code segment:

```
int p = 12;
int q = p / 3;
int r = p % 4;
p++;
System.out.println(p);
```

What is printed as a result of executing the code segment above?

(A) 13
(B) 14

(C) 15
(D) 16
(E) 17

20. Which of the following code segments will run without error?

I.
```
int a = 10;
int b = 20;
int c = 5;

if (a < b && 0 < b/c) {
    System.out.println("Marge");
}

else {
    System.out.println("Lisa");
}
```

II.
```
int x = 10;
int y = 20;
int z = 0;

if (x > y && 10 < y/z)
    System.out.println("Homer");
else
    System.out.println("Bart");
```

III.

```
int p = 25;
int q = 35;
int r = 0;

if (p > q || 10 < q/r)
    System.out.println("Maggie");
else
    System.out.println("Bart");
```

(A) I only
(B) II only
(C) III only
(D) I and II
(E) I, II, and III

21. Consider the following code segment:

```
int u = -15, v = 30;
if (u > -20) {
  if (u < -10) {
    v = u * 2;
    if (v < 20) {
      u += 5;
    }
    v = u - 10;
  } else {
    u = -u;
  }
}
```

What values are stored in variables u and v after the execution of the code?

(A) u = -10, v = 15
(B) u = -10, v = 0
(C) u = -10, v = -20
(D) u = -10, v = 20
(E) u = 10, v = -20

22. Consider the code segment:

```
ArrayList scores = new ArrayList<>();
scores.add(75);
scores.add(63);
scores.add(52);
scores.add(80);
scores.set(2, 70);
scores.remove(1);
System.out.println(scores);
```

What is printed as a result of executing the code segment?

(A) [75, 52, 80]
(B) [75, 52, 70]
(C) [75, 70, 80]
(D) [75, 80, 70]
(E) [75, 52, 70]

23. Consider the method:

```
public void filterWords(ArrayList words) {
    int i = 0;
    while (i < words.size()) {
        if (words.get(i).length() < 5) {
            words.remove(i);
        } else {
            i++;
        }
    }
}
```

If the ArrayList words contains the values ["apple", "banana", "pear", "kiwi", "grape"], what will words contain after executing the filterWords method?

(A) ["pear", "banana"]
(B) ["apple", "banana", "grape"]
(C) ["apple", "banana", "pear", "kiwi", "grape"]
(D) ["apple", "banana", "kiwi", "grape"]
(E) []

24. Consider the following code segment:

```
int[][] matrix = {{1, 2, 3}, {4, 5, 6}, {7, 8, 9}};

if (matrix[2][1] % 2 == 0)
    matrix[2][1] += 4;
else
    matrix[2][1] -= 2;
```

What is the value of matrix[2][1] after the execution of the code?

(A) 6
(B) 12
(C) 8
(D) 10
(E) 4

25. Which of the following code snippets correctly initializes a 2D array and fills it with sequential values starting from 1?

(A)
```
int[][] arr = new int[3][4];
for (int i = 1; i <= 3; i++) {
    for (int j = 1; j <= 4; j++) {
     arr[i][j] = i * j;
    }
}
```

(B)
```
int[][] arr = new int[3][4];
int value = 1;
for (int i = 0; i < 3; i++) {
    for (int j = 0; j < 4; j++) {
     arr[i][j] = value;
     value++;
    }
}
```

(C)
```
int[][] arr = new int[4][3];
for (int i = 0; i < 4; i++) {
    for (int j = 0; j < 3; j++) {
     arr[i][j] = i + j;
    }
}
```

(D)
```
int[][] arr = new int[3][4];
for (int i = 1; i <= 3; i++) {
    for (int j = 1; i <= 4; j++) {
     arr[i - 1][j - 1] = i * j;
    }
}
```

(E)
```
int[][] arr = new int[3][4];
for (int i = 1; i <= 3; i++) {
    for (int j = 1; j <= 4; j++) {
     arr[j][i] = i * j;
    }
}
```

26. In Java, you want to create a 2D array of integers named matrix with 4 rows and 3 columns and initialize it in the constructor of a class. Which of the following code snippets accomplishes this correctly?

(A) `int[][] matrix = new int[4][3];`
(B) `int matrix[][] = new int[3][4];`
(C) `matrix = a new int[4, 3];`
(D) `matrix = new int[][]{{1, 2, 3}, {4, 5, 6}, {7, 8, 9}, {10, 11, 12}};`
(E) `int[][] matrix = new int[][]{{1, 2, 3}, {4, 5, 6}, {7, 8, 9}, {10, 11, 12}};`

27. In Java, what is the maximum number of classes that a single class can extend?

(A) None
(B) 1
(C) 2
(D) 3
(E) There is no maximum limit.

28. Consider the following recursive method:

```
public int mystery(int n) {
    if (n == 1)
      return 1;
    else
      return n + sum(n - 1);
}
```

What value is returned as a result of the call `mystery(7)`?

(A) 7
(B) 14
(C) 21
(D) 28
(E) 36

29. Consider the following code snippet:

```
public class DiscountVerifier {

  public static void main(String[] args) {

    double purchaseAmount = 150.0;
    boolean result =
isEligibleForDiscount(purchaseAmount);

    System.out.println("Eligible for discount? " +
result);
  }

  static boolean isEligibleForDiscount(double
amount) {

    return amount > 100 && amount <= 200;

  }

}
```

What is the value of 'result'?

(A) Eligible for discount? true
(B) Eligible for discount? false
(C) Eligible for discount? It throws a runtime error.
(D) Eligible for discount? It depends on the initial value of purchaseAmount.
(E) Eligible for discount? It depends on the value of another variable.

30. Consider the following code snippet:

```
public class ShoppingCart {
  public static void main(String[] args) {
    int itemCount = 5;
    double itemPrice = 25.0;
    double total = calculateTotal(itemCount,
itemPrice);
    System.out.println("Total cost: $" + total);
  }

  static double calculateTotal(int count, double
price) {
    if (count > 0 && price > 0) {
      return count * price;
    } else {
      return 0.0;
    }
  }
}
```

What is the output of the code?

(A) Total cost: $125.0
(B) Total cost: $0.0
(C) Total cost: $5.0
(D) Total cost: $25.0
(E) Total cost: $125.0

31. Consider the following code snippet:

```
int x = 12;
int y = 8;
boolean result = (x > 10) ? (y > 5) : (x % 3 == 0)
&& (y < 10);
```

What is the value of 'result'?

(A) true
(B) false
(C) It throws a runtime error.
(D) It depends on the initial values of x and y.
(E) It depends on the value of another variable.

32. In the following statement:

```
boolean c = (x || y) && !(x && y);.
```

Under what conditions will the value of c be true?

(A) Only when x is different than the value of y
(B) Only when x is the same as the value of y
(C) Only when x and y are both true
(D) Only when x and y are both false
(E) The value of c will be true for all values of x and y.

33. . Consider the code snippet:

```
int a = 0;
for (int i = 0; i < 6; i++) {
    for (int j = 0; j <= 3; j++) {
        for (int k = 1; k <= 8; k = k * 3) {
            a++;
        }
    }
}
```

What is the value of a after the code segment executes?

(A) 40
(B) 48
(C) 56
(D) 64
(E) 72

34. Consider the following code segment:

```
int x = -10, y = 20;
if (x > 0) {
    if (x < 50) {
        y = x * 2;
        if (y < 30) {
            x += 5;
        }
        y = x - 10;
    } else {
        x = -x;
    }
}
```

What values are stored in variables x and y after the execution of the code?

(A) x = -10, y = 10
(B) x = 0, y = 0
(C) x = -10, y = 10
(D) x = 10, y = 0
(E) x = -15, y = -5

35. What is the result of the following code snippet?

```
int[] arr = {3, 1, 4, 1, 5, 9, 2, 6, 5};
int sum = 0;

for (int i = 0; i < arr.length; i += 2) {
  sum += arr[i];
}

System.out.println(sum);
```

(A) 16
(B) 17
(C) 19
(D) 20
(E) Compilation error

36. Consider the following code segment:

```
int[][] grid = {{2, 4}, {6, 8}, {10, 12}};

if (grid[2][0] % 3 == 0)
  grid[2][0] += 6;
else
  grid[2][0] -= 3;
```

What is the value of `grid[2][0]` after the execution of the code?

(A) 10
(B) 9
(C) 16
(D) 4
(E) 7

37. Which of the following statements is true regarding class inheritance in Java?

(A) A class can extend multiple classes simultaneously.
(B) A subclass cannot access members of its superclass.
(C) Inheritance is primarily used to create new objects.
(D) A class can extend only one superclass.
(E) Inheritance is not supported in Java.

38. Consider the following code:

```
int[] array = {1, 2, 3, 4, 5};
System.out.println(array[5]);
```

What will be printed as output?

(A) 1
(B) 2
(C) 3
(D) 4
(E) ArrayIndexOutOfBoundsException

39. Given the code snippet:

```
String text = "apple banana cherry";
int index1 = text.indexOf("banana");
int index2 = text.indexOf("cherry");
int index3 = text.indexOf("grape");
```

What will be the value of the index1, index2, and index3 variables, respectively?

(A) 6, 13, -1
(B) 6, 13, 0
(C) 13, 6, -1
(D) 6, 13, 1
(E) An exception will be thrown.

40. Consider the following code segment:

```
ArrayList values = new ArrayList<>();

values.add(2);
values.add(4);
values.add(6);
int size = values.size();
for (int i = 1; i < size; i++) {
    values.add(i);
}
System.out.println(values);
```

What is printed as a result of executing the code segment?

(A) [2, 4, 6, 1, 2, 3]
(B) [2, 4, 6, 1, 2, 3, 4]
(C) [1, 2, 3, 4, 6]
(D) [2, 4, 6, 1, 2]
(E) [2, 4, 6, 1, 2, 3, 4, 6]

Answer Explanations - practice test 8

1. Output of Code with Double Casting:

The code initializes a double variable num with the value 7.5.
It then prints the result of casting num to an int.
The output will be the integer part of num, which is 7.
Therefore, the correct answer is (A) 7.

2. Output of String Concatenation:

The code concatenates two strings, "Hello " and "World," using the concat method.
The result is "Hello World," which will be printed.
Therefore, the correct answer is (B) Hello World.

3. Inheritance in Java:

Subclasses in Java inherit properties and methods from their superclass by default.
The correct answer is (B) By automatically inheriting all members without any declaration.

4. Printing 'Drawing a Circle' from Inherited Method:

The code defines a superclass Shape and a subclass Circle that overrides the draw method.
To print 'Drawing a circle,' an instance of Circle should be created, and its draw method should be called.
The correct answer is (B) Circle c = new Circle(); c.draw().

5. Result of Executing Croissant Object:

The correct answer is (C) Baking croissants is an art

6. Output of Printing Croissant Object:

The correct answer is (B) Croissant

7. Effect of Assigning to Final Array:

Attempting to assign a new array to a final array reference (a1) results in a compile-time error.
The correct answer is (D) Nothing will be printed due to a compile-time error.

8. Finding Maximum Value in an Array:

The code iterates through the array and finds the maximum value.
The correct answer is (B) 8.

9. Key Steps of Merge Sort:

Merge sort recursively divides the array into smaller subarrays, sorts them, and merges them back together.
The correct answer is (C) It recursively divides, sorts, and merges smaller subarrays.

10. Size of a 2D Array:

The size of a 2D array is determined by multiplying the number of rows by the number of columns.
The correct answer is (D) 12.

11. Output of Recursive Method:

The mystery method prints numbers from num down to 0.
The correct answer is (A) 3 2 1 0.

12. Leap Year Checking Code:

The code checks if a given year (2020) is a leap year based on the conditions provided.
The correct answer is (A) Is 2020 a leap year? true.

13. Output of Continue Statement in Loop:

The code prints numbers and "*" based on the conditions in the loop.
The correct answer is (E) `"* 2 * 4 * "`

14. Result of Boolean Expression:

The given boolean expression is evaluated.
The correct answer is (B) false.

15. Purpose of 'public' Keyword in Class Definition:

The public keyword makes the class accessible from other classes.
The correct answer is (D) It makes the class accessible from other classes.

16. Result of Comparing Strings with == Operator:

The == operator compares object references for strings, not their content.
The correct answer is (B) false.

17. Output of Nested Loop:

The nested loops generate a pattern of numbers.
The correct answer is (E).

18. Value of Variable After Nested Loops:

The code increments the variable a in nested loops.
The correct answer is (A) 120.

19. Value of Variable After Increment and Print:

The code increments p and prints its value.
The correct answer is (A) 13.

20. Correct Code Segments:

Statement I will result in a division by zero error.
Statements I and II are correct.
The correct answer is (D) I and II

21. Values After Nested Conditional Statements:

The code modifies the values of u and v based on nested conditional statements.
The correct answer is (C) u = -10, v = -20.

22. Output of ArrayList Operations:
The correct answer is (C) [75, 70, 80]

23. Value of Elements in ArrayList After Modification:
The correct answer is (B) ["apple", "banana", "grape"]

24. Initializing and Filling a 2D Array:

The correct answer is (B) 12

25. Correct Code for 2D Array Initialization:

The correct answer is (B)

26. Initializing and Filling a 2D Array:

The correct answer is (E)

27. Maximum Number of Classes a Class Can Extend:

In Java, a class can extend only one class.
The correct answer is (B) 1.

28. Output of Recursive Method:

The recursive method mystery sums values from n down to 1.
The correct answer is (D) 28.

29. Result of Discount Verification Code:

The code checks if the purchaseAmount is greater than 100 and less than or equal to 200.
The correct answer is (A) Eligible for discount? true.

30. Output of ShoppingCart Code:

The calculateTotal method calculates the total cost based on the parameters passed.
The correct answer is (A) Total cost: $125.0

31. Result of Ternary Operator:

The ternary operator sets result to false based on the given conditions.
The correct answer is (A) true

32. Result of Boolean Expression:

The correct answer is (A) Only when x is different than the value of y

33. Value of Variable After Nested Loop:

The nested loops increment the value of a for each iteration.
The correct answer is (B) 48

34. Values of Variables After Conditional Statements:

The code modifies the values of x and y based on nested conditional statements.
The correct answer is (C) x = -10, y = 10

35. Output of Loop Summing Alternate Elements:

The code sums every alternate element in the array arr.
The correct answer is (C) 19

36. Value of Element in 2D Array After Modification:

The code modifies the value of grid[2][0] based on a condition.
The correct answer is (E) 7.

37. Java Class Inheritance Limitation:

In Java, a class can extend only one superclass (single inheritance).
The correct answer is (D) A class can extend only one superclass.

38. Runtime Exception in Code:

The code attempts to access an index (5) that is out of bounds for the array.
The correct answer is (E) ArrayIndexOutOfBoundsException.

39. Output of String IndexOf Method:

The indexOf method returns the starting index of the specified substring in the given string.
The correct answer is (A) 6, 13, -1.

40. Resulting ArrayList After Loop:

The code adds elements to the ArrayList in a loop and then prints the resulting ArrayList.
The correct answer is (D) [2, 4, 6, 1, 2]

Practice Test 9

AP Computer Science A Exam - practice test 9

Section 1: Multiple-Choice Questions

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO.

At a glance
Total Time 1 hour 30 minutes **Number of Questions** 40 **Percent of Total Score** 50% **Writing Instrument** Pencil Required

Instructions

Section I of this examination contains 40 multiple-choice questions. Fill in only the ovals for numbers 1 through 40 on your answer sheet.

Indicate all of your answers to the multiple-choice questions on the answer sheet. No credit will be given for anything written in this exam booklet, but you may use the booklet for notes or scratch work. After you have decided which of the suggested answers is best, completely fill in the corresponding oval on the answer sheet. Give only one answer to each question. If you change an answer, be sure that the previous mark is erased completely. Here is a sample question and answer.

Sample Questions

Chicago is a

(A) state
(B) city
(C) country
(D) continent
(E) country

Sample Answers

Use your time effectively, working as quickly as you can without losing accuracy. Do not spend too much time on any one question. Go on to other questions and come back to the ones you have not answered if you have time. It is not expected that everyone will know the answers to all the multiple-choice questions.

About Guessing

Many candidates wonder whether or not to guess the answers to questions about which they are not certain. Multiple-choice scores are based on the number of questions answered correctly. Points are not deducted for incorrect answers, and no points are awarded for unanswered questions. Because points are not deducted for incorrect answers, you are encouraged to answer all multiple-choice questions. On any questions you do not know the answer to, you should eliminate as many choices as you can, and then select the best answer among the remaining choices.

COMPUTER SCIENCE A

SECTION I

TIME—-1 hour and 30 minutes

Number of Questions—-40

Percent of total exam grade—-50%

Directions: Determine the answer to each of the following questions or incomplete statements, using the available space for any necessary scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet. No credit will be given for anything written in the examination booklet. Do not spend too much time on any one problem.

Notes:

- Assume that the classes listed in the Quick Reference have been imported where appropriate.
- Assume that declarations of variables and methods appear within the context of an enclosing class.
- Assume that method calls that are not prefixed with an object or class name and are not shown within a complete class definition appear within the context of an enclosing class.
- Unless otherwise noted in the question, assume that parameters in the method calls are not null and that methods are called only when their preconditions are satisfied.

1. Consider the following code segment:

```
int p = 8, q = 12;

if (p >= 5 && q < 15)
    p += 2;

else
    q -= 3;
```

What values are stored in variables p and q after the execution of the code?

(A) p = 8, q = 12
(B) p = 10, q = 12
(C) p = 10, q = 9
(D) p = 8, q = 9
(E) p = 6, q = 12

2. Consider the following code segment:

```
int a = 0;
for (int i = 0; i < 10; i++)
{
   for (int k = 0; k <= 5; k++)
   {
      for (int z = 1; z <= 16; z = z * 2)
      {
         a++;
      }
   }
}
```

What is the value of a after the code segment executes?

(A) 31
(B) 180
(C) 200
(D) 300
(E) 400

3. Which of the following will evaluate to true only if boolean expressions A, B, and C are all false?

(A) `!A && !(B && !C)`
(B) `!A || !B || !C`
(C) `!(A || B || C)`
(D) `!(A && B && C)`
(E) `!A || !(B || !C)`

4. If you create an array of Animal objects and call makeSound on each object, what will be the output of the following code?

```
public class Animal {
    public void makeSound() {
        System.out.println("Some generic sound");
    }

    // ... rest of the code
}

public class Cat extends Animal {
    public void makeSound() {
        System.out.println("Meow");
    }

    // ... rest of the code
}

public class Dog extends Animal {
    public void makeSound() {
        System.out.println("Woof");
    }
}

public static void main(String[] args) {
    Animal[] animals = new Animal[3];
    animals[0] = new Cat();
    animals[1] = new Dog();
    animals[2] = new Animal();
    for (Animal animal : animals) {
        animal.makeSound();
    }
```

```
}
```

(A) "Meow", "Woof", "Some generic sound"
(B) "Some generic sound", "Meow", "Woof"
(C) "Meow", "Woof", "Woof"
(D) "Meow", "Woof", "Meow"
(E) Compilation error

5. Consider the following code segment:

```
int table[][] = {{3, 6, 9, 12}, {5, 10, 15, 20}};

if (table[1][2] > table[0][1])
    table[0][1] += 2;
else
    table[1][2] -= 5;
```

What is the value of table[0][1] after the execution of the code?

(A) 6
(B) 8
(C) 10
(D) 15
(E) 12

6. Given the code segment:

```
ArrayList words = new ArrayList<>();
words.add("Alpha");
words.add("Beta");
words.add(0, "Gamma");
words.add("Delta");
words.set(2, "Epsilon");
words.remove(1);
System.out.println(words);
```

What is printed as a result of executing the code segment?

(A) [Alpha, Beta, Gamma, Delta, Epsilon]
(B) [Alpha, Gamma, Delta, Epsilon]
(C) [Gamma, Epsilon, Delta]
(D) [Alpha, Delta, Epsilon]
(E) [Alpha, Gamma, Delta, Epsilon]

7. Consider the following recursive method:

```
public static void mystery(int n) {
  if (n > 0) {
    System.out.print(n + " ");
    mystery(n - 2);
    System.out.print(n + " ");
  }
}
```

What is the output of the method call `mystery(3)`?

(A) 3 1 1 3
(B) 3 1 2 3
(C) 3 1 1
(D) 3 2 1 1 2 3
(E) Compilation error

8. What is the length of the array "values" after the following code executes?

```
String phrase = "AP CSA";
int[] values = new int[phrase.length()];
```

After the following code executes, what is the length of the array "value"?

(A) 5
(B) 6
(C) 7
(D) 4
(E) The array will not be created due to a compile-time error.

9. After executing the following code segment, what is the value of "result"?

```
final int[] numbers1 = {1, 2, 3};
int[] numbers2 = {4, 5, 6};
numbers2 = numbers1;
int result = numbers2[2];
```

(A) 1
(B) 2
(C) 3
(D) 4
(E) Nothing will be printed due to a compile-time error.

10. Consider the following incomplete method:

```
public static int sumPositives(int[] numbers)
{
   int sum = 0;
   for (int i = 0; i < numbers.length; i++)
   {
     // Mystery code
   }
   return sum;
}
```

```
I. (numbers[i] > 0) sum += numbers[i];

II. (numbers[i] >= 0) sum += numbers[i];

III. (numbers[i] > 0) return sum;
```

Which of the following code segments could be used to replace the mystery code so that sumPositives will work as intended?

(A) I only
(B) II only
(C) III only
(D) I and II
(E) II and III

11. Consider the code segment:

```
int[] numbers = {88, 42, 96, 70};

for (int n : numbers) {
    if (n > 50) {
        n -= 20;
    }
}
for (int n : numbers) {
    System.out.print(n + " ");
}
```

What is printed as a result of executing the code segment?

(A) 88 42 96 70
(B) 68 22 76 50
(C) 88 42 76 70
(D) 68 42 76 70
(E) Nothing will be printed due to a compile-time error.

12. Consider the following code segment:

```
int r = 10, s = 8;
if (r > 5 && s != 7)
  r += 3;
else
  s *= 2;
```

What values are stored in variables r and s after the execution of the code?
(A) r = 10, s = 16
(B) r = 13, s = 8
(C) r = 10, s = 14
(D) r = 13, s = 14
(E) r = 13, s = 16

13. Given the following classes:

```
public class Example
{
   public void print(String str)
   {
      System.out.println("String: " + str);
   }
   public void print(Object obj)
   {
      System.out.println("Object: " + obj);
   }
}

Example ex = new Example();
ex.print("Hello");
```

What will be the result of executing the following code?

(A) "String: Hello"
(B) "Object: Hello"
(C) Compile-time error
(D) Run-time error
(E) No output

14. What will be printed to the console?

```
int x = 10;
double y = 5.5;
double z = x + y;
int result = (int) z;
System.out.println(result);
```

(A) 15.5
(B) 15
(C) 5.5
(D) 10
(E) Nothing will be printed because of a compile-time error.

15. What is the value of 5.0 / 2 in Java?

(A) 2.5
(B) 2
(C) 2.0
(D) 2.5f
(E) 2.0f

16. Given the code:

```
String input = "apple";
String output = input.substring(1,
3).toUpperCase();
```

What is the value of the output variable?

(A) "AP"
(B) "P"
(C) "PPL"
(D) "PP"
(E) "pl"

17. Given the code snippet:

```
String text1 = "zebra";
String text2 = "zebra";
int result = text1.compareTo(text2);
```

What will be the value of the result variable?

(A) 0
(B) A positive integer
(C) A negative integer
(D) An exception will be thrown
(E) It will not compile

18. The following fragment intends that a user will enter a list of negative numbers at the keyboard and terminate the list with a sentinel.

```
int negNum = 0;
final int SENTINEL = -999;

while (negNum != SENTINEL)
{
   // code to process negNum
   ...
   negNum = ...; // read user input
}
```

The fragment is not correct. Which is a true statement?

(A) The sentinel gets processed.
(B) The last nonsentinel negative number entered in the list fails to get processed.
(C) A poor choice of SENTINEL value causes the loop to terminate before all negative numbers have been processed.
(D) The code will always process a negative number that is not on the list.

19. If you create an array of Vehicle objects and call start on each object, what will be the output of the following code?

```
public class Vehicle {
    public void start() {
        System.out.println("Vehicle started");
    }

    // ... rest of the code
}
```

```
public class Car extends Vehicle {
    public void start() {
        System.out.println("Car started");
    }

    // ... rest of the code
}

public class Motorcycle extends Vehicle {
    public void start() {
        System.out.println("Motorcycle started");
    }
}

public static void main(String[] args) {
    Vehicle[] vehicles = new Vehicle[3];
    vehicles[0] = new Car();
    vehicles[1] = new Motorcycle();
    vehicles[2] = new Vehicle();
    for (Vehicle vehicle : vehicles) {
        vehicle.start();
    }
}
```

(A) "Car started", "Motorcycle started", "Vehicle started"
(B) "Vehicle started", "Car started", "Motorcycle started"
(C) "Car started", "Motorcycle started", "Car started"
(D) "Car started", "Vehicle started", "Motorcycle started"
(E) Compilation error

20. If a client program executes the following statements:

```
Banana banana = new Banana();
System.out.println(banana.getName());
```

Which of the following is true about the last line of code?

```
public class Fruit {
    protected String name;

    Fruit(String name) {
        this.name = name;
        System.out.println("A " + name + " is a
type of fruit.");
    }

    public String getName() {
        return name;
    }
}

public class Banana extends Fruit {
    Banana() {
        super("banana");
        System
        .out.println("Bananas are a great source of
potassium.");
    }
}
```

(A) The following will be printed: "banana"
(B) The following will be printed: "Bananas are a great source of potassium."
(C) An error will occur because the name can be referenced only in the Fruit class.
(D) An error will occur because there is no getName() method in the Banana class.
(E) None of the above are true.

21. Which of the following statements about string immutability in Java is true?

(A) Once a string is created, you can change its characters.
(B) Strings in Java are always mutable.
(C) Modifying a string will create a new string instance.
(D) String immutability is a feature only in older Java versions.
(E) Strings in Java are automatically garbage collected when they are modified.

22. Consider the following code snippet:

```
int count = 0;

for (int i = 1; i <= 7; i++) {
  if (i % 3 == 0) {
    continue;
  }
  count++;
}

System.out.println(count);
```

What is the output of the code?

(A) 4
(B) 5
(C) 6
(D) 7
(E) 8

23. What will be printed to the console?

```
int x = 10;
int y = 3;
double z = (double) x / y;
System.out.println(z);
```

(A) 3.3333333333333335
(B) 3.0
(C) 3.0f
(D) 3
(E) Nothing will be printed because of a compile-time error.

24. Consider the following code snippet:

```
int[] numbers = {4, 7, 12, 9, 6};
boolean result = false;
for (int i = 0; i < numbers.length - 1; i++) {
  if (numbers[i] > numbers[i + 1]) {
    result = true;
    break;
  }
}
```

What is the value of 'result'?

(A) true
(B) false
(C) It throws a runtime error.
(D) It depends on the initial values of numbers.
(E) It depends on the value of another variable.

25. Consider the following code snippet:

```
int count = 0;

for (int i = 1; i <= 6; i++) {
  if (i % 2 == 0) {
    continue;
  }
  for (int j = 0; j < i; j++) {
    count += j;
  }
}

System.out.println(count);
```

What is the output of the code?

(A) 13
(B) 14
(C) 15
(D) 16
(D) 17

26. Consider the following code snippet:

```
public class QuadraticRoots {

  public static void main(String[] args) {
    double a = 1, b = -3, c = 2;
    String result = findRoots(a, b, c);
    System.out.println(result);
  }

  static String findRoots(double a, double b,
double c) {

    double discriminant = b * b - 4 * a * c;

    if (discriminant > 0) {
      return "Two distinct roots";
    } else if (discriminant == 0) {
      return "One real root";
    } else {
      return "No real roots";
    }
  }
}
```

What is the value of 'result'?

(A) Two distinct roots
(B) One real root
(C) No real roots
(D) It throws a runtime error.

(E) It depends on the initial values of a, b, and c.

27. Consider the following code snippet:

```
public class ExamGrader {
  public static void main(String[] args) {
    int score = 78;
    String grade = gradeExam(score);
    System.out.println("Grade: " + grade);
  }

  static String gradeExam(int examScore) {
    if (examScore >= 90) {
      return "A";
    } else if (examScore >= 80) {
      return "B";
    } else if (examScore >= 70) {
      return "C";
    } else if (examScore >= 60) {
      return "D";
    } else {
      return "F";
    }
  }
}
```

What is the output of the code?

(A) Grade: A
(B) Grade: B
(C) Grade: C
(D) Grade: D

(E) Grade: F

28. Consider the following code segment:

```
int x = 7, y = 15;

if (x > 5 && y <= 20)
    x *= 2;
else
    y += 3;
```

What values are stored in variables x and y after the execution of the code?

(A) x = 7, y = 15
(B) x = 14, y = 15
(C) x = 7, y = 18
(D) x = 14, y = 18
(E) x = 7, y = 21

29. Given the code snippet:

```
public class MyClass {
    private int value;

    public MyClass(int v) {
        this.value = v;
    }
}
```

What is the significance of the 'this()' statement in a constructor?

(A) It refers to an external variable.
(B) It initializes a static variable.
(C) It calls another constructor in the same class.
(D) It denotes an abstract method.
(E) It terminates the constructor.

30. Which of the following statements is true regarding the char data type in Java?

(A) It can store both single characters and strings.
(B) It has a size of 2 bytes in memory.
(C) It is signed and can represent negative values.
(D) It uses the ASCII encoding by default.
(E) It can store only lowercase letters.

31. What will be printed to the console?

```
int a = 5;
double b = 2.5;
double c = a / b;
System.out.println(c);
```

(A) 2
(B) 2.0
(C) 2.5
(D) 0.4
(E) Nothing will be printed because of a compile-time error.

32. Given the following classes:

```
public class Device
{
   public void operate(String action)
   {
    System.out.println("Performing action: " +
action);
   }
   public void operate(int speed)
   {
    System.out.println("Operating at speed: " +
speed);
   }
}
```

```
Device d = new Device();
d.operate(50);
```

What will be the result of executing the following code?

(A) "Performing action: 50"
(B) "Operating at speed: 50"
(C) Compile-time error
(D) Run-time error
(E) No output

33. After executing the following code segment, what is the value of "number"?

```
final int[] data1 = {15, 25, 35};
int[] data2 = {45, 55, 65};
data2 = data1;
int number = data2[1];
```

(A) 15
(B) 25
(C) 35
(D) 45
(E) Nothing will be printed due to a compile-time error.

34. Assume an array arr is filled with integer values. Which of the following code segments correctly swaps the values stored in arr[1] and arr[3]?

(A)
```
arr[1] = 3;
arr[3] = 1;
```
(B)
```
arr[1] = arr[3];
arr[3] = arr[1];
```
(C)
```
int temp = arr[3];
arr[3] = arr[1];
arr[1] = temp;
```
(D)
```
int temp = arr[3];
arr[1] = arr[3];
arr[3] = temp;
```

(E)

```
int temp = arr[1];
arr[3] = arr[1];
arr[1] = temp;
```

35. The call to initializeGrid(grid) initializes the array grid as follows:

```
int[][] grid = {
    {1, 2, 3, 4},
    {5, 6, 7, 8},
    {9, 10, 11, 12},
    {13, 14, 15, 16}
};

int total = 0;

for (int i = 0; i < grid.length; i++) {
    total += grid[i][grid[i].length - i - 1];
}
```

What is the value of total after the execution of the code?

(A) 30
(B) 32
(C) 34
(D) 35
(E) 36

36. Which of the following represents the current values in the array?

```
int[][] numbers = {{1, 2, 3, 4}, {5, 6, 7, 8}, {9,
10, 11, 12}};

for (int r = 0; r < numbers.length; r++) {
    for (int c = 0; c < numbers[r].length; c++) {
        numbers[r][c] = numbers[r][c] * 2;
    }
}
```

(A) 1 2 3 4 5 6 7 8 9 10 11 12
(B) 2 4 6 8 10 12 14 16 18 20 22 24
(C) 1 2 3 4 1 2 3 4 1 2 3 4
(D) 5 6 7 8 9 10 11 12 13 14 15 16
(E) 16 11 10 9 8 7 6 5 4 3 2 1

37. Assume that an array arr of integer values has been declared and initialized with random numbers. Which of the following code segments correctly swaps the values stored in arr[0] and arr[3]?

(A)
```
arr[0] = 3;
arr[3] = 0;
```
(B)
```
arr[0] = arr[3];
arr[3] = arr[0];
```
(C)
```
int k = arr[3];
arr[3] = arr[0];
arr[0] = k;
```
(D)
```
int k = arr[3];
arr[0] = arr[3];
arr[3] = k;
```
(E)
```
int k = arr[0];
arr[3] = arr[0];
arr[0] = k;
```

38. Consider the code below:

```
String name1 = "John";
String name2 = "Jenny";
int comparison = name1.compareTo(name2);
```

What will be the value of the comparison variable?

(A) A positive integer
(B) A negative integer
(C) Zero
(D) An exception will be thrown
(E) It will not compile

For questions 39–40, consider the following classes:

```
public class Bread {
  public String smell() {
    return "Freshly baked bread smells good";
  }
}

public class Pastry extends Bread {
  public String taste() {
    return "Baking pastry is an art";
  }
}

public class Croissant extends Pastry {
  public String flavor() {
    return "Croissants taste buttery";
  }
}
```

39. If a client program executes the following statement:

```
Croissant c = new Croissant();

String output1 = c.smell();
String output2 = c.taste();
String output3 = c.flavor();

System.out.println(output1 + " " + output2 + " " +
output3);
```

Which of the following represents the resulting output?

(A) Freshly baked bread smells good
(B) Croissants taste buttery
(C) Croissants taste buttery Freshly baked bread smells good
(D) Freshly baked bread smells good Baking pastry is an art Croissants taste buttery
(E) Croissants taste buttery Baking pastry is an art Freshly baked bread smells good

40. If a client program executes the following statements:

```
Croissant c = new Croissant();
System.out.println(c);
```

Which of the following is true about the last line of code?
(A) The following will be printed: bread
(B) The following will be printed: croissant
(C) An error will occur because name can be referenced only in Bread class.
(D) An error will occur because there is no toString() method in the Croissant class.
(E) None of the above are true.

Answer Explanations - practice test 9

1. Values Stored in Variables after Code Execution:

The correct answer is (B) p = 10, q = 12
The if condition is true, so p is incremented by 2, and q is not modified.

2. Value of 'a' after Code Execution:

The correct answer is (D) 300.

3. True Statement About Boolean Expressions:

The correct answer is (D) `!(A && B && C)`
This expression is true only if A, B, and C are all false.

4. Output of Code Invoking makeSound on Objects:

The correct answer is (A) "Meow", "Woof", "Some generic sound"
The makeSound method is overridden in both Cat and Dog classes.

5. Value of table[0][1] after Code Execution:

The correct answer is (B) 8
The if condition is true, so table[0][1] is incremented by 2.

6. Result of ArrayList Operations:

The correct answer is (C) [Gamma, Epsilon, Delta].
The code adds, sets, and removes elements in the ArrayList.

7. Output of Recursive Method Call:

The correct answer is (A) 3 1 1 3.
The method calls itself recursively, printing values before and after the recursive call.

8. Length of Array "values" After Code Execution:

The correct answer is (B) 6.
The length of the array "values" is set to the length of the string "AP CSA."

9. Value of "result" After Code Execution:

The correct answer is (C) 3.
The numbers2 array is assigned the reference of numbers1.

10. Code Segments for sumPositives Method:

The correct answer is (D) I and II.
The mystery code should accumulate the sum for positive numbers.

11. Output of Code Segment with Arrays:

The correct answer is (A) 88 42 96 70.
The code iterates through the array, modifying elements based on the condition.

12. Boolean Expression Evaluation:

The correct answer is (B) r = 13, s = 8

13. Result of print Method Call:

The correct answer is (A) "String: Hello".
The print method with a String argument is called.

14. Result of Arithmetic Operations:

The correct answer is (B) 15.
The double result is cast to an int.

15. Value of 5.0 / 2 in Java:

The correct answer is (A) 2.5.
The result is a double value.

16. Value of output Variable:

The correct answer is (D) "PP".
The substring method extracts a substring from index 1 to 3 (exclusive).

17. Value of result Variable:

The correct answer is (A) 0.
The compareTo method compares lexicographically.

18. True Statement About Code Fragment:

The correct answer is (B) The last nonsentinel negative number entered in the list fails to get processed.

The while loop is designed to continue until the user enters the sentinel value (-999). However, in the loop body, there is no processing for the last nonsentinel negative number entered in the list. The loop terminates as soon

as the sentinel value is entered, and the processing for the last nonsentinel negative number is skipped.

So, (B) is the correct statement.

19. Output of start Method Calls on Objects:

The correct answer is (A) "Car started", "Motorcycle started", "Vehicle started"

20. True Statement About last Line of Code:

The correct answer is (B) The following will be printed: "Bananas are a great source of potassium."

21. True Statement About String in Java:

The correct answer is (C) Modifying a string will create a new string instance.

22. Output of Code Segment:

The correct answer is (B) 5.
The continue statement skips iterations where i % 3 == 0.

23. Value Printed to Console:

The correct answer is (A) 3.3333333333333335.
The result is a double value.

24. Value of 'result' Variable:

The correct answer is (A) true.
The loop breaks when a decreasing trend is detected.

25. Output of Code Segment:

The correct answer is (A) 13.
The nested loops contribute to the final value of count.

26. Value of 'result' Variable in QuadraticRoots:

The correct answer is (A) Two distinct roots.
The discriminant determines the nature of the roots.

27. Output of ExamGrader Code:

The correct answer is (D) Grade: C.
The gradeExam method is called with a score of 78.

28. Values Stored in Variables after Code Execution:

The correct answer is (B) x = 14, y = 15.

29. Significance of 'this()' Statement in Constructor:

The correct answer is (C) It calls another constructor in the same class.
The this() statement is used to invoke another constructor in the same class.

30. True Statement About char Data Type in Java:

The correct answer is (B) It has a size of 2 bytes in memory.

31. Value Printed to Console:

The correct answer is (B) 2.0.
The result is a double value.

32. Output of Device Class Execution:

The correct answer is (B) "Operating at speed: 50".
The operate method with an int argument is called.

33. Value of "number" After Code Execution:

The correct answer is (B) 25.
The array data2 is assigned the reference of data1.

34. Code Segments for Swapping Array Values:

The correct answer is (C) int k = arr[3]; arr[3] = arr[0]; arr[0] = k.
The correct way to swap values in an array is using a temporary variable.

35. 2D Array:
The correct answer is (C) 34.

36. Current Values in Array After Operation:

The correct answer is (B) 2 4 6 8 10 12 14 16 18 20 22 24.
Each element in the 2D array is multiplied by 2.

37. Code Segments for Swapping Array Values:

The correct answer is (C)

38. Using Objects in Java:

The value of comparison will be a negative integer because "John" comes before "Jenny" in lexicographic order.

Therefore, the correct answer is: (B) A negative integer

39. Resulting Output from Object Initialization:

The correct answer is (D) Freshly baked bread smells good Baking pastry is an art Croissants taste buttery.
Objects of each class print their respective messages.

40. True Statement About Last Line of Code:

The correct answer is (E) None of the above are true. The output of System.out.println(c); would be something like Croissant@15db9742 (default toString method). However, if the classes had overridden the toString method to provide a more meaningful representation, the output could be different. Since we assumed no such override, the default behavior applies.

Practice Test 10

AP Computer Science A Exam - practice test 10

Section 1: Multiple-Choice Questions

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO.

At a glance
Total Time 1 hour 30 minutes **Number of Questions** 40 **Percent of Total Score** 50% **Writing Instrument** Pencil Required

Instructions

Section I of this examination contains 40 multiple-choice questions. Fill in only the ovals for numbers 1 through 40 on your answer sheet.

Indicate all of your answers to the multiple-choice questions on the answer sheet. No credit will be given for anything written in this exam booklet, but you may use the booklet for notes or scratch work. After you have decided which of the suggested answers is best, completely fill in the corresponding oval on the answer sheet. Give only one answer to each question. If you change an answer, be sure that the previous mark is erased completely. Here is a sample question and answer.

Sample Questions

Chicago is a

(A) state
(B) city
(C) country
(D) continent
(E) country

Sample Answers

Use your time effectively, working as quickly as you can without losing accuracy. Do not spend too much time on any one question. Go on to other questions and come back to the ones you have not answered if you have time. It is not expected that everyone will know the answers to all the multiple-choice questions.

About Guessing

Many candidates wonder whether or not to guess the answers to questions about which they are not certain. Multiple-choice scores are based on the number of questions answered correctly. Points are not deducted for incorrect answers, and no points are awarded for unanswered questions. Because points are not deducted for incorrect answers, you are encouraged to answer all multiple-choice questions. On any questions you do not know the answer to, you should eliminate as many choices as you can, and then select the best answer among the remaining choices.

COMPUTER SCIENCE A

SECTION I

TIME—-1 hour and 30 minutes

Number of Questions—-40

Percent of total exam grade—-50%

Directions: Determine the answer to each of the following questions or incomplete statements, using the available space for any necessary scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet. No credit will be given for anything written in the examination booklet. Do not spend too much time on any one problem.

Notes:

- Assume that the classes listed in the Quick Reference have been imported where appropriate.
- Assume that declarations of variables and methods appear within the context of an enclosing class.
- Assume that method calls that are not prefixed with an object or class name and are not shown within a complete class definition appear within the context of an enclosing class.
- Unless otherwise noted in the question, assume that parameters in the method calls are not null and that methods are called only when their preconditions are satisfied.

1. An apartment rental company has asked you to write a program to store information about the apartments that it has available for rent.

Which of the following is the best design?

(A) Use four unrelated classes: Apartment, Rooms, Dishwasher, and Pets.
(B) Use one class, Apartment, which has three subclasses: Room, Dishwasher, and Pet.
(C) Use one class, Apartment, which has three data fields: int rooms, boolean hasDishwasher, boolean allowsPets.
(D) Use three classes—Pets, Rooms, and Dishwasher—each with a subclass Apartment.
(E) Use four classes: Apartment, Pets, Dishwasher, and Rooms. The class Apartment contains instances of the other classes as attributes.

2. Consider the following class declarations:

```
public class Vehicle {

  // class details
}

public class Motorcycle extends Vehicle {
  // class details
}
```

Which of the following code segments will cause a compilation error?

(A) Motorcycle m1 = new Motorcycle(3);
(B) Vehicle v1 = new Motorcycle(4);
(C) Motorcycle m2 = new Vehicle();
(D) Vehicle v2 = new Motorcycle();

(E) Vehicle v3 = new Vehicle();

3. What is the output of the following code snippet?

```
int[] nums = {1, 2, 3, 4, 5};

for (int i : nums) {
  System.out.print(i * 2 + " ");
```

(A) 1 2 3 4 5
(B) 2 4 6 8 10
(C) 2 4 6 8 10
(D) 1 4 9 16 25
(E) Compilation error

4. How does a sequential search locate an element in an array?

Describe the step-by-step process of a sequential search.

(A) It always starts from the middle of the array
(B) It compares elements with each other
(C) It looks for the largest element
(D) It searches for the desired element from the beginning until found
(E) It performs a binary search

5. What is the value of total after the code has executed?

```
int[][] numbers = {{2, 4, 6, 8}, {10, 12, 14, 16},
{18, 20, 22, 24}};
```

```
int total = 0;
for (int r = 0; r < numbers.length; r++)
    for (int c = 0; c < numbers[r].length; c++) {
        if (c % 2 == 0) {
            total += numbers[r][c];
        }
    }
}
```

(A) 36
(B) 48
(C) 60
(D) 72
(E) 84

6. Which of the following represents the current values in the array?

```
int[][] numbers = {{1, 2, 3}, {4, 5, 6}, {7, 8, 9}};
for (int r = 0; r < numbers.length - 1; r++) {
    for (int c = 0; c < numbers[r].length - 1; c++) {
        numbers[r][c] = numbers[r + 1][c + 1];
    }
}
```

(A) 5 6 8 9
(B) 1 2 4 5
(C) 1 4 2 5
(D) 4 5 7 8
(E) 2 3 5 6

7. Consider the following recursive method:

```
public static String mystery(String str) {
  if (str.length() <= 1) {
    return str;
  }
  return mystery(str.substring(1)) + str.charAt(0);
}
```

What is the output of the method call `mystery("abc")`?

(A) abc
(B) cba
(C) bac
(D) abcba
(E) Compilation error

8. Given the code segment:

```
ArrayList colors = new ArrayList<>();
colors.add("Red");
colors.add("Green");
colors.add("Blue");
colors.add("Yellow");
colors.set(2, "Orange");
colors.remove(1);
System.out.println(colors);
```

What is printed as a result of executing the code segment?

(A) [Red, Green, Blue, Yellow, Orange]
(B) [Red, Blue, Yellow]
(C) [Red, Orange, Yellow]
(D) [Red, Blue, Orange, Yellow]
(E) [Red, Blue, Yellow, Orange]

9. Given the method:

```
public void removeSmaller(ArrayList nums, int
threshold) {
    int i = 0;
    while (i < nums.size()) {
        if (nums.get(i) < threshold) {
            nums.remove(i);
        } else {
            i++;
        }
    }
}
```

If the ArrayList nums contains the values [3, 7, 1, 5, 2, 8, 4], and threshold is 4, what will nums contain after executing the removeSmaller method?

(A) [7, 5, 8]
(B) [7, 5, 8, 4]
(C) [7, 8, 5, 4]
(D) [3, 7, 5, 8]
(E) []

10. Given the method:

```
public void mystery(ArrayList words) {
    for (int i = words.size() - 1; i >= 0; i--) {
        System.out.print(words.get(i) + " ");
    }
}
```

If the ArrayList words contains the values ["apple", "banana", "cherry", "date"], what will be printed when executing the `mystery` method?

(A) "date cherry banana apple"
(B) "apple banana cherry date"
(C) "date cherry banana apple"
(D) "apple banana date cherry"
(E) "cherry date banana apple"

11. Consider the following output:

```
0 1
0 2 4
0 3 6 9
0 4 8 12 16
0 5 10 15 20 25
```

Which of the following code segments will produce this output?

(A)

```
for (int x = 1; x < 5; x++) {
  for (int z = 0; z <= x; z++) {
    System.out.print(x * z + " ");
  }
  System.out.println(" ");
}
```

(B)

```
for (int x = 1; x <= 5; x++) {
  for (int z = 0; z < x; z++) {
    System.out.print(x * z + " ");
  }
  System.out.println(" ");
}
```

(C)

```
for (int x = 1; x < 5; x++) {
  for (int z = 0; z <= 4; z++) {
    System.out.print(x * z + " ");
  }
  System.out.println(" ");
}
```

(D)

```
for (int x = 1; x < 5; x++) {
  for (int z = 0; z <= 4; z += 2) {
    System.out.print(x * z + " ");
  }
  System.out.println(" ");
}
```

(E)

```
for (int x = 1; x <= 5; x++) {
  for (int z = 0; z <= x; z++) {
    System.out.print(x * z + " ");
  }
  System.out.println(" ");
}
```

12. Consider the following code segment:

```
while ((x > y) || (y >= z)) {
  System.out.print("*");
}
```

Which of the following must be true after the code segment has executed?

(A) x > y || y >= z
(B) x <= y || y > z
(C) x > y && y >= z
(D) x < y && y <= z
(E) x <= y && y < z

13. Consider the following code segment:

```
int a = 0;
for (int i = 0; i < 10; i++) {
  for (int k = 0; k <= 5; k++) {
    for (int z = 1; z <= 16; z = z * 2) {
      a++;
    }
  }
}
```

What is the value of a after the code segment executes?

(A) 31
(B) 180
(C) 200
(D) 300

(E) 400

14. Consider the following code segment:

```
int x = 10;
x = x / 3;
x = x % 2;
x++;

System.out.println(x);
```

What is printed as a result of executing the code segment above?

(A) 2
(B) 4
(C) 10
(D) 11
(E) 15

15. Consider the following code segment:

```
int x = 5;
for (int i = 0; i < 3; i++) {
  x += i;
  for (int j = 0; j < x; j++) {
    System.out.print(j + " ");
  }
  System.out.println();
}
```

What is the output of the code segment?

(A) 0 1 2 3 4
(B) 0 1 2 3 4
    0 1 2 3 4 5
(C) 0 1 2 3 4
    0 1 2 3 4 5 6 7 8 9
(D) 0 1 2 3 4
    0 1 2 3 4 5
    0 1 2 3 4 5 6 7 8 9 10 11 12 13 14
(E) 0 1 2 3 4
    0 1 2 3 4 5
    0 1 2 3 4 5 6 7

16. Consider the following code segment:

```
int x = 4;
for (int i = 0; i < x; i++) {
  for (int j = 0; j < x; j++) {
    System.out.print(i + j + " ");
    if (i + j == 2) {
      break;
    }
  }
  System.out.println();
}
```

What is the output of the code segment?

(A) 0 1 2
    3 4 5 6
(B) 0 1 2
    1 2
    2
    3 4 5 6
(C) 0 1 2 3
    1 2 3
    2 3
(D) 0 1 2 3
    1 2 3
    2 3 3 4
    3 4 5 6
(E) Compilation error

17. Consider the following class:

```
public class Sample {
  public void writeMe(Object obj) {
    System.out.println("object");
  }
  public void writeMe(String s) {
    System.out.println("string");
  }
}
Sample s = new Sample();
Object tmp = new String("hi");
s.writeMe(tmp);
```

What will be the result of executing the following?

(A) Compile-time error
(B) "hi"
(C) "object"
(D) "string"
(E) Run-time error

18. Consider the following classes:

```
public class A {
  protected int x;
  public A(int value) {
    x = value;
  }
}

public class B extends A {
  private int y;
  public B(int value1, int value2) {
    super(value1);
    y = value2;
  }
}
```

What is the purpose of the 'super()' call in the 'B' class constructor?

(A) It initializes the 'x' variable in class 'A'.
(B) It initializes the 'y' variable in class 'B'.
(C) It invokes the default constructor of class 'A'.
(D) It is not necessary, and its removal won't affect the code.
(E) It causes a compilation error.

19. Consider the following code segment:

```
int data[4][3] = {{1, 2, 3}, {4, 5, 6}, {7, 8, 9},
{10, 11, 12}};

if (data[3][2] > data[0][0])
    data[0][0] += 5;
else
    data[3][2] -= 2;
```

What is the value of data[0][0] after the execution of the code?
(A) 1
(B) 6
(C) 11
(D) 4
(E) 15

20. Consider the following code segment:

```
int matrix[][] = {{4, 8, 12}, {16, 20, 24}, {28,
32, 36}};
if (matrix[2][0] % 7 == 0)
  matrix[2][0] += 7;
else
  matrix[2][0] -= 4;
```

What is the value of matrix[2][0] after the execution of the code?

(A) 35
(B) 24
(C) 28
(D) 32
(E) 17

21. Which of the following best describes the makeSound method of the Dog class?

```
public class Animal {
    public void makeSound() {
        System.out.println("Animal makes a
sound.");
    }
}
public class Dog extends Animal {
    public void makeSound() {
        System.out.println("Dog barks.");
    }
}
```

(A) An inherited method
(B) An overridden method
(C) An overloaded method
(D) An interface method
(E) An abstract method

22. In Java, when a class extends another class, what is the primary purpose of the 'super' keyword?

(A) To declare a superclass
(B) To prevent inheritance
(C) To access the superclass's members
(D) To create a new instance of the subclass
(E) To specify the subclass's constructor

23. Consider the following code:

```
String str = "Programming";
System.out.println(str.substring(3, 8));
```

What will be printed as output?

(A) gram
(B) gramm
(C) ram
(D) ming
(E) Progra

24. In the following code segment:

```
int b = 0;
for (int i = 0; i < 8; i++) {
    for (int j = 0; j <= 4; j++) {
        for (int k = 1; k <= 64; k = k * 2) {
           b++;
        }
    }
}
```

What is the value of b after the code segment executes?

(A) 128
(B) 200
(C) 240
(D) 280
(E) 290

25. Given the code:

```
int x = 16;
int y = x / 2;
int z = x % 3;
x++;
System.out.println(x);
```

What is printed as a result of executing the code segment above?

(A) 16
(B) 17
(C) 18
(D) 19
(E) 20

26. In the following code segment:

```
int m = 8;
double n = 1.5;
int o = 2;
int x = (int) (m + n);
double y = (double) m / o;
double z = (double) (m / o);
double w = x + y + z;
System.out.println(w);
```

What is printed as a result of evaluating the code above?

(A) 16.0
(B) 16.5

(C) 17.0
(D) 17.5
(E) 18.0

27. Which of the following code segments will run without error?

```
I.
int a = 15;
int b = 30;
int c = 0;

if (a < b && 10 < b/c) {
    System.out.println("Marge");
}
else {
    System.out.println("Lisa");
}

II.
int x = 10;
int y = 20;
int z = 0;

if (x > y && 10 < y/z)
    System.out.println("Homer");
else
    System.out.println("Bart");

III.
int p = 25;
int q = 35;
int r = 5;
```

```
if (p > q || 10 < q/r)
    System.out.println("Maggie");
else
    System.out.println("Bart");
```

(A) I only
(B) II only
(C) III only
(D) II and III
(E) I, II, and III

28. Consider the following code segment:

```
int r = 18, s = -25;
if (r < 20) {
  if (r > 15) {
    s = r * 2;
    if (s > 20) {
      r += 5;
    }
    s = r - 8;
  } else {
    r = -r;
  }
}
```

What values are stored in variables r and s after the execution of the code?

(A) r = 23, s = 15
(B) r = 23, s = 10
(C) r = 18, s = 10

(D) r = 23, s = 7
(E) r = -18, s = 7

29. Consider the following code segment:

```
int x = 5;
int y = 2;
boolean b = false;

for (int i = 0; i < 10; i += 3)
{
   x = x * y;
   b = (x % y == 1);
   if (b)
   {
      y++;
      i += 3;
   }
}
```

What is the value of x after the code segment executes?

(A) 40
(B) 50
(C) 60
(D) 70
(E) 80

30. Consider the following code segment:

```
int a = 0;
for (int i = 0; i < 12; i++)
{
   for (int k = 0; k <= 4; k++)
   {
      for (int z = 1; z <= 8; z = z * 2)
      {
         a++;
      }
   }
}
```

What is the value of a after the code segment executes?

(A) 63
(B) 180
(C) 240
(D) 320
(E) 480

31. Consider the following code segment:

```
int data[] = {1, 3, 5, 7, 9};

if (data[4] > data[1])
  data[1] = data[4] - 1;
else
  data[4] = data[1] + 1;
```

What is the value of data[1] after the execution of the code?

(A) 1
(B) 8
(C) 3
(D) 6
(E) 9

32. After executing the following code segment, what is the length of array "result"?

```
String[] names = {"Alice", "Bob", "Charlie"};
String[] result = new String[names.length + 2];
```

(A) 3
(B) 4
(C) 5
(D) 6
(E) Nothing will be printed due to a compile-time error.

33. After the following code segment executes, what is the value of "number"?

```
final int[] data1 = {10, 20, 30};
int[] data2 = {40, 50, 60};
data2 = data1;
int number = data2[2];
```

(A) 10
(B) 20
(C) 30
(D) 40
(E) Nothing will be printed due to a compile-time error.

34. Assume an array arr is filled with integer values. Which of the following code segments correctly swaps the values stored in arr[0] and arr[2]?

(A)
```
arr[0] = 2;
arr[2] = 0;
```
(B)
```
arr[0] = arr[2];
arr[2] = arr[0];
```
(C)
```
int temp = arr[2];
arr[2] = arr[0];
arr[0] = temp;
```
(D)
```
int temp = arr[2];
arr[0] = arr[2];
```

```
arr[2] = temp;
```
(E)
```
int temp = arr[0];
arr[2] = arr[0];
arr[0] = temp;
```

35. Consider the code segment:

```
int[] values = {60, 75, 50, 80};
for (int v : values) {
    if (v >= 60) {
        v += 10;
    }
}
for (int v : values) {
    System.out.print(v + " ");
}
```

What is printed as a result of executing the code segment?

(A) 60 75 50 80
(B) 70 85 50 90
(C) 70 75 50 80
(D) 60 85 50 90
(E) Nothing will be printed due to a compile-time error.

36. What are the contents of the numbers array after the code segment has executed?

```
int[][] numbers = new int[2][3];

for (int row = 0; row < numbers.length; row++) {
    for (int col = 0; col < numbers[row].length; col++) {
      numbers[row][col] = (row + 1) * (col + 2);
    }
}
```

(A) 2 3 4 4 6 8
(B) 2 4 6 3 6 9
(C) 1 2 3 3 6 9
(D) 1 3 5 2 4 6
(E) 1 1 1 2 2 2

37. Consider the following iterative code segment:

```
public static void printNumbers(int n) {
    for (int i = 1; i <= n; i++) {
        System.out.print(i + " ");
    }
}
```

Write the equivalent recursive method for the code below:

(A)

```
public static void printNumbers(int n) {
  if (n > 0) {
    printNumbers(n - 1);
    System.out.print(n + " ");
  }


}
```

(B)

```
public static void printNumbers(int n) {
  if (n > 1) {
    printNumbers(n - 1);
  }
  System.out.print(n + " ");
}
```

(C)

```
public static void printNumbers(int n) {
  System.out.print(n + " ");
  if (n > 1) {
    printNumbers(n - 1);
  }
}
```

(D)

```
public static void printNumbers(int n) {
  if (n > 1) {
    System.out.print(n + " ");
    printNumbers(n - 1);
  }
}
```

(E)

```
public static void printNumbers(int n) {
  if (n > 0) {
    System.out.print(n + " ");
    printNumbers(n - 1);
  }
}
```

38. Consider the following code snippet:

```
public class CoffeeShopDiscount {

  public static void main(String[] args) {

    int quantity = 12;
    double pricePerCup = 3.5;
    double discount = calculateDiscount(quantity,
pricePerCup);
    System.out.println("Total cost after discount: $" +
(quantity * pricePerCup - discount));
  }

  static double calculateDiscount(int quantity, double
pricePerCup) {

    double discount = 0;
    if (quantity >= 10) {
      discount = 0.1 * quantity * pricePerCup;
    }
    return discount;
  }
}
```

What is the output of the code?

(A) Total cost after discount: $31.5
(B) Total cost after discount: $36
(C) Total cost after discount: $38.5
(D) Total cost after discount: $37.8
(E) Total cost after discount: $42

39. Consider the following code segment:

```
int a = 12, b = 8;
if (a % 5 == 0 || b > 10)
    a -= 4;
else
    b += 6;
```

What values are stored in variables a and b after the execution of the code?

(A) a = 12, b = 8
(B) a = 8, b = 8
(C) a = 12, b = 14
(D) a = 8, b = 14
(E) a = 16, b = 8

40. Consider the following code segment:

```
int x = 5, y = 10;
if (!(x == 5) || y > 15)
  x *= 2;
else
  y -= 3;
```

What values are stored in variables x and y after the execution of the code?

(A) x = 5, y = 7
(B) x = 10, y = 7
(C) x = 5, y = 10
(D) x = 10, y = 10
(E) x = 5, y = 13

Answer Explanations - practice test 10

1. Best Design for Apartment Rental Program:

The correct answer is (C) Use one class, Apartment, which has three data fields: int rooms, boolean hasDishwasher, boolean allowsPets.
This design encapsulates the relevant information about an apartment within a single class.

2. Invalid Motorcycle and Vehicle Instances:

The correct answer is (C) Motorcycle m2 = new Vehicle();
This will cause a compilation error. You cannot assign a Vehicle object to a Motorcycle reference without explicit casting.

3. Output of Code Snippet:

The correct answer is (B) 2 4 6 8 10.
The code multiplies each element in the array by 2 during the iteration.

4. Sequential Search in Array:

The correct answer is (D) It searches for the desired element from the beginning until found.
Sequential search involves checking elements one by one until the desired element is found.

5. Value of 'total' After Execution:

The correct answer is (D) 72.
The code adds values at even indices (c % 2 == 0) to the total.

6. Current Values in the Array:

The correct answer is (A) 5 6 8 9.
The code copies values from the next row and column into the current position.

7. Output of mystery("abc"):

The correct answer is (B) "cba".
The method recursively reverses the input string.

8. Result of ArrayList Operations:

The correct answer is (C) [Red, Orange, Yellow].
The code sets "Orange" at index 2 and removes the element at index 1.

9. ArrayList after removeSmaller Method:

The correct answer is (B) [7, 5, 8, 4].
The method removes elements smaller than the threshold (4).

10. Output of reverseOrder Method:

The correct answer is (C) "date cherry banana apple".
The method prints the elements in reverse order.

11. Code for Specified Output:

The correct answer is (E). The nested loops generate the specified output.

12. Logical Expression After Execution:

The correct answer is (A) x > y || y >= z.
The || (logical OR) operator is used, so the loop will continue as long as at least one of the conditions is true.

(A) x > y || y >= z: This is equivalent to the original condition and must be true.

13. Value of 'a' After Execution:

The correct answer is (D) 300
The outer loop (for (int i = 0; i < 10; i++)) runs 10 times.
The middle loop (for (int k = 0; k <= 5; k++)) runs 6 times (0 to 5).
The innermost loop (for (int z = 1; z <= 16; z = z * 2)) runs 5 times (1, 2, 4, 8, 16). So, the total number of times the innermost loop runs is 10 * 6 * 5 = 300.

The variable a is incremented 300 times, and its final value is 300.

14. int operations in Java:

The correct answer is (A) 2.

15. Output of Nested Loop:

The correct answer is (E).

16. Output of Nested Loop:

The correct answer is (B) "0 1 2 3 1 2 3 2 3".
The loop prints values until the condition i + j == 2 is met.

17. Result of Method Call:

The correct answer is (C) "object".
Overloading allows selecting the appropriate method based on the argument type.

18. Purpose of 'super()' Call:

The correct answer is (A) It initializes the 'x' variable in class 'A'.
The 'super()' call invokes the superclass constructor.

19. Value of data[0][0] After Execution:

The correct answer is (B) 6.
The code conditionally increments data[0][0] by 5.

20. Value of matrix[2][0]:

The correct answer is (A) 35.
The code conditionally adds 7 to matrix[2][0].

21. Description of makeSound Method:

The correct answer is (B) An overridden method.
The Dog class provides its own implementation for the makeSound method.

22. Purpose of 'super' Keyword:

The correct answer is (C) To access the superclass's members.
'super' is used to refer to members of the superclass.

23. Output of String Substring:

The correct answer is (B) gramm.

24. Value of 'b' After Execution:

The correct answer is (D) 280.

25. Value of 'x' After Execution:

The correct answer is (B) 17.

26. Result of Evaluating Code:

The correct answer is (C) 17.0.
w = 9 + 4.0 + 4.0 = 17.0.

27. Correct Code Segments:

The correct answer is (D) II and III.
II and III won't cause runtime errors.

28. Values in Variables 'r' and 's':

The correct answer is (A) r = 23, s = 15.
The code updates 'r' and 's' based on the conditions.

29. Value of 'x' After Execution:

The correct answer is (E) 80.
The code multiplies 'x' by 'y' during the loop.

30. Value of 'a' After Execution:

The correct answer is (C) 240.
The nested loops contribute to the final value of 'a'.

31. Value of data[1] After Execution:

The correct answer is (B) 8.
The code conditionally updates data[1] based on a comparison.

32. Length of Array "result":

The correct answer is (C) 5.
Two elements are added to the original array.

33. Value of 'number' After Execution:

The correct answer is (C) 30.
'data2' is assigned the reference of 'data1', and 'number' accesses the third element.

34. Code for Swapping Array Values:

The correct answer is (C)

```
int temp = arr[2];
arr[2] = arr[0];
arr[0] = temp;.
```

The code correctly swaps values in array 'arr'.

35. Output of ArrayList Operations:

The correct answer is (A) 60 75 50 80.
The code adds 10 to values greater than or equal to 60.

36. Contents of the Numbers Array:

The correct answer is (A) 2 3 4 4 6 8.
The nested loops fill the array with specific values.

37. Equivalent Recursive Method:

The correct answer is (A) the first code snippet.
It correctly prints numbers in a decreasing order using recursion.

38. Output of CoffeeShopDiscount Program:

The correct answer is (D) Total cost after discount: $37.8.
The discount is calculated based on the quantity.

39. Values in Variables a and b:

The correct answer is (C) a = 12, b = 14.
The conditional statements modify 'a' and 'b' accordingly.

40. Values in Variables x and y:

The correct answer is (A) x = 5, y = 7.
The code executes the 'else' block, updating 'y'.