22/02345

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Section 1:

1. Explain the differences between primitive and reference data types.

- Primitive type always has a value, it can never be null but reference type can be null, which denotes the absence of value.

- The primitive data types are predefined in Java that serves as a fundamental building block while the reference data type refers to where data is stored

- Primitive types store **values** but reference type stores **handle** objects in heap space.

- When you assign a value to primitive data types, the primitive value is copied, but when you assign an object to reference type, the handle is copied.

- When you pass primitive values to a method the values are passed to the method, but when you pass the reference variable, only the handle is copied.

2. Define the scope of a variable (hint: local and global variable)

- The scope of a variable is the region of a program in which the variable is visible,the scope of a global variable is visible (hence accessible) throughout the program, unless shadowed.

3. Why is initialization of variables required

- In order to avoid unnecessary memory usage and enhance code readability because of the reduced scope.

4. Differentiate between static, instance and local variables

- Static variables are created when the program starts and destroyed when the program stops.

- Instance variablesare created when an object is created with the use of the keyword 'new' and destroyed when the object is destroyed.

- Local variables are created when the method, constructor or block is entered and the variable will be destroyed once it exits the method, constructor, or block.

5. Differentiate between widening and narrowing casting in java.

- – This involves the conversion of a smaller data type to the larger type size. – This involves converting a larger data type to a smaller size type.

  Widening Casting (automatically)

  Narrowing Casting (manually)

6. The following table shows data type, its size, default value and the range. Fill in the missing values.

TYPE	SIZE (IN BYTES)	DEFAULT	RANGE
boolean	1 bit	false	true, false
Char	2	\0000	'\0000' to '\ffff'
Byte	4	0	-128 to 127
Short	2	0	-215 to +215-1
Int	4	0	-2,147,483,647 to 2,147,483,647
Long	4	0L	-263 to 263-1.
Float	4	00.0f	1.175494351 E – 38 to 3.402823466 E + 38
Double	8	0.0d	-1.8E+308 to +1.8E+308

7. Define package as used in java programming

- A package is a namespace that organizes a set of related classes and interfaces.

8. Explain the importance of using packages

- Packages are used to avoid name conflicts, and to write a better maintainable code.

Section 2

1

```java
package surnameandage;

import java.util.Scanner;
public class SurnameAndAge {

    public static void main(String[] args) {

    // Create a Scanner object to read input from the user.
        Scanner scanner = new Scanner(System.in);

        // Prompt the user to enter their surname.
        System.out.print("Enter your surname: ");
        String surname = scanner.nextLine();

        // Prompt the user to enter their age.
        System.out.print("Enter your age: ");
        int age = scanner.nextInt();

        // Get the number of characters in the surname.
        int numberOfCharacters = surname.length();

        // Check if the age is even or odd.
        boolean isEven = age % 2 == 0;

        // Print the number of characters in the surname and whether the age is even or odd.
        System.out.println("The number of characters in your surname is " + numberOfCharacters + ". Your age is " + (isEven ? "even" : "odd
    }
    }
```

2

```java
import java.util.Scanner;

public class AverageOfFiveUnits {

    public static void main(String[] args) {

        // Create a Scanner object to read input from the user.
        Scanner scanner = new Scanner(System.in);

        // Initialize the variables.
        int mark1 = 0;
        int mark2 = 0;
        int mark3 = 0;
        int mark4 = 0;
        int mark5 = 0;
        double average = 0.0;

        // Prompt the user to enter the marks of the five units.
        System.out.print("Enter the mark of unit 1: ");
        mark1 = scanner.nextInt();
        System.out.print("Enter the mark of unit 2: ");
        mark2 = scanner.nextInt();
        System.out.print("Enter the mark of unit 3: ");
        mark3 = scanner.nextInt();
        System.out.print("Enter the mark of unit 4: ");
        mark4 = scanner.nextInt();
        System.out.print("Enter the mark of unit 5: ");
        mark5 = scanner.nextInt();

        // Calculate the average.
        average = (mark1 + mark2 + mark3 + mark4 + mark5) / 5.0;
```

```
        // Round the average to two decimal places.
        average = Math.round(average * 100.0) / 100.0;

        // Display the average.
        System.out.println("The average mark is " + average);
    }
}
```

3

```
package divisibility;

import java.util.Scanner;


public class Divisibility {

    public static void main(String[] args) {

        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter an integer: ");
        int number = scanner.nextInt();
        scanner.close();

        System.out.println("Divisibility test results:");
        System.out.println("==========================");

        // Check divisibility by numbers 0-9
        for (int i = 0; i <= 9; i++) {
            if (isDivisible(number, i)) {
                if (i == 0)
                    System.out.println(number + " is divisible by " + i + " because it ends with a 0 (zero).");
                else if (i == 5)
                    System.out.println(number + " is divisible by " + i + " because it ends with a 5.");
                else
                    System.out.println(number + " is divisible by " + i);
            } else {
                System.out.println(number + " is not divisible by " + i);
            }
        }
    }

    private static boolean isDivisible(int number, int divisor) {
        if (divisor == 0)
            return false;
        else
            return number % divisor == 0;
    }
}
```

4.

```
package mutiples;

import java.util.Scanner;


public class Mutiples {

    public static void main(String[] args) {
      System.out.println("Multiples of 2, 3, and 7 between 71 and 150:");
        System.out.println("==========================================");

        for (int i = 71; i <= 150; i++) {
            if (i % 2 == 0 || i % 3 == 0 || i % 7 == 0) {
                System.out.println(i);
            }
        }
```

```
    }
}
```

5

```java
import java.util.Scanner;

public class Calculator {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        boolean exit = false;

        while (!exit) {
            System.out.print("Enter the first number: ");
            double num1 = scanner.nextDouble();

            System.out.print("Enter the operator (+, -, *, /) or 'q' to quit: ");
            char operator = scanner.next().charAt(0);

            if (operator == 'q' || operator == 'Q') {
                exit = true;
                continue;
            }

            System.out.print("Enter the second number: ");
            double num2 = scanner.nextDouble();

            double result;
            boolean isValidOperator = true;

            switch (operator) {
                case '+':
                    result = num1 + num2;
                    break;
                case '-':
                    result = num1 - num2;
                    break;
                case '*':
                    result = num1 * num2;
                    break;
                case '/':
                    if (num2 != 0) {
                        result = num1 / num2;
                    } else {
                        System.out.println("Error: Division by zero is not allowed.");
                        isValidOperator = false;
                    }
                    break;
                default:
                    System.out.println("Error: Invalid operator.");
                    isValidOperator = false;
                    break;
            }

            if (isValidOperator) {
                System.out.println("Result: " + result);
            }
        }

        scanner.close();
    }
}
```