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Assignment: Arrays

Part A: MCQs

1. What is an array in Java?
A. A collection of different data types
B. A collection of same data type values
C. A class
D. A package
Answer: B

---

2. Which of the following is the correct way to declare an array?
A. int arr[];
B. int[] arr;
C. Both A and B
D. None
Answer: C

---

3. Array index in Java starts from?
A. 1
B. 0
C. -1
D. Any number
Answer: B

---

4. What will be the size of this array?

```
int arr[] = {10, 20, 30};
```

A. 2
B. 3
C. 4
D. Error
Answer: B

---

5. Which property is used to find array length?
A. size
B. length()
C. length
D. getLength
Answer: C

---

6. Default value of int array elements is?
A. 1
B. null
C. 0
D. garbage
Answer: C

---

7. Which loop is best suited for arrays?
A. while
B. do-while
C. for
D. All
Answer: D

---

8. What happens if index is out of range?
A. Compile-time error
B. Runtime error
C. No error
D. Warning
Answer: B

---

9. Which exception occurs for invalid index access?
A. NullPointerException
B. NumberFormatException
C. ArrayIndexOutOfBoundsException
D. IOException
Answer: C

---

10. How do you access first element of array `arr`?
A. arr(0)
B. arr[1]
C. arr[0]
D. arr.first
Answer: C

---

11. Can array store primitive data types?
A. Yes
B. No
C. Sometimes
D. Only int
Answer: A

---

12. Can array size be changed after creation?
A. Yes
B. No
C. Sometimes
D. Depends on data type
Answer: B

---

13. Which keyword is used to create array object?
A. create
B. array
C. new
D. make
Answer: C

---

14. How many elements are in this array?

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

A. 4
B. 5
C. 6
D. 0
Answer: B

---

15. Which data type stores characters?
A. String
B. char
C. int
D. boolean
Answer: B

---

16. Which array holds true/false values?
A. int
B. char
C. boolean
D. String
Answer: C

---

17. What is printed?

```
int a[] = {1,2,3};
System.out.println(a.length);
```

A. 2
B. 3
C. 4
D. Error
Answer: B

---

18. Arrays in Java are stored in?
A. Stack
B. Heap
C. Register
D. CPU
Answer: B

---

19. Which is a valid array declaration?
A. int arr[5];
B. arr int[];
C. int[] arr = new int[5];
D. array int arr;
Answer: C

---

20. What does `arr[i]` represent?
A. Index
B. Value at index i
C. Size
D. Memory address
Answer: B

Part B: Problem Statements

1. Print Elements of an Array

Problem Statement:
Write a Java program that accepts multiple integer values from the user, stores them in an array, and prints all the elements of the array in the same order as entered.

Sample Input:
```
5
10 20 30 40 50
```

Sample Output:
```
10 20 30 40 50
```

```java
/* 1. Print Elements of an Array */
class PrintArray {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int n = sc.nextInt();
        int[] arr = new int[n];

        for (int i = 0; i < n; i++) {
            arr[i] = sc.nextInt();
        }

        for (int i = 0; i < n; i++) {
            System.out.print(arr[i] + " ");
        }
    }
}
```

2. Find Sum of Array Elements

Problem Statement:
Write a Java program to store integers in an array and calculate the total sum of all elements present in the array.

Sample Input:
```
4
5 10 15 20
```

Sample Output:
```
Sum = 50
```

```java
/* 2. Sum of Array Elements */
class SumArray {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int n = sc.nextInt();
        int[] arr = new int[n];
        int sum = 0;

        for (int i = 0; i < n; i++) {
            arr[i] = sc.nextInt();
            sum += arr[i];
        }

        System.out.println("Sum = " + sum);
    }
}
```

3. Find Average of Array Elements

Problem Statement:
Write a Java program that calculates the average of all elements stored in an integer array by dividing the sum of elements by the total number of elements.

Sample Input:
```
3
10 20 30
```

Sample Output:
```
Average = 20
```

```java
/* 3. Average of Array */
class AverageArray {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int n = sc.nextInt();
        int[] arr = new int[n];
        int sum = 0;

        for (int i = 0; i < n; i++) {
            arr[i] = sc.nextInt();
            sum += arr[i];
        }

        System.out.println("Average = " + (sum / n));
    }
}
```

4. Find Maximum Element in Array

Problem Statement:
Write a Java program to find and display the largest element present in an integer array entered by the user.

Sample Input:
```
5
12 45 2 89 34
```

Sample Output:
```
Maximum = 89
```

```java
/* 4. Maximum Element */
class MaxArray {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int n = sc.nextInt();
        int[] arr = new int[n];

        for (int i = 0; i < n; i++) {
            arr[i] = sc.nextInt();
        }

        int max = arr[0];
        for (int i = 1; i < n; i++) {
            if (arr[i] > max) {
                max = arr[i];
            }
        }

        System.out.println("Maximum = " + max);
    }
}
```

---

5. Find Minimum Element in Array

Problem Statement:
Write a Java program to identify and display the smallest element from the array values provided by the user.

Sample Input:
```
4
25 5 40 10
```

Sample Output:
```
Minimum = 5
```

```java
/* 5. Minimum Element */
class MinArray {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int n = sc.nextInt();
        int[] arr = new int[n];

        for (int i = 0; i < n; i++) {
            arr[i] = sc.nextInt();
        }

        int min = arr[0];
        for (int i = 1; i < n; i++) {
            if (arr[i] < min) {
                min = arr[i];
            }
        }

        System.out.println("Minimum = " + min);
    }
}
```

---

6. Count Even Numbers in Array

Problem Statement:
Write a Java program that counts how many even numbers are present in the given integer array.

Sample Input:
```
6
2 5 8 9 12 3
```

Sample Output:
```
Even Count = 3
```

```java
/* 6. Count Even Numbers */
class EvenCount {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int n = sc.nextInt();
        int[] arr = new int[n];
        int count = 0;

        for (int i = 0; i < n; i++) {
            arr[i] = sc.nextInt();
            if (arr[i] % 2 == 0) {
                count++;
            }
        }

        System.out.println("Even Count = " + count);
    }
}
```

7. Search an Element in Array

Problem Statement:
Write a Java program that searches for a specific number in an array and displays whether the element is found or not.

Sample Input:
```
5
10 20 30 40 50
Search = 30
```

Sample Output:
```
Element Found
```

```java
/* 7. Search an Element */
class SearchArray {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int n = sc.nextInt();
        int[] arr = new int[n];

        for (int i = 0; i < n; i++) {
            arr[i] = sc.nextInt();
        }

        int search = sc.nextInt();
        boolean found = false;

        for (int i = 0; i < n; i++) {
            if (arr[i] == search) {
                found = true;
                break;
            }
        }

        if (found)
            System.out.println("Element Found");
        else
            System.out.println("Element Not Found");
    }
}
```

8. Reverse an Array

Problem Statement:
Write a Java program to display all array elements in reverse order without changing the original array.

Sample Input:
```
4
1 2 3 4
```

Sample Output:
```
4 3 2 1
```

```java
/* 8. Reverse Array */
class ReverseArray {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int n = sc.nextInt();
        int[] arr = new int[n];

        for (int i = 0; i < n; i++) {
            arr[i] = sc.nextInt();
        }

        for (int i = n - 1; i >= 0; i--) {
            System.out.print(arr[i] + " ");
        }
    }
}
```

9. Count Positive Numbers in Array

Problem Statement:
Write a Java program that counts the total number of positive integers present in the array.

Sample Input:
```
5
-2 5 -1 8 3
```

Sample Output:
```
Positive Count = 3
```

```java
/* 9. Count Positive Numbers */
class PositiveCount {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int n = sc.nextInt();
        int[] arr = new int[n];
        int count = 0;

        for (int i = 0; i < n; i++) {
            arr[i] = sc.nextInt();
            if (arr[i] > 0) {
                count++;
            }
        }

        System.out.println("Positive Count = " + count);
    }
}
```

10. Replace Negative Numbers with Zero

Problem Statement:
Write a Java program that replaces all negative numbers in the array with zero and prints the updated array.

Sample Input:
```
5
-1 4 -3 6 2
```

Sample Output:
```
0 4 0 6 2
```

```java
/* 10. Replace Negative Numbers with Zero */
class ReplaceNegative {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int n = sc.nextInt();
        int[] arr = new int[n];

        for (int i = 0; i < n; i++) {
            arr[i] = sc.nextInt();
            if (arr[i] < 0) {
                arr[i] = 0;
            }
        }

        for (int i = 0; i < n; i++) {
            System.out.print(arr[i] + " ");
        }
    }
}
```
