

Programming Fundamentals - Topic 04 Tutorial

Section 1: Arithmetic Operators & Order of Evaluation

Question 1.1: Basic Arithmetic

Calculate the results of the following expressions:

- a) `10 + 5 * 2`
- b) `(10 + 5) * 2`
- c) `20 / 4 + 3`
- d) `20 / (4 + 3)`
- e) `15 % 4 + 2 * 3`

Question 1.2: Compound Assignment

Rewrite the following statements using compound assignment operators:

- a) `total = total + 10;`
- b) `count = count - 1;`
- c) `price = price * 1.2;`
- d) `score = score / 2;`
- e) `balance = balance + amount;`

Question 1.3: What's the Value?

If `x = 10` (before all of the following statements), what is the value of `x` after each statement?

- a) `x += 5;`
- b) `x -= 3;`
- c) `x *= 2;`
- d) `x++;`
- e) `x--;`

Section 2: Boolean Values & Conditions

Question 2.1: True or False?

Given: `int age = 20; int price = 15; String name = "John";`

Evaluate whether these conditions are `true` or `false`:

- a) `age >= 18`
- b) `age < 18`
- c) `price == 15`
- d) `price != 15`
- e) `age > 20`
- f) `age <= 20`
- g) `price > 10 && price < 20`
- h) `age < 18 || age > 65`

Question 2.1: Boolean Variables

Complete the code by creating appropriate boolean variables:

```
int temperature = 25;
int humidity = 80;

// Create boolean variables
boolean _____ = temperature > 30;
boolean _____ = temperature < 0;
boolean _____ = humidity > 70;
boolean _____ = isHot && isHumid;
```

Section 3: Simple If Statements

Question 3.1: Write Simple If Statements

Write if statements for the following scenarios:

- a) If a person's age is 18 or over, print "You can vote"
- b) If the price is negative, print "Invalid price"
- c) If the score is 100, print "Perfect score!"
- d) If the balance is 0 or less, print "Insufficient funds"

Question 3.2: Complete the Code

Fill in the missing parts:

```
public void checkTemperature(int temp) {  
    if (_____) { // temp is below 0  
        System.out.println("Freezing!");  
    }  
}  
  
public void validateAge(int age) {  
    if (_____) { // age is between 13 and 19 inclusive  
        System.out.println("Teenager");  
    }  
}
```

Section 4: If-Else Statements

Question 4.1 Pass or Fail

Write a method that checks if a student passed or failed:

- Score \geq 40: Print "Pass"
- Score $<$ 40: Print "Fail"

```
public void checkResult(int score) {  
    // Your code here  
  
}
```

Question 4.3: Even or Odd

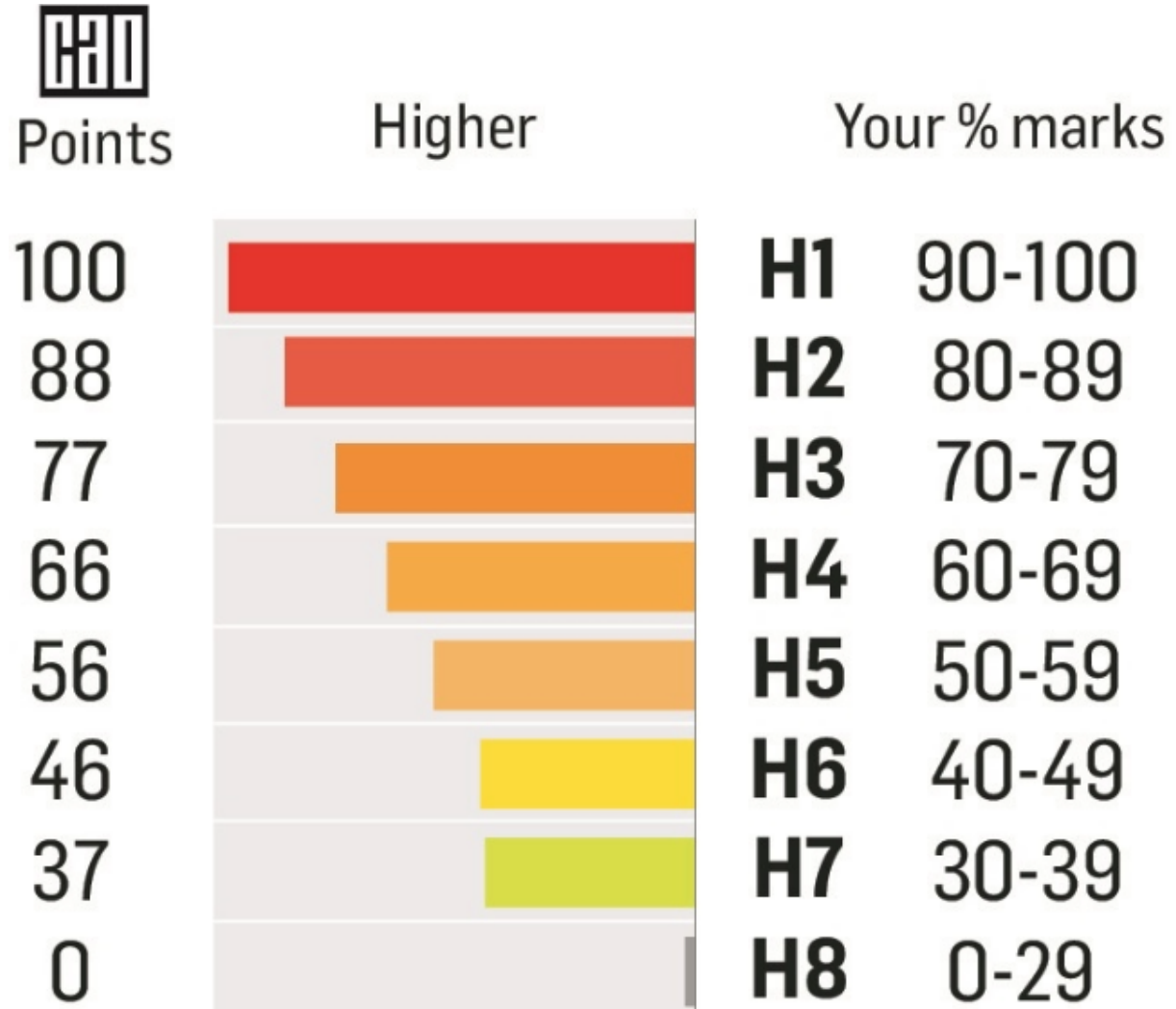
Write code to determine if a number is even or odd:

```
public void checkEvenOdd(int number) {  
    // Hint: Use the % operator  
    // Your code here  
  
}
```

Section 5: If-Else-If Statements

Question 5.1: Marks and Grades

Given the following grade categories:



Write a method **printGrade** person's a given mark, prints the grade (e.g. "H1", "H2", etc.)

```
public void printGrade(int mark) {
    // Your code here
}
```

Question 5.2: Ticket Pricing

A cinema charges different prices based on age:

- Under 12: €6
- 12-64: €10
- 65 and over: €7

Write a method to calculate and print the ticket price:

```
public double getTicketPrice(int age) {  
    // Your code here  
  
}
```

Section 6: Compound Conditions (AND &&)

Question 6.1: Valid Mark Range

Write code to check if a mark is valid (between 0 and 100 inclusive):

```
public void validateMark(int mark) {  
    // Your code here  
  
}
```

Question 6.2: Valid Mark Range - boolean method

Write a method similar to validateMark as above except that in this case the method returns a boolean value - true if the mark is valid between 0 and 100 inclusive and false otherwise.

```
public boolean validateAgeBoolean(int age) {  
    // Your code here  
  
}
```

Question 6.3: Loan Eligibility

Write a method that checks (and prints) if a person is eligible for a loan. A person is eligible for a loan if:

- Age is between 18 and 65 (inclusive)
- Has no existing loans

```
public void checkLoanEligibility(int age, boolean hasExistingLoan) {  
    // Your code here  
  
}
```

Question 6.4: Loan Eligibility - boolean method

Write a method that checks if a person is eligible for a loan. A person is eligible for a loan if:

- Age is between 18 and 65 (inclusive)

- Has no existing loans The method returns a boolean value - true if the person is eligible for a loan and false otherwise

```
public boolean checkLoanEligibilityBoolean(int age, boolean
hasExistingLoan) {
    // Your code here
}
```

Section 7: Compound Conditions (OR ||)

Question 7.1: Invalid Mark

Write code to check if a mark is INVALID (less than 0 OR greater than 100):

```
public void checkInvalidMark(int mark) {
    // Your code here
}
```

Question 7.2: Weekend Day

Write code to check if a day is a weekend day (Saturday or Sunday):

```
public void checkWeekend(String day) {
    // Your code here
}
```

Question 7.3: Discount Eligibility

A customer gets a discount if they are a student OR a senior (65+):

```
public void checkDiscount(boolean isStudent, int age) {
    // Your code here
}
```

Section 8: Compound Conditions (NOT !)

Question 8.1: Voting Ineligibility

Write code using the NOT operator:

```
boolean isEligible = false;

// If NOT eligible, print "Sorry you cannot vote"
// Your code here
```

Question 8.2: Not Raining

Write code to suggest outdoor activities if it's NOT raining:

```
public void suggestActivity(boolean isRaining) {
    // Your code here
}
```

Question 8.3: Account Not Active

Write code to deny access if an account is NOT active:

```
public void checkAccess(boolean isActive) {
    // Your code here
}
```

Section 9: Debugging Exercises

Debug 1: Find and Fix the Errors

```
public void checkAge(int age) {
    if (age = 18) { // Error here
        System.out.println("Exactly 18");
    }
    else if (age > 18) AND (age < 65) { // Error here
        System.out.println("Adult");
    }
    else
        System.out.println("Senior") // Error here
}
```

Debug 2: Logic Error

Why doesn't this code work as expected?

```
public void checkDiscount(int age, boolean isStudent) {  
    if (isStudent) {  
        System.out.println("Student discount: 20%");  
    }  
    if (age >= 65) {  
        System.out.println("Senior discount: 15%");  
    }  
    else {  
        System.out.println("No discount");  
    }  
}  
  
// Problem: If someone is a student AND 65+, what happens?
```

Debug 3: Compound Assignment Error

```
int total = 100;  
total += 50; // Is this correct?  
System.out.println(total); // What prints?
```
