Tutorial Sheet - Topic 04

Programming Fundamentals 1

Selection - If-Else, Precedence of Operators, Logical Operators, compound assignment statements

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 >= 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:

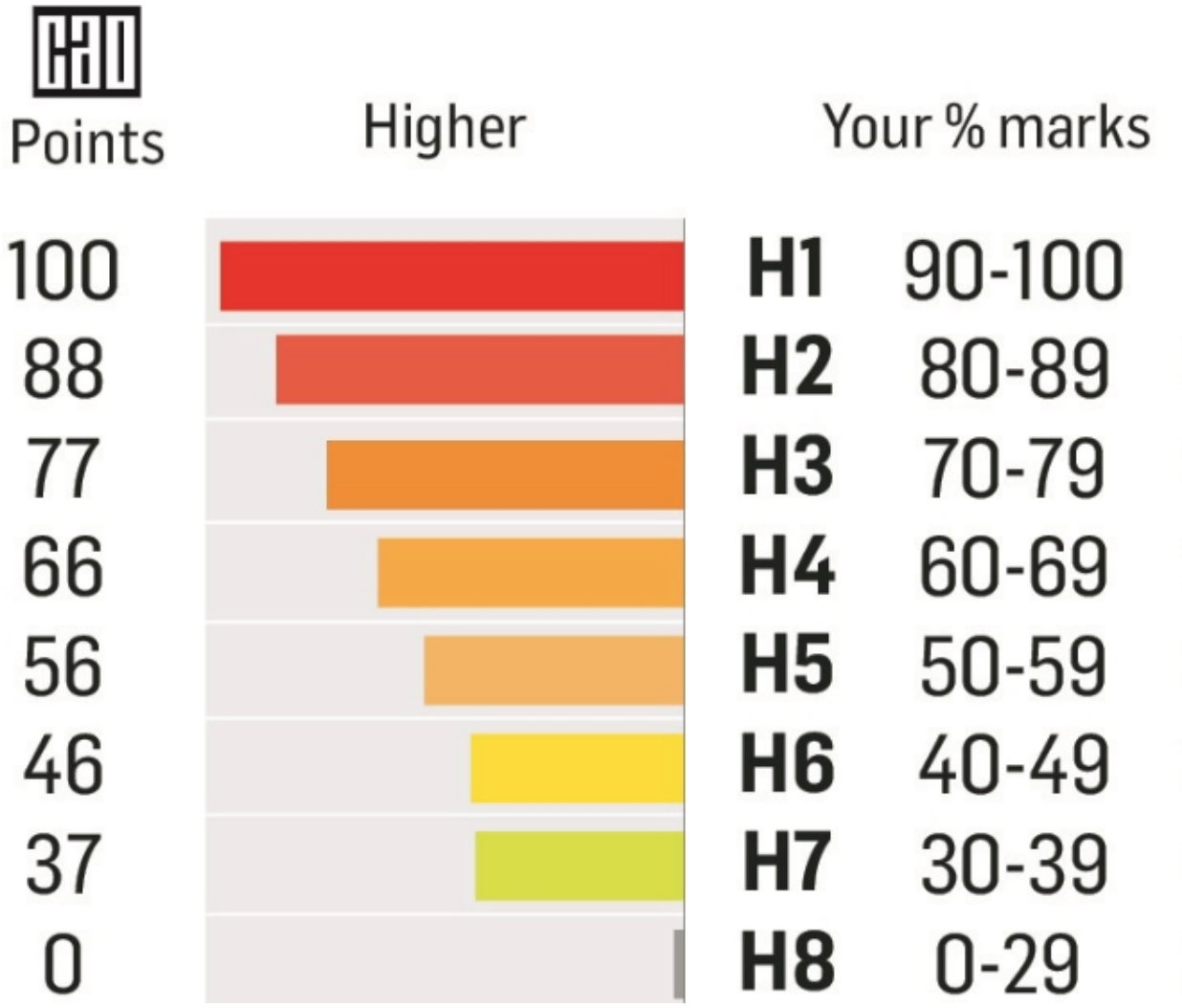
```
public void checkEvenOdd(int number) {
    // Hint: Use the % operator
    // Your code here

}
```

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 thehe 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 validbetween 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?
```
