الجامعة العربية المفتوحة

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Meeting 3 – Part 1:

- Division operator (/).
- Modulo(remainder) operator (%).
- Logic operators (&& - || - ! - ^)
- Examples

Meeting 3 – Part 2:

- Primitive data types
- Casting
- Nested if-else statement
- Examples

Meeting 3 – Part 3:

- String – charAt() - equals()
- Compound Assignment operators
- Increment and decrement operators
- Examples

Meeting 3 – Part 4:

- For Loop.
- Examples.
- While loop
- Operator precedence.

TM105 – Meeting 3 (Part 1)

- **Division operator (/).**
- **Modulo(remainder) operator (%).**
- **Logic operators (&& - || - ! - ^)**
- **Examples**

Division operator (/):

- **int / int = int**

Example:

4 / 2 = 2
2 / 4 = 0
5 / 2 = 2

- **int / double = double**

Example:

4 / 2.0 = 2.0
5 / 2.0 = 2.5

- **double / int = double**

Example:

4.0 / 2 = 2.0
5.0 / 2 = 2.5

Test yourself:

- **------- / 3 = 3**
  a. 9 **b. 9.0**
- **4 / 8 = --------**
  a. 0.5 **b. 0**
- **4.0 / 8 = --------**
  a. 0.5 **b. 0**
- **2 / 5 * (3 + 4) = 0**
  a. True **b. False**

Modulo(remainder) operator (%):

Example:

29 % 5 = ?

Examples:

1 % 3 = 1
1 % 3.0 = 1.0
6 % 2 = 0
6 % 2.0 = 0.0

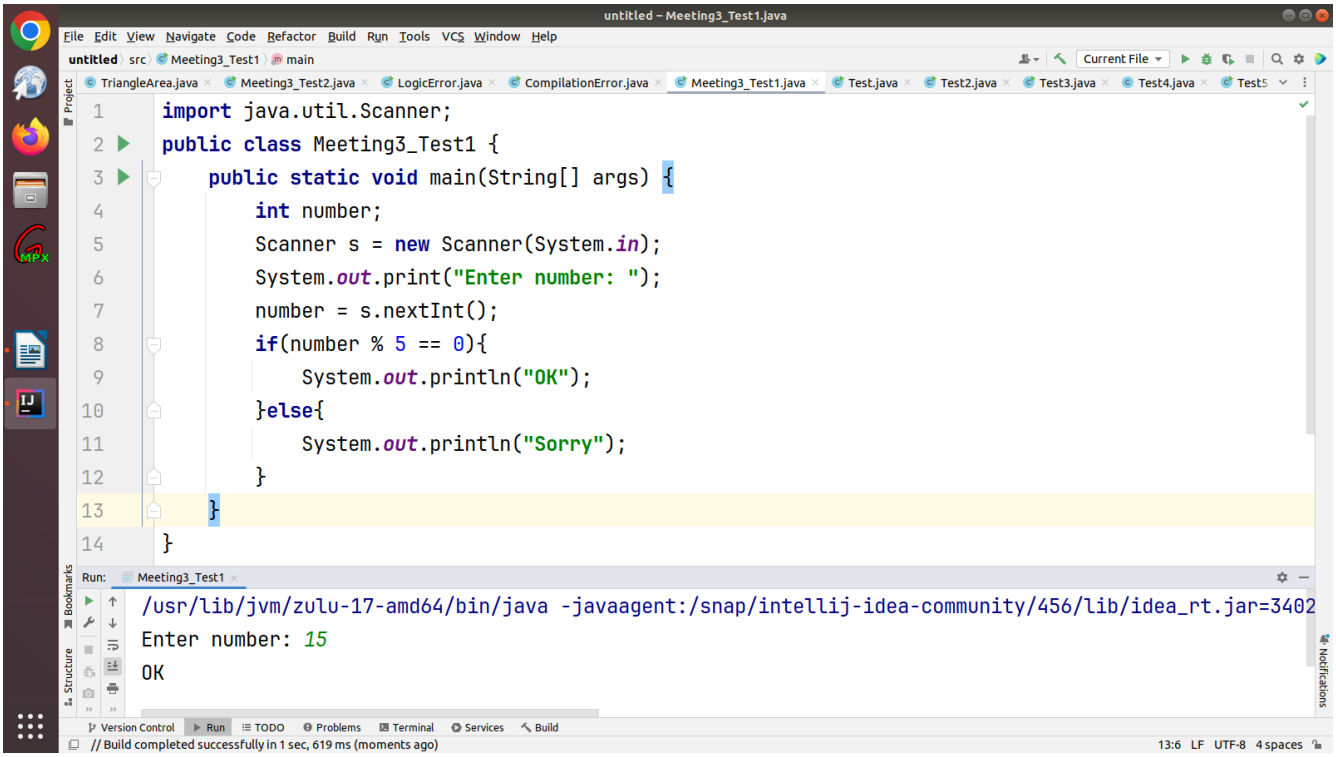
Note: We use % operator to check if a number is divisible by 2 or not:

Example:

```
if ( number % 2 == 0 ){
        System.out.println(“Even number”);
}else{
        System.out.println(“Odd number”);
}
```

Example:

Write a program to read an integer from user. The program check if the number is divisible by 5 or not. If the number is divisible by 5 the program prints "OK", otherwise, it prints "Sorry".



Logical operators (&& - || - !): They are used to combine conditions.

&&: Logical conjunction.

Example:

```
if ( c1 && c2 ){
        ----------------
        ----------------
}
```

||: Logical disjunction.

Example:

```
if ( c1 || c2 ){
        ----------------
        ----------------
}
```

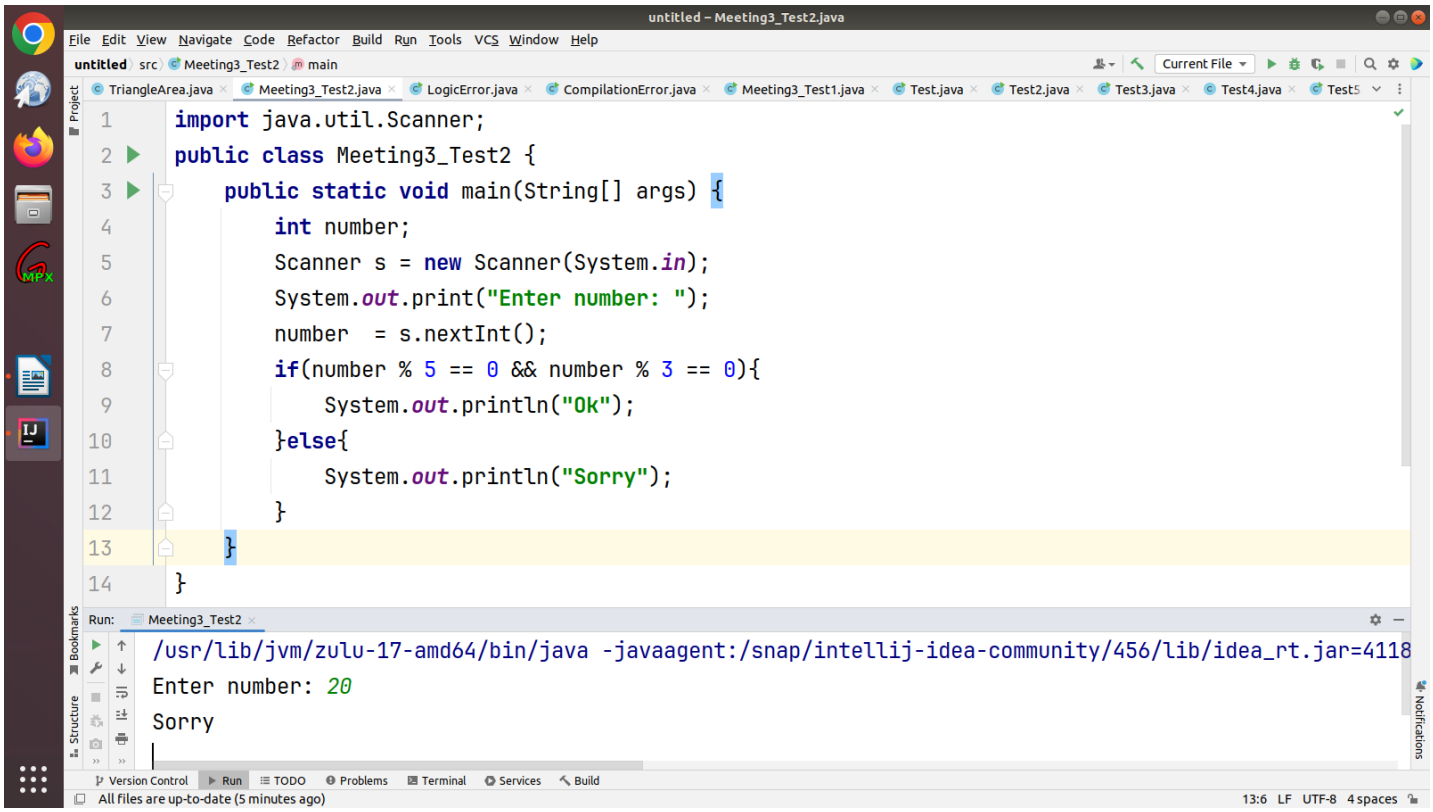
!: Logical negation.

Example:

```
if ( !c ){
        ----------------
        ----------------
}
```

Example:

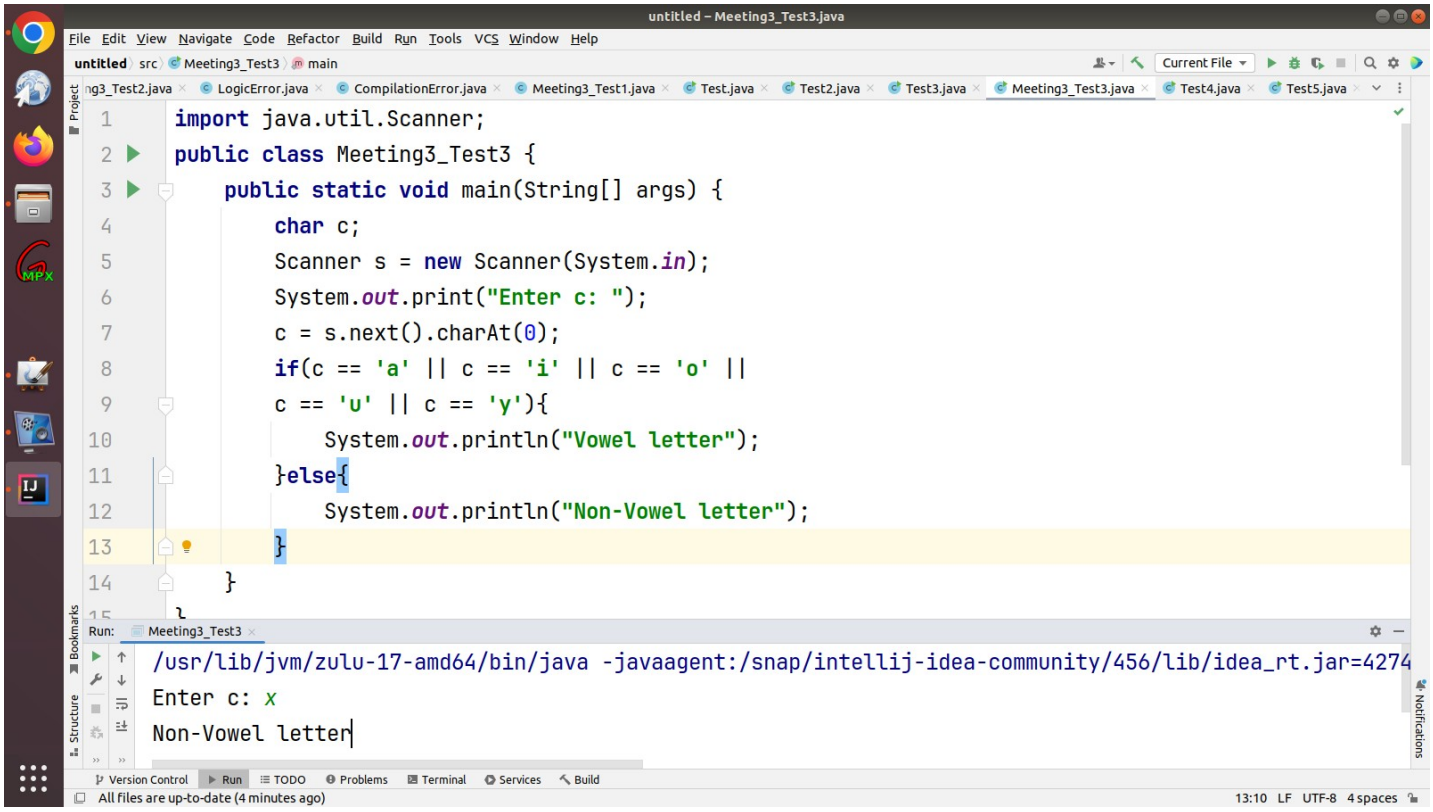
Write a program to read an integer from user. The program check if the number is divisible by 5 and 3 or not. If the number is divisible by 5 and 3 the program prints “OK”, otherwise, it prints “Sorry”.



Example:

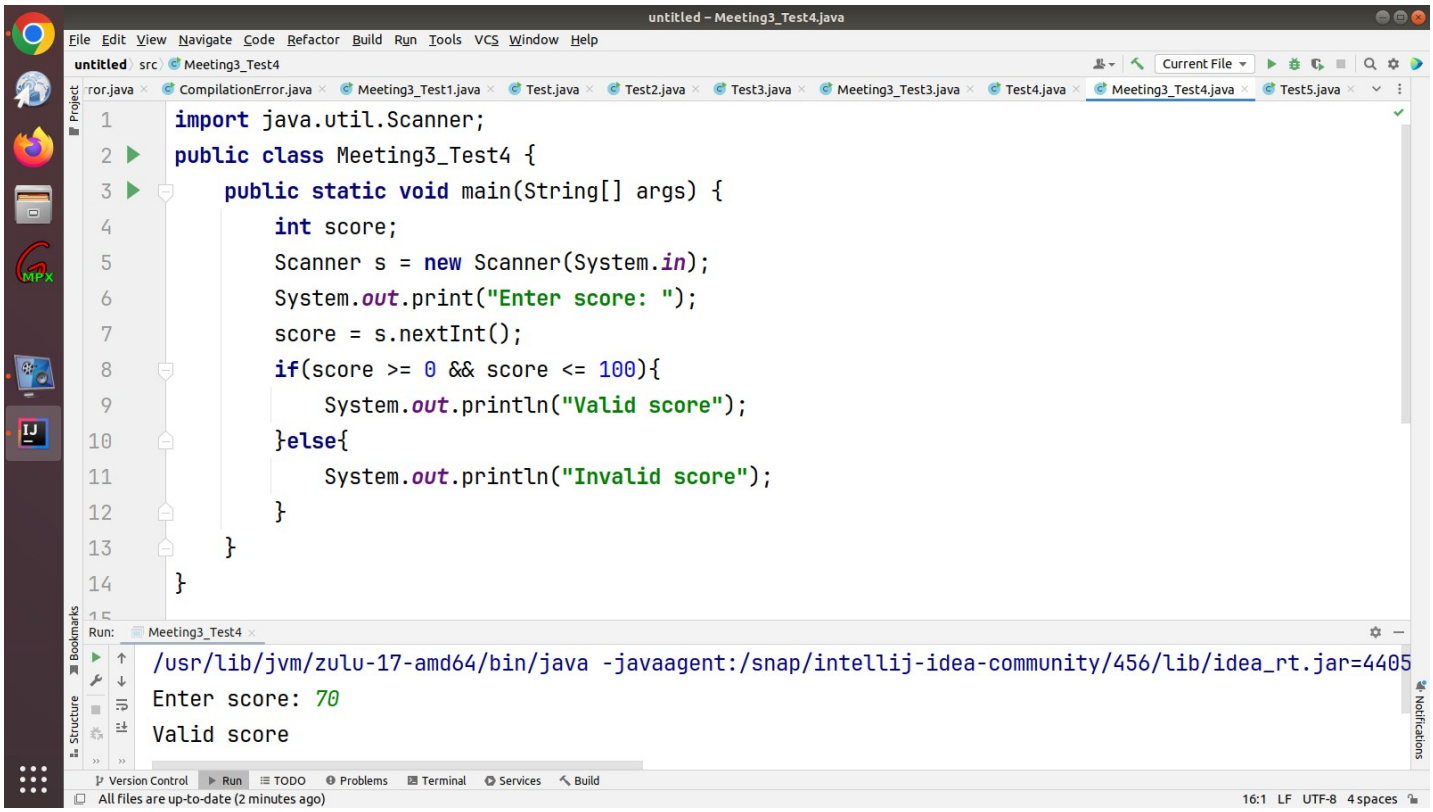
Write a program to read a character from user. If the character is ‘a’ or ‘i’ or ‘o’ or ‘u’ or ‘y’ the program prints “Vowel letter”, otherwise, it prints “Non-Vowel letter”.

Note: To read a character from user you need to use next().charAt(0)



Example:

Write program to read the student score. The program prints "Valid score" if the score is greater than or equals 0 and less than or equals 100, otherwise, it prints "Invalid score".



Test yourself

Write program that reads base and height from user. If base is greater than or equal 3 and height is greater than 2 then calculate and print the area of triangle, otherwise, print "Invalid base or height".

area of triangle = ½ (base) (height)

Note: base, height and area are real numbers.

TM105 – Meeting 3 (Part 2)

- **Primitive data types**
- **Casting**
- **Nested if-else statement**
- **Examples**

Primitive data types

Description	Data type	Size	Examples
Whole numbers – الارقام الصحيحة (Numbers without decimal point) الارقام التي لا يوجد فيها علامة عشرية	byte	1	-3 2 1 0 7
	short	2	
	int	4	
	long	8	
Real numbers – الارقام المصحوبة بعلامة عشرية	float	4	1.0f – 2.3f
	double	8	1.0 – 2.3
Characters – الحرفية	char	2	'a' - 'A' - '#'
Booleans - المنطقية	boolean	JVM Based	true - false

Example:

- byte b = 5;
- int i = -3;
- float f = 2.5f;
- double d = 2.5;
- char c = 'm';
- boolean b = true;

Note:

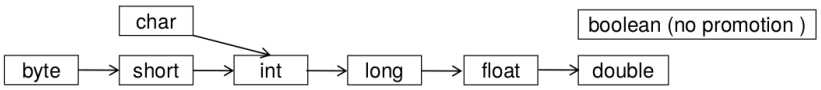
- Java is strongly typed: All variables require to have a type.
- All primitive data types are written in small letters.

Test yourself:

Which of the following types is a primitive data type:

a. String b. Scanner c. Double d. double

Cating

	Done by		Example
Implicit (Promotion)	**Compiler**		double d = 3; S.o.p(d) → 3.0

Explicit	**Programmer**
	
	(Programmer have to use the casting operator to cast the value)
			int i = 72.9; → error
			
			int i = (int) 72.9;
			S.o.p(i) → 72
			
			float f = 3.5; →error
			
			float f = (float) 3.5;

Casting operator precedence:

1. () brackets
2. (*data type*) casting operator
3. * / %
4. + -

Example 1: (double) 5 / 2 = 5.0 / 2 = 2.5
Example 2: (double) (5 / 2) = (double) 2 = 2.0

Test yourself

What is the value of the following expression(Write steps). And what is type of the variable x:

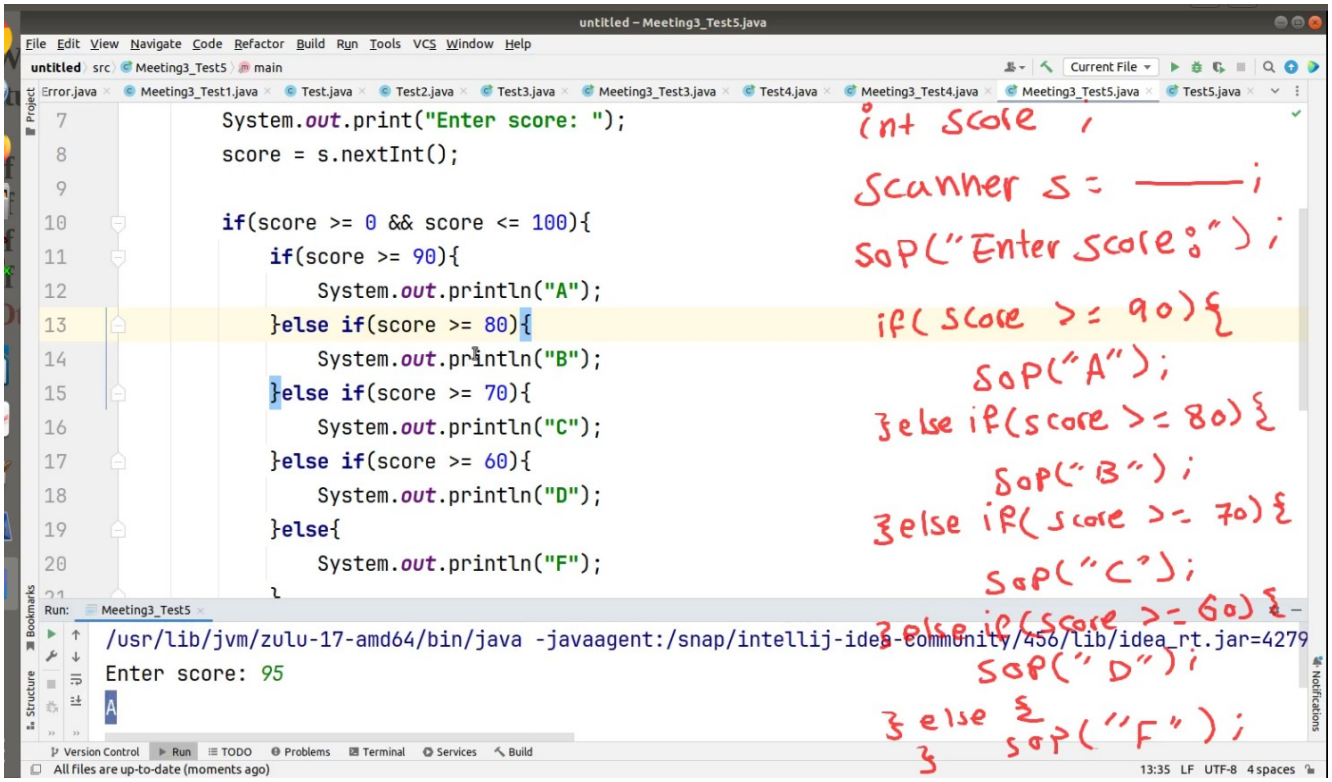
------ x = 3 + (12 / 4) / 2 – (int) 4.9 * 2

Nested if-else

Example:

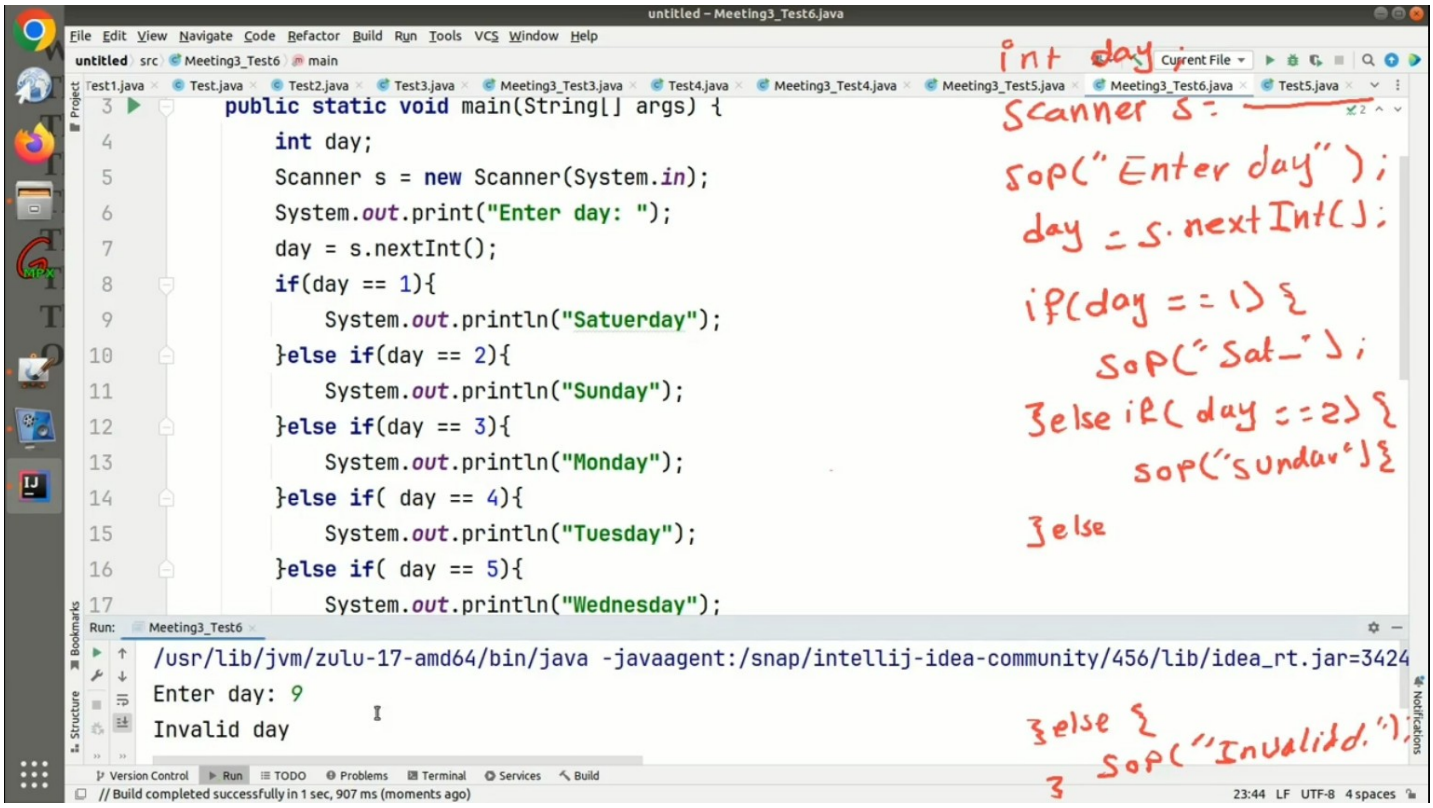
Write a program to read a student score. The program prints the student grade according to his score:

If score is greater than or equals 90 - the grade is "A".
If score is greater than or equals 80 - the grade is "B".
If score is greater than or equals 70 - the grade is "C".
If score is greater than or equals 60 - the grade is "D".
Otherwise, the grade is "F".



Example:

Write a program to read a the day number.
The program prints "Saturday" if the day number equals 1.
The program prints "Sunday" if the day number equals 2.
The program prints "Monday" if the day number equals 3.
The program prints "Tuesday" if the day number equals 4.
The program prints "Wednesday" if the day number equals 5.
The program prints "Thursday" if the day number equals 6.
The program prints "Friday" if the day number equals 7.
Otherwise, it prints "Invalid day"



Example:

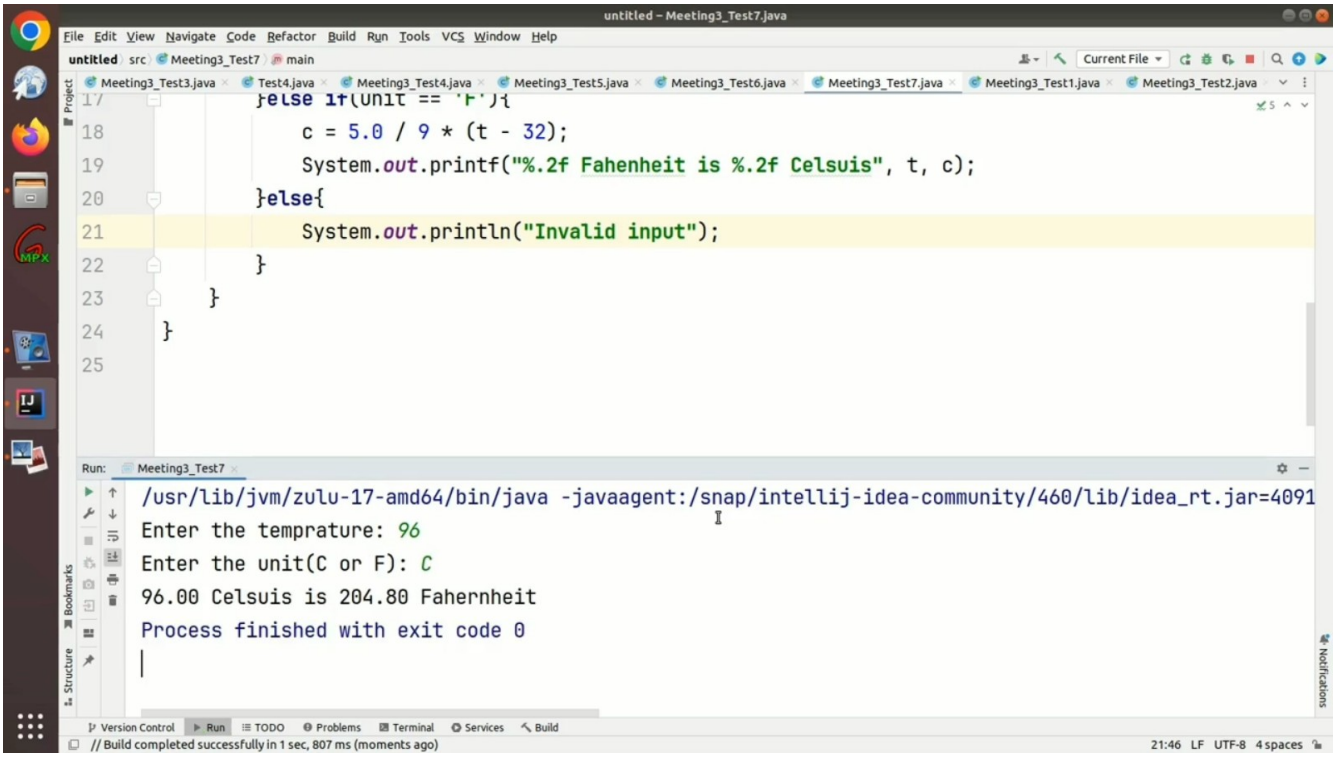
Mid Term March 2023

Q2. Write a Java program according to the following specifications [20 Marks]:

- Read from the user a temperature as areal number and the unit the temperature is in. The unit could be either C or F.
- If the user enters C, the program should then convert the temperature from Celsius to Fahrenheit and print it rounded to 2 decimal values, using the formula:
  $F = \frac{9}{5}C + 32$
- If the user enters F, the program should then convert the temperature from Fahrenheit to Celsius and print it rounded to 2 decimal values, using the formula:
  $C = \frac{5}{9}(F - 32)$
- If the user enters a unit other than C or F, the program should print an error message and nothing should be calculated.

Here are 3 different samples of the program run to help you understand how the program works.

1	Enter the temperature: 96 Enter the unit (C or F): C 96.00 Celsius is 204.80 Fahrenheit
2	Enter the temperature: 66.5 Enter the unit (C or F): F 66.50 Fahrenheit is 19.17 Celsius
3	Enter the temperature: 34 Enter the unit (C or F): D Invalid input


untitled – Meeting3_Test7.java
File Edit View Navigate Code Refactor Build Run Tools VCS Window Help
untitled src Meeting3_Test7 main
Current File
Meeting3_Test3.java Test4.java Meeting3_Test4.java Meeting3_Test5.java Meeting3_Test6.java Meeting3_Test7.java Meeting3_Test1.java Meeting3_Test2.java
}else if(unit == 'F'){
c = 5.0 / 9 * (t - 32);
System.out.printf("%.2f Fahenheit is %.2f Celsuis", t, c);
}else{
System.out.println("Invalid input");
}
}
}
Run: Meeting3_Test7
/usr/lib/jvm/zulu-17-amd64/bin/java -javaagent:/snap/intellij-idea-community/460/lib/idea_rt.jar=4091
Enter the temprature: 96
Enter the unit(C or F): C
96.00 Celsuis is 204.80 Fahernheit
Process finished with exit code 0
Version Control Run TODO Problems Terminal Services Build
// Build completed successfully in 1 sec, 807 ms (moments ago)
21:46 LF UTF-8 4 spaces

TM105 - Meeting 3 (Part 3)

- String – charAt() - equals()
- Compound Assignment operators
- Increment and decrement operators
- Examples

String

String str1 = “welcome”;	0123456 welcome	char c1 = str1.charAt(0) → c1 = w char c2 = str1.charAt(1) → c2 = e char c3 = str1.charAt(2) → c3 = l char c4 = str1.charAt(3) → c4 = c
String str2 = “welcome”; String str3 = “welcoMe”; String str4 = “java”;		S.o.p(str1.equals(str2)) → true S.o.p(str1.equals(str3)) → false S.o.p(str1.equals(str4)) → false

Examle1: What is the output of the following code?

```
String str1 = “TM105”;
String str2 = “TM251”;
if ( str1.equals(str2) == true){
        System.out.println(“str1 equals str2”);
}else{
        System.out.println(“str1 does not equal str2”);
}
```

Answer:

str1 does not equal str2

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Examle2: What is the output of the following code?

```
String str1 = “TM105”;
char c1 = str1.charAt(0);
String str2 = “tm251”;
char c2 = str2.charAt(0);
if ( c1 == c2 ){
        System.out.println(“c1 = c2”);
}else{
        System.out.println(“c1 != c2”);
}
```

Answer:

c1 != c2

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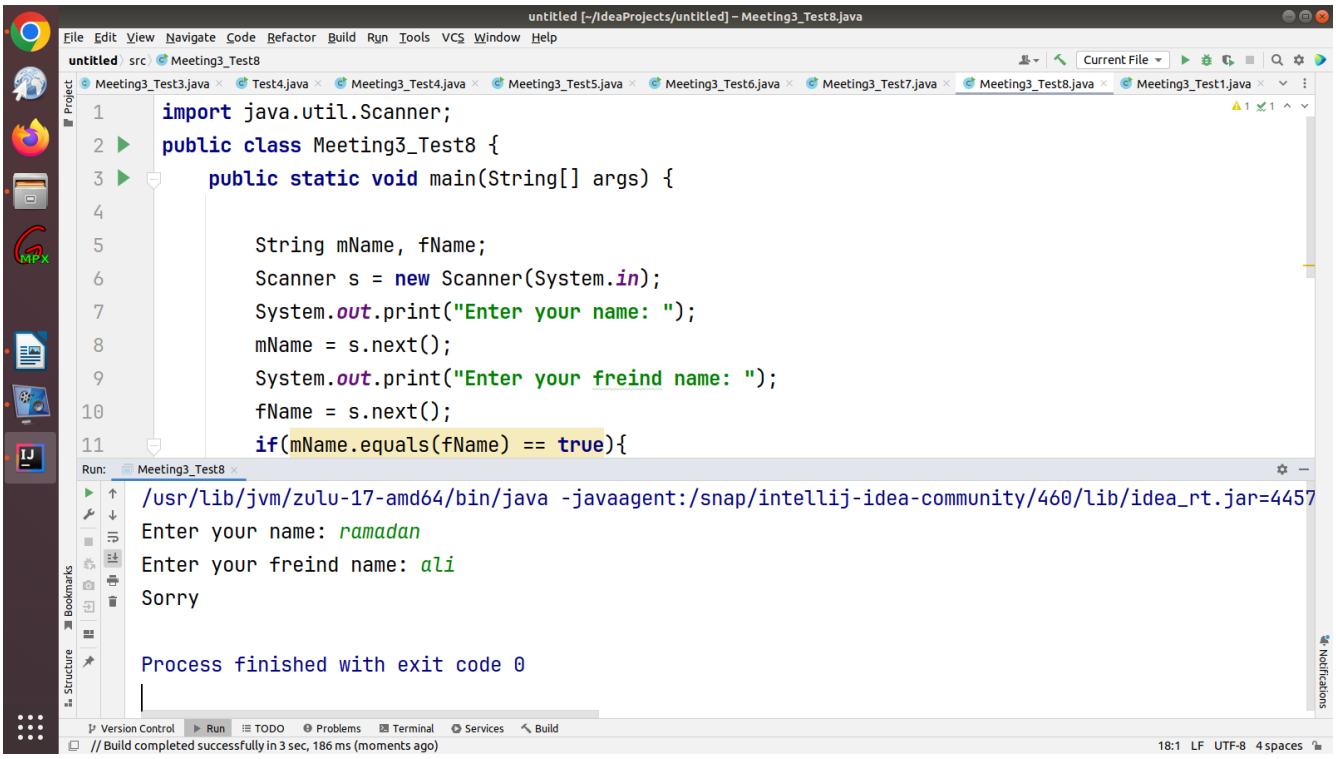
Example:

Write program to read your first name and the first name of your friend. The program prints "OK" if your name equals the name of your friend, otherwise, it prints "Sorry".



Test yourself

Write program to read your first name and the first name of your friend. The program prints "OK" if the third character of your name equals the first character of your friend name, otherwise, it prints "Sorry".

Note: If your name is "ahmed" then the first character in your name is 'a'.

Write a Java program to compute the price of a ticket to a passenger on specific Airways based on the following table:

Class	Price
First Class	KD 300
Economy Class (with meal)	KD 150
Economy Class (without meal)	KD 130

Mid Term 2012

The program reads the class that the passenger wants to travel on:

- If the class is the first class, the program prints the price of the ticket immediately.
- If the class is the economy class, the program asks the passenger if he/she wants a meal on the flight. Then prints the price of the ticket according to the response of the passenger.

```java
import java.util.Scanner;
public class Meeting3_Test9 {
  public static void main(String[] args) {
    String class_type, meal;
    int price;
    Scanner s = new Scanner(System.in);
    System.out.print("Enter class type: ");
    class_type = s.next();
    if(class_type.equals("First") == true){
      price = 300;
      System.out.println("Price = " + price);
    }else{
      System.out.print("Enter Yes for meal or No for no meal: ");
      meal = s.next();
      if(meal.equals("Yes") == true){
        price = 150;
        System.out.println("Price = " + price);
      }else{
        price = 130;
        System.out.println("Price = " + price);
      }
    }
  }
}
```

Test yourself

Question 5: (15 Marks)

Body Mass Index (BMI) is a measure of health on weight. BMI is computed as a function of the weight in kilograms w and the height in meters h using the formula: $\boldsymbol{BMI = w/h^2}$.
The category of weight case is determined according to the following table:

BMI value	**Category**
less than 18.5	*underweight*
18.5 – 25	*ideal*
25 – 30	*overweight*
Greater than 30	*obese*

Write a java program the does the following:

- Reads from the user the weight and the height of a person.
- Calculate and prints (rounded to 2 decimal places) the value of BMI.
- Determine the category of weight state according to the given table.

Compound Assignment Operators

```
int c = 5;
c = c + 3;
```

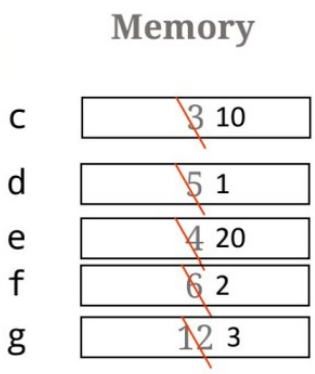
This is equivalent to:

```
int c = 5;
c += 3; // Same as c = c + 3
```

The compound assignment operators are: `+=`, `-=`, `/=`, `*=`, `%=`

Compound Assignment Operators

Operator	Sample Expression	Explanation
`int c = 3, d = 5, e = 4, f = 6, g = 12;`		
`+=`	`c += 7`	`c = c + 7`
`-=`	`d -= 4`	`d = d - 4`
`*=`	`e *= 5`	`e = e * 5`
`/=`	`f /= 3`	`f = f / 3`
`%=`	`g %= 9`	`g = g % 9`



Operators

<table>
<tr><td rowspan="4">Operators</td><td rowspan="2">Binary

(They have two operands one to its left and one to its right)</td><td>Mathematical operators</td><td>Relational operators</td><td>Compound assignment operators</td></tr>
<tr><td>+
-
*
/
%</td><td>></td><td>+=
-=
*=
/=
%=</td></tr>
<tr><td rowspan="2">Unary

(It has one operand only)</td><td>Casting operators</td><td>Increment operator</td><td>Decrement operator</td></tr>
<tr><td>(int)
(double)
(char)</td><td>++</td><td>--</td></tr>
</table>

Increment and Decrement Operators

- The mathematical operators +, -, *, /, % are binary operators.
- They has 2 operands, one to its left and one to its right.

```
3 + 7        4 * 5
```

- Unary operator means it has one operand only.
- Unary increment operator, **++**, adds one to its operand:

```
int a = 2;
a++;    // Same as a = a + 1;
```

a | ~~2~~ 3

- Unary decrement operator, **--**, subtracts one from its operand:

```
int a = 2;
a--;    // Same as a = a - 1;
```

a | ~~2~~ 1

Example: What is the output?

int a = 3;

int b = a++ + 5;

System.out.println(“b = ” + b);

System.out.println(“a = ” + a);

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Answer:

b = 8
a = 4

Example: What is the output?

```
int a = 3;

int b = a++ + a++ + a++ + 5;

System.out.println("b = " + b);

System.out.println("a = " + a );
```

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Answer:

b = 17
a = 6

Example: What is the output?

```
String name = "ahmed";
int i = 0;
if(name.charAt(i++) == 'a'){
        System.out.println("OK");
}else{
        System.out.println("Sorry");
}
System.out.println("i = " + i);
```

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Answer:

OK
i = 1

Test yourself

What is the output?

```
int a = 3;
int b = 5;
if(a++ > 3 || b++ == 5){
        System.out.println(“OK”);
}else{
        System.out.println(“Sorry”);
}
```

TM105 - Meeting 3 (Part 4)

- **For Loop.**
- **Examples.**
- **While loop**
- **Operator precedence.**

For loop

Example: Write program to print your course name 10 times.

```
for( int i = 0; i < 10; i++ ) {
        System.out.println("TM105");
}
```

Tracing code – تتبع الكود

i	i < 10	Output
0	true	TM105
1	true	TM105
2	true	TM105
3	true	TM105
4	true	TM105
5	true	TM105
6	true	TM105
7	true	TM105
8	true	TM105
9	true	TM105
10	false	

More Examples:

- **Get 10 names (String) from user:**

```
for ( int i = 0; i < 10; i++ ) {
        System.out.print("Enter a word: ");
        name = s.next();
}
```

- **Get 10 temperatures (real numbers) from user:**

```
for ( int i = 0; i < 10; i++ ) {
        System.out.print("Enter the temprature: ");
        temp = s.nextDouble();
}
```

- **Get 10 ages (integers) from user:**

```
for ( int i = 0; i < 10; i++ ) {
        System.out.print("Enter the age: ");
        age = s.nextInt();
}
```

- **Get 10 characters from user:**

```
for ( int i = 0; i < 10; i++ ) {
        System.out.print("Enter a character: ");
        c = s.next().charAt(0);
}
```

ملاحظة: أثناء كتابة برامج للفور لوب ينصح بإعطاء قيمة ابتدائية لجميع المتغيرات أثناء الإعلان عنها.

```
String name = "";    لا نحتاج مسافة
int age = 0, count = 0, sum = 0;
double temp = 0, avg = 0;
char c = ' ';              نحتاج مسافة
```

Example 1:

Write a program to read 10 names from user. The program counts how many names start with the letter a.

```
import java.util.Scanner;
public class Meeting3_Test10 {
	public static void main(String[] args) {
		String name = "";
		int count = 0;
		Scanner s = new Scanner(System.in);
		for(int i = 0; i < 10; i++){
			System.out.print("Enter name: ");
			name = s.next();
			if(name.charAt(0) == 'a'){
				count = count + 1;
			}
		}
		System.out.println("Count = " + count);
	}
}
```

Test yourself

Write a program to read 10 student names from user. The program counts how many students their names equals to the user's name.

Note: Ask user to enter his name.

Example 2:

Write a program to read 10 temperatures (real numbers) from user. The program count and prints the number of the positive temperatures, the number of the negative temperatures and the number of zeros temperatures.

```
import java.util.Scanner;
public class Meeting3_Test11 {
	public static void main(String[] args) {
		double temp = 0;
		int countPositive = 0, countNegative = 0, countZeros = 0;
		Scanner s = new Scanner(System.in);
		for (int i = 0; i < 10; i++) {
			System.out.print("Enter the temperatures: ");
			temp = s.nextDouble();
			if(temp > 0){
				countPositive++;
			}else if(temp < 0){
				countNegative++;
			}else{
				countZeros++;
			}
		}
		System.out.println("The number of positive temperatures are: " +
countPositive);
		System.out.println("The number of negative temperatures are: " +
countNegative);
		System.out.println("The number of zeros temperatures are: " +
countZeros);
	}
}
```

Example 3:

Write a program to read 10 characters from user. The program count and prints the number of the vowel letters.

Note: The vowel letters are: a, i, o, u, y.

```
import java.util.Scanner;
public class Meeting3_Test12 {
	public static void main(String[] args) {
		char c = ' ';
		int count = 0;
		Scanner s = new Scanner(System.in);
		for (int i = 0; i < 10; i++) {
			System.out.print("Enter a character: ");
			c = s.next().charAt(0);
			if(c == 'a' || c == 'i' || c == 'o' || c == 'u' || c == 'y'){
				count++;
			}
		}
		System.out.println("Count = " + count);
	}
}
```

Example 4:

Write a program to read 10 ages from user. The program counts and prints the number of ages are greater than 18 and less than 40.

```
import java.util.Scanner;
public class Meeting3_Test13 {
	public static void main(String[] args) {
		int age = 0, count = 0;
		Scanner s = new Scanner(System.in);
		for (int i = 0; i < 10; i++) {
			System.out.print("Enter age: ");
			age = s.nextInt();
			if(age > 18 && age < 40){
				count++;
			}
		}
		System.out.println("Count = " + count);
	}
}
```

Example 5:

Write a program to read 10 ages from user. The program prints the maximum age.

```
import java.util.Scanner;
public class Meeting3_Test14 {
	public static void main(String[] args) {
		int age = 0, max = 0;
		Scanner s = new Scanner(System.in);
		for (int i = 0; i < 10; i++) {
			System.out.print("Enter age: ");
			age = s.nextInt();
			if(age > max){
				max = age;
			}
		}
		System.out.println("Maximum age = " + max);
	}
}
```

Test yourself

Write a program to read 10 ages from user. The program prints the minimum age.

Example 6:

Write a program to read 10 ages from user. The program calculates and prints the total ages.

```
import java.util.Scanner;
public class Meeting3_Test15 {
	public static void main(String[] args) {
		int age = 0, sum = 0;
		Scanner s = new Scanner(System.in);
		for (int i = 0; i < 10; i++) {
			System.out.print("Enter age: ");
			age = s.nextInt();
			sum = sum + age;
		}
		System.out.println("Total ages = " + sum);
	}
}
```

Test yourself

Write a program to read 10 ages from user. The program prints the the average ages.

Note: average = total / عدد الاعمار = total / 10

Test yourself

Write a program to read 10 numbers (integer numbers) from user. The program counts and prints how many numbers are even and how many numbers are odd.

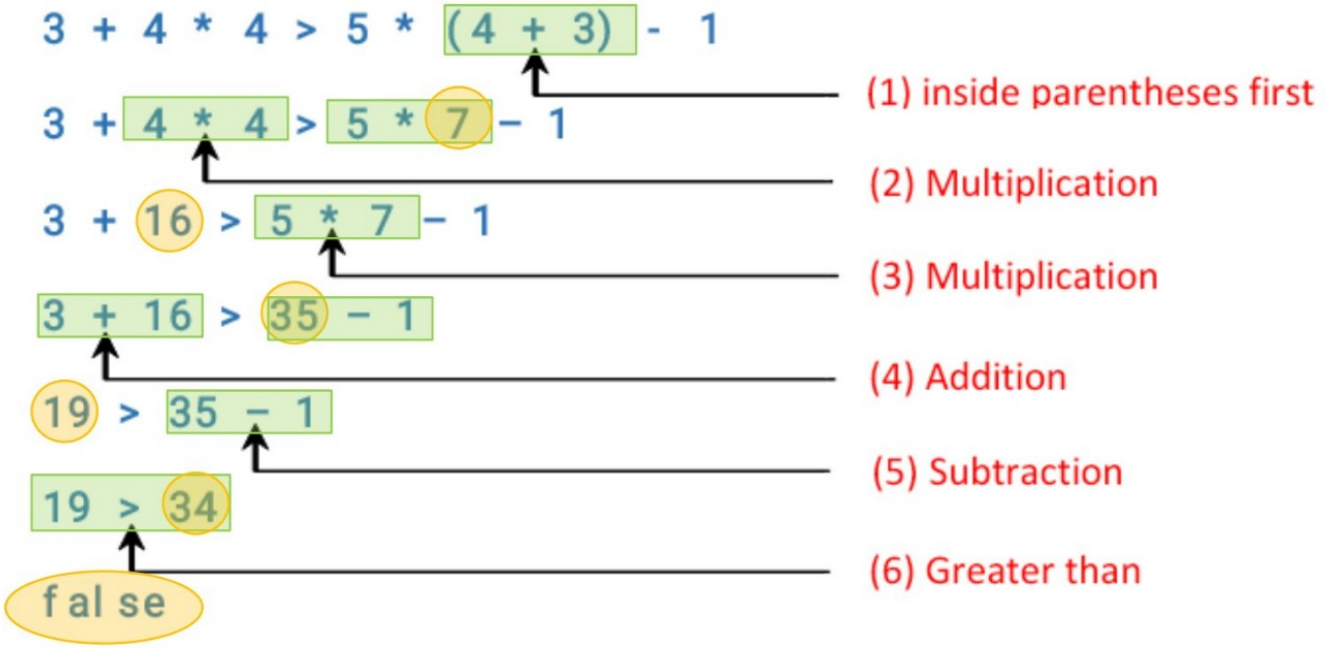
تحويل من for إلى while

for(int i = 0; i < 10; i++){
System.out.println(“TM105”);
}
	→ Equivalent to →	int i = 0;
		while(i < 10){
		System.out.println(“TM105”);
		i++;
		}

Test yourself

Write a program to read 10 ages from user. The program prints the minimum age. Use while loop.

Apply the operator precedence and associativity rule to find the value of: **3 + 4 * 4 > 5 * (4 + 3) - 1**



Test yourself

boolean b = 6 + (3 – 2) * 4 == (2 + 5)
System.out.println(b);

The output will be ----------

رابط المقطع على اليوتيوب: https://youtu.be/mrnP9XLm8Ek

عند وجود أي مشكلة في الوصول إلى المقطع على اليوتيوب يمكنكم التواصل معي على الواتساب

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