

public static int  
 public static double  
 public static String

value apa yg  
 nak return

## TUTORIAL

## STATIC VARIABLES AND METHODS

## Section A

1. Describe the difference between predefined method and programmer-defined method? *method ada ()*

Predefined methods are the method that is already defined in the Java class libraries. It is also known as the standard library method or built-in method. Example : `length()`, `equals()`, `compareTo()`, `sqrt()`, etc. In object-oriented programming, a method is a programmed procedure that is defined as part of a class and included in any object of that class. A class (and thus an object) can have more than one method.

cth predefined :

Math.pow (a, 2) *2 parameter*  
*class* *method → pow*

sc.next();  
*object* *method*

2. Given the following program:

```
1 import java.util.Scanner; ] library scanner
2 import java.lang.Math; ] library, provide predefined method utk pow n sqrt
3
4 public class TutorialOne {
5
6     public static void main(String[] args) {
7         double a, aSqr, b, bSqr, c;
8
9         Scanner scan = new Scanner(System.in);
10
11         a = scan.nextDouble(); return type, double
12         b = scan.nextDouble(); no parameter
13
14         aSqr = Math.pow(a, 2.0);
15         bSqr = Math.pow(b, 2.0);
16
17         c = Math.sqrt(aSqr + bSqr);
18
19         System.out.println("The length of hypotenous is " + c);
20     }
21 }
22
```

Figure 1: Program 6.1

- a) Identify the predefined methods used in Program 6.1 above, and state which import library contains the definition of each predefined methods?

predefined methods : `public static void` *q*  
`import java.lang.Math` : `pow`  
`import java.lang.Math` : `sqrt`

`import java.util.Scanner` ← `nextDouble`

- b) For each predefined method used in Program 6.1, state the type of the return value, the number of parameters and their types

*nextDouble*  
 q method *double*:

para : 0  
 type return value : *double*  
 type : *double*

*utk Method pow :*

(type of return value = *double*) ✓ sbb c kita declare *double*  
 no. of parameter = 1 *q* no. of parameter = 2  
 type = *String* *q* return type = *double*

*code BBLc* →

method → return  
 no return (void)

tgk header

`public static void calcBMI (int H, int w)`

`public static void calcBMI (int H, int w) {`

`int BMI = formula BMI;`

`SOP ("BMI = " + BMI);`

`return BMI;`

*return kepada siapa?*  
*2 kepada siapa q panggil dia kat main method.*



- c) Luqman wants to hang a photo frame of his graduation photo. The ladder is placed at 2 feet away from the wall. The angle that is formed by the wall and the ground is 105 degrees and the angle formed by the center mark and the ladder will be 15 degrees. In programming context, use the predefined method(s) in Math class, find the length of the ladder (in 2 decimal format) that Luqman needed in order to put up his graduation photo neatly.

```
double radB = (Math.PI * (B/180));
double radC = (Math.PI * (C/180));
double b = (c * Math.sin(radB) / Math.sin(radC));
System.out.printf("x.2f", b);
```

[gambar]

3. Given the following program: formal parameter berada pada header

```
3 public class TutorialTwo {
4     public static char toGrade(int mark) {
5         char grade;
6         if (mark >= 80)
7             grade = 'A';
8         else if (mark >= 70)
9             grade = 'B';
10        else if (mark >= 60)
11            grade = 'C';
12        else if (mark >= 50)
13            grade = 'D';
14        else
15            grade = 'E';
16        return grade;
17    }
18
19    public static void main(String[] args) {
20        Scanner sc = new Scanner(System.in);
21        int mark;
22        char grade;
23        mark = sc.nextInt();
24        grade = toGrade(mark);
25        System.out.println(grade);
26    }
27 }
28 }
```

formal parameter berada pada header

hold temporary

hold actual one.

actual parameter

return pada line 16

berada pada header

Figure 2: Program 6.2

- a) Identify the **formal parameter** and **actual parameter**. dalam method call adalah actual parameter.

formal parameter : int mark	formal parameter : char grade
actual parameter : 80, 70, 60, 50	actual parameter : A, B, C, D, E

formal : int mark [line 4]  
actual : mark [line 24]

- b) Note the declaration for variable mark in line 4 and line 24. Can we have two variables with same name in one program?

(yes) because each of the variable is local to respective methods, which is main and toGrade methods. variable dia local for each method.

- c) Discuss the scope of variable `mark` in (d).

(`mark` in line 4 is local to method `toGrade`) ✓  
(`mark` in line 24 is local to main method) ✓

- d) Discuss the scope of variable `grade` in line 5 and line 25.

`grade` in line 5 is local to method `toGrade`  
`grade` in line 25 is local to main method

### Section B

1. Given the following program:

```
1 public class tripleInteger {  
2  
3     public static void main(String[] args) {  
4  
5         int numOne = 100;  
6  
7         System.out.print("Your integer is " + numOne + "\n");  
8  
9         tripleInt(numOne);  
10  
11        System.out.print("Your integer is " + numOne + "\n");  
12    }  
13        x did not return value  
14    public static void tripleInt(int numOne)  
15    {  
16        numOne = numOne * 3;  
17        System.out.print("Your integer is " + numOne + "\n");  
18    }  
19 }
```

Figure 3: Program 6.3

- a) What is the output of Program 6.3?

( Your integer is 100 ) ✓  
( Your integer is 300 ) ✓  
( Your integer is 100 ) ✓

- b) Explain why the value of `numOne` is still 100 at line 11 after passing it to method `tripleInt()` at line 9?

after line 10, the variable `numOne` is reset to 100, not 300 because it is out from the method `tripleInt`  
sbb did not return value.



- c) Which syntax(s) need to modify for the value of numOne to be 300 after passing it to method tripleInt () at line 9? [Identify the line code and write the correct syntax(s)]

```

1 public class Week7Lecture02MethodSum.java
2
3
4 public static void main(String[] args) {
5     int numOne = 100;
6     System.out.print("Your integer is " + numOne + "\n");
7     tripleInt(numOne);
8     //System.out.print("Your integer is " + numOne + "\n");
9
10 } // end of main
11
12 public static void tripleInt( int numOne ) {
13     numOne = numOne*3;
14     System.out.print("Your integer is " + numOne + "\n");
15     System.out.print("Your integer is " + numOne + "\n");
16 }
17
18
19
20
21

```

code from line 12 is move to line 21  
Place the SOP in method tripleInt

line 9: remove tripleInt(numOne);  
line 11: SOP("Your int is " + tripleInt(numOne) + "\n")  
line 14: public static int tripleInt(int numOne)  
line 18: remove }, shift to next line, and add  
-return numOne;

2. Given the following program:

```

1 import java.util.*;
2
3 public class Harmonic {
4     public static double harmonic(int n) {
5         double sum = 0.0;
6         for (int i = 1; i <= n; i++) {
7             sum += 1.0 / i;
8         }
9         return sum;
10    }
11
12    public static void main(String[] args) {
13        Scanner sc = new Scanner(System.in);
14        int N = sc.nextInt();
15        for (int i = 0; i < N; i++) {
16            int arg = sc.nextInt();
17            double value = harmonic(arg);
18            System.out.println(value);
19        }
20    }
21 }

```

Figure 4: Program 6.4

- a) State the name of method, method header and method declaration in the program. Briefly explain what the method do:

(method name : harmonic)  
(method header : public static double harmonic (int n)  
(method declaration : header + body content of method)  
= method definition. (line 4 → line 9)

basically did just calculate and return sum.

- b) What is the output of the following program if the input is 5 2 5 1 0 10?

```
5 2 5 1 0 10
1.5
2.2833333333333333
1.0
0.0
2.9289682539682538
```

- c) What is the output of the following program if the input is 4.0 3 55 9 1?

(invalid output because 4.0 is not integer type) ✓  
runtime error

### Section C

1. Complete the following methods:

- a) public static double calculateArea(double radius) {  
// return area of a circle  
}

```
public class CalculateArea {
    public static void main(String[] args) {
        double area = calculateArea(3.0);
        System.out.printf("%.2f", area, "\n");
    }
    public static double calculateArea(double radius) {
        return 3.14 * radius * radius;
    }
}
```

area = 3.14 \* radius \* radius  
return area  
}

- b) public static double toCelcius(double fahrenheit) {  
// convert temperature from Fahrenheit to Celcius  
}

```
import java.util.Scanner;
public class toCelciusV2 {
    static Scanner sc = new Scanner(System.in);
    static int n = sc.nextInt();
    public static void main(String[] args) {
        double value = toCelcius(n);
        System.out.println(value);
    }
    public static double toCelcius(double fahrenheit) {
        return (fahrenheit - 32) * 5 / 9;
    }
}
```

- c) public static int toSecond(int hour, int min, int sec) {  
// convert time to second  
}

```
import java.util.Scanner;
public class toSecond {
    static Scanner sc = new Scanner(System.in);
    static int a = sc.nextInt();
    static int b = sc.nextInt();
    static int c = sc.nextInt();
    public static void main(String[] args) {
        long totalTimeInSec = toSecond(a, b, c);
        System.out.println(totalTimeInSec);
    }
    public static int toSecond(int hour, int min, int sec) {
        return hour * 3600 + min * 60 + sec;
    }
}
```



d) `public static String getMonthName(int month)`  
 // return the month name for month  
 // e.g. if month is 1, return "January"  
 }

```
1 import java.util.Scanner;
2
3 public class getMonth {
4
5     static Scanner sc = new Scanner(System.in);
6     static int n = sc.nextInt();
7
8     public static void main(String[] args) {
9         String c = getMonthName(n);
10        System.out.println(c);
11    }
12    public static String getMonthName(int month) {
13        switch (month)
14        {
15            case 1 : return "January";
16            case 2 : return "February";
17            case 3 : return "March";
18            case 4 : return "April";
19            case 5 : return "May";
20            case 6 : return "June";
21            case 7 : return "July";
22            case 8 : return "August";
23            case 9 : return "September";
24            case 10 : return "October";
25            case 11 : return "November";
26            case 12 : return "December";
27        }
28        return null;
29    }
30 }
```

e) `public static int getHighest(int [] data) {`  
 // determine and return the highest value in the array  
 }

```
Scanner sc = new Scanner(System.in);
int max = data[0];

for (int i = 1; i < data.length; i++) {
    if (data[i] > max)
        max = data[i];
}
```

2. Define a method `maxNumber()` to complete the following program. Method `maxNumber()` is to find the largest of the three numbers.

```
public static void main(String[] args) {
    Scanner sc = new Scanner(System.in);
    int numOne = sc.nextInt();
    int numTwo = sc.nextInt();
    int numThree = sc.nextInt();

    System.out.print("The maximum is " + maxNumber(numOne,
        numTwo, numThree));
}

public static int maxNumber(int a, int b, int c)
{
    //define here
}
```

```
gilah          syakir
int [] number = {a,b,c};
int max = 0;

for (int i = 0; i < 3; i++) {
    if (max < number[i])
        max = number[i];
}

return max;
```

3. Define a method `is_even()` to complete the following program. Method `is_even()` is to determine whether the number is even or odd.

```
public static void main(String[] args) {  
    Scanner sc = new Scanner(System.in);  
    System.out.print("Enter an integer ");  
    int a = sc.nextInt();  
  
    System.out.printf("%d is %s", a, is_even(a));  
}
```

```
public static String is_even(int a)  
{  
    //define here  
}
```

Here we

```
String EO = "";  
if (a % 2 == 0)  
    EO = "Even";  
else  
    EO = "Odd";  
return EO;
```