

Algoritma dan Pemrograman

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05

Math Function and Formatting

Math

- Math
 - The class `Math` contains methods for performing basic numeric operations such as;
 - the elementary exponential,
 - logarithm,
 - square root, and
 - trigonometric functions.

Math Function 1/5

- **Constants Methods.** The Math class includes two constants:
 - **Math.E**, which is the base of natural logarithms, and
 - **Math.PI**, which is the ratio of the circumference of a circle to its diameter.
- *E*
 - This is E field of the Math class which returns you a default exponent value that is closer than any other to e, the base of the natural logarithms.
- *PI*
 - This is also a field of the *Method* class which returns you a default pi value, the ratio of the circumference of a circle to its diameter.

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- **Basic Methods.**

- ***abs()***. This is the `abs()` function which returns you the absolute number.
- ***ceil()***. This is the `ceil()` function which returns you the smallest value but greater than the argument.
- ***floor()***. This is the `floor()` function which returns you the largest value but less than the argument.
- ***rint()***. This is the `rint()` function which returns you a value closest to the given value.
- ***round()***. This is the `round()` function which returns you a value that is in the rounded form.
- ***min()***. This is the `min()` function which distinguishes the minimum value from the two given value.
- ***max()***. This is the `max()` function which distinguishes the maximum value from the two given value.

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- **Exponential and Logarithmic Methods**
 - ***exp()***. This is the `exp()` function which returns you the exponential value raised to the power of a double value.
 - ***log()***. Returns the natural logarithm of the argument.
 - ***pow()***. This is the `pow()` function which returns you the number raised to the power of a first given value by the another one.
 - ***sqrt()***. This is the `sqrt()` function which returns you the square root of the specified value.

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- **Trigonometric Methods**
 - ***sin()*** . Returns the sine of the specified double value.
 - ***cos()*** . Returns the cosine of the specified double value.
 - ***tan()*** . Returns the tangent of the specified double value.

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- **Random Numbers**

- ***random()*** . This is the random() function which returns you the random number. It is absolutely system generated.
- method returns a pseudo-randomly selected number between 0.0 and 1.0. The range includes 0.0 but not 1.0. In other words: $0.0 \leq \text{Math.random}() < 1.0$. To get a number in a different range, you can perform arithmetic on the value returned by the random method. For example, to generate an integer between 0 and 9, you would write:
 - **`int number = (int) (Math.random() * 10);`**
- By multiplying the value by 10, the range of possible values becomes $0.0 \leq \text{number} < 10.0$.

The format Method - Number

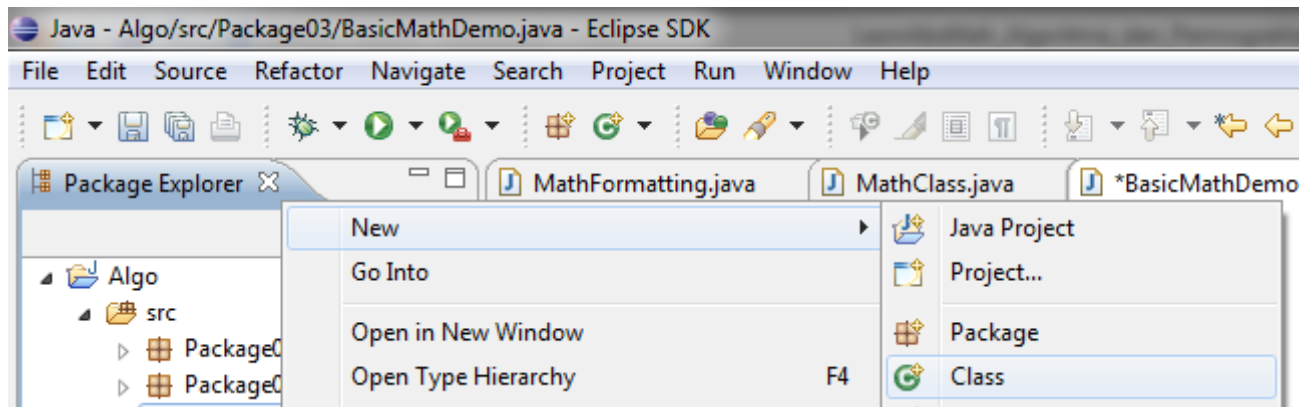
- The format method formats multiple arguments based on a *format string*. The format string consists of static text embedded with *format specifiers*; except for the format specifiers, the format string is output unchanged.

Format specifiers

- Like the three used in this example, all format specifiers begin with a `%` and end with a 1- or 2-character *conversion* that specifies the kind of formatted output being generated. The three conversions used here are:
 - **d** formats an integer value as a decimal value.
 - **f** formats a floating point value as a decimal value.
 - **n** outputs a platform-specific line terminator.

Create New Class

- Pada Package03 klik kanan dan pilih New | Class



Source folder:

Package:

Enclosing type:

Name:

Modifiers: public default private protected
 abstract final static

Superclass:

Interfaces:

Which method stubs would you like to create?

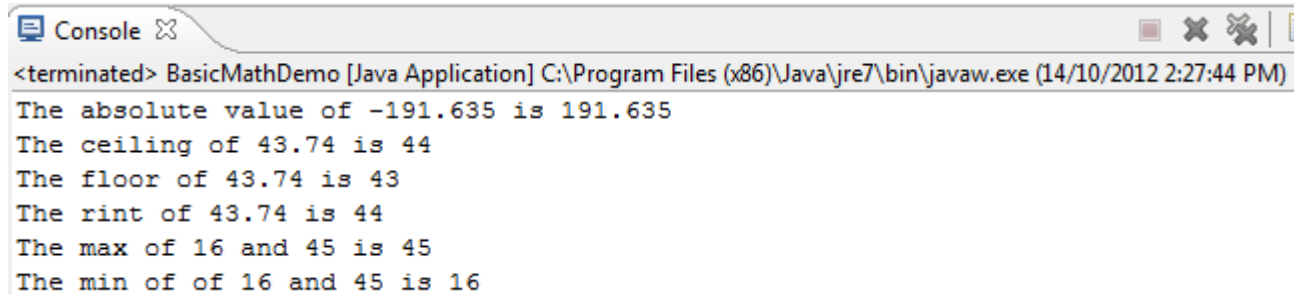
public static void main(String[] args)
 Constructors from superclass
 Inherited abstract methods

Do you want to add comments? (Configure templates and default value [here](#))
 Generate comments

```
package Package03;

public class BasicMathDemo {
    public static void main(String[] args) {
        double a = -191.635;
        double b = 43.74;
        int c = 16, d = 45;

        System.out.printf("The absolute value " +
                           "of %.3f is %.3f\n",
                           a, Math.abs(a));
        System.out.printf("The ceiling of " +
                           "%.2f is %.0f\n",
                           b, Math.ceil(b));
        System.out.printf("The floor of " +
                           "%.2f is %.0f\n",
                           b, Math.floor(b));
        System.out.printf("The rint of %.2f " +
                           "is %.0f\n",
                           b, Math.rint(b));
        System.out.printf("The max of %d and " +
                           "%d is %d\n",
                           c, d, Math.max(c, d));
        System.out.printf("The min of of %d " +
                           "and %d is %d\n",
                           c, d, Math.min(c, d));
    }
}
```



```
Console [X]  
<terminated> BasicMathDemo [Java Application] C:\Program Files (x86)\Java\jre7\bin\javaw.exe (14/10/2012 2:27:44 PM)  
The absolute value of -191.635 is 191.635  
The ceiling of 43.74 is 44  
The floor of 43.74 is 43  
The rint of 43.74 is 44  
The max of 16 and 45 is 45  
The min of of 16 and 45 is 16
```

Create New Class

- Pada Package03 klik kanan, pilih New | Class
- **MathFormatting**

```

package Package03;

import java.text.DecimalFormat;

public class MathFormatting {

    public static void main(String[] args) {
        System.out.println ("=== PROGRAM MATEMATIKA dan FORMATTING ===\n");

        System.out.print ("masukkan A : ");
        int a = new Scanner(System.in).nextInt();
        System.out.print ("masukkan B : ");
        int b = new Scanner(System.in).nextInt();

        double AA = Math.pow(a,2); // mencari a pangkat 2
        double BB = Math.pow(b,2); // mencari b pangkat 2
        double C = Math.sqrt(AA + BB); // mencari akar c = akar dari (a kuadrat + b kuadrat)
        double newKB = Math.round(C); // pembulatan
        DecimalFormat df = new DecimalFormat("###.##"); // format 2 decimal

        System.out.format("\nHASIL dari %d kuadrat adalah %f.\n", a, AA);
        System.out.format("\nHASIL dari %d kuadrat adalah %f.\n", b, BB);
        System.out.format("\nHASIL dari %d kuadrat + %d kuadrat adalah %f.\n", a, b, C);
        System.out.println("C dibulatkan dengan (Math.round) menjadi " + newKB);
        System.out.println("C with 2 dec digits (DecimalFormat) menjadi " + df.format(C));
    }
}

```

```
<terminated> MathFormatting (1) [Java Application] C:\Program Files (x86)\Java\jre7\bin\javaw.exe (14/10/2012 2:19:24 PM)
```

```
=== PROGRAM MATEMATIKA dan FORMATTING ===
```

```
masukkan A : 2
```

```
masukkan B : 3
```

```
|
```

```
HASIL dari 2 kuadrat adalah 4.000000.
```

```
HASIL dari 3 kuadrat adalah 9.000000.
```

```
HASIL dari 2 kuadrat + 3 kuadrat adalah 3.605551.
```

```
C dibulatkan dengan (Math.round) menjadi 4.0
```

```
C with 2 dec digits (DecimalFormat) menjadi 3.61
```


Math

- Math
 - The class `Math` contains methods for performing basic numeric operations such as the elementary exponential, logarithm, square root, and trigonometric functions.
- `Math.pow()`
- `Math.sqrt()`

Square Root

- **sqrt**

- public static double **sqrt**(double a) Returns the correctly rounded positive square root of a double value. Special cases: If the argument is NaN or less than zero, then the result is NaN.
 - If the argument is positive infinity, then the result is positive infinity.
 - If the argument is positive zero or negative zero, then the result is the same as the argument.
 - Otherwise, the result is the double value closest to the true mathematical square root of the argument value.
- **Parameters:**
 - a - a value.
- **Returns:**
 - the positive square root of a. If the argument is NaN or less than zero, the result is NaN.

Power

- **pow**
 - `public static double pow(double a, double b)`
 - Returns the value of the first argument raised to the power of the second argument. Special cases:
 - If the second argument is positive or negative zero, then the result is 1.0.
 - If the second argument is 1.0, then the result is the same as the first argument.
 - etc
 - A result must be within 1 ulp of the correctly rounded result. Results must be semi-monotonic.
- **Parameters:**
 - a - the base.
 - b - the exponent.
- **Returns:**
 - the value a^b .

Exercise – Prisma Segitiga Siku2

- Diketahui alas berupa segitiga siku2, dengan rumus:
 - luas alas adalah $\frac{1}{2}A.T$
 - volume Prisma Segitiga Siku2 adalah luasAlas * tinggi
- Create a java program to calculate them

