

Assignments

1. Assignments

The assignment operation assigns, or copies, a value into a variable. We use the = symbol to perform the assignment operation. The assignment operation always copies the value that is on the right side of the = symbol to the variable that is on the left side of the =.

```
int age;  
float tax;  
  
age = 21;  
tax = 7.5;
```

When we assign a value into a variable at the time when the variable is declared we refer to it as an initialization of that variable.

```
int age = 21;
```

2. Expressions

The right side of the equal sign does not have to be just a single constant but can also be a mathematical expression.

- Use the symbols +, -, * and / to do addition, subtraction, multiplication, and division.
- Use the symbol % to do modulus, i.e., the remainder of a division.
- The order in which the operators are performed follow the same math rules.
- The parenthesis can be used to change the order of the operation.

In performing the assignment operation, the expression on the right side of the = sign is first evaluated. The result from the expression is then assigned into the variable on the left side of the = sign.

Note again: the = sign does not mean “equality” as used in math.

Real complicated examples that’s beyond this class:

```
readMessage = new String((byte[]) msg.obj, StandardCharsets.UTF_8);  
mDevicesListView = (ListView)findViewById(R.id.devices_list_view);
```

```

int i;
float f;

i = 1 + 3 * (5 - 2);
cout << "a) " << i << endl;

f = 2.6;
cout << "b) " << f << endl;

i = 4.6;
cout << "c) " << i << endl;

f = 5/2;
cout << "d) " << f << endl;

f = 5.0/2.0;
cout << "e) " << f << endl;

f = 5%2;
cout << "f) " << f << endl;

```

Sample output:

```

a) 10
b) 2.6
c) 4
d) 2
e) 2.5
f) 1

```

What do the following assignment statements do?

$n = n + 1;$	equivalent to	$n += 1;$	equivalent to	$n++$
$n = n - 1;$	equivalent to	$n -= 1;$	equivalent to	$n--$
$n = n * 1;$	equivalent to	$n *= 1;$		
$n = n / 1;$	equivalent to	$n /= 1;$		

3. Exercises (Questions with an * are more difficult)

1. Automobile Costs

Write a program that asks the user to enter the monthly costs for the following expenses incurred from operating his or her automobile: loan payment, insurance, gas, oil, tires, and maintenance. The program should then display the total monthly cost of these expenses, and the total annual cost of these expenses.

2. Test Average

Write a program that asks for five test scores. The program should calculate the average test score and display it.

3. Stadium Seating

There are three seating categories at stadium. For a softball game, Class A seats cost \$15, Class B seats cost \$12, and Class C seats cost \$9. Write a program that asks how many tickets for each class of seats were sold, then displays the amount of income generated from ticket sales.

4. Miles per Gallon

Write a program that calculates a car's gas mileage. The program should ask the user to enter the number of gallons of gas the car can hold, and the number of miles it can be driven on a full tank. It should then display the number of miles that may be driven per gallon of gas.

5. Celsius to Fahrenheit

Write a program that converts Celsius temperatures to Fahrenheit temperatures. The conversion formula is

$$F = \frac{9}{5}C + 32$$

where F is the Fahrenheit temperature, and C is the Celsius temperature.

6. Average Rainfall

Write a program that calculates the average rainfall for three months. The program should ask the user to enter the name of each month, such as June or July, and the amount of rain (in inches) that fell each month. The program should display a message similar to the following:

The average rainfall for June, July, and August is 6.72 inches.

7. Male and Female Percentages

Write a program that asks the user for the number of males and the number of females registered in a class. The program should display the percentage of males and females in the class.

Hint: Suppose there are 8 males and 12 females in a class. There are 20 students total in the class. The percentage of males can be calculated as $\frac{8}{20} = 0.4$, or 40 percent. The percentage of females can be calculated as $\frac{12}{20} = 0.6$, or 60 percent.

8. Ingredient Adjuster

A cookie recipe calls for the following ingredients:

- 1.5 cups of sugar
- 1 cup of butter
- 2.75 cups of flour

The recipe produces 48 cookies with this amount of the ingredients. Write a program that asks the user how many cookies he or she wants to make, then displays the number of cups of each ingredient needed for the specified number of cookies.

Hint: If the user wants n cookies then to calculate the amount of sugar needed, you do

$$n \times \frac{1.5}{48}$$

9. Box Office

A movie theater only keeps a percentage of the revenue earned from ticket sales. The remainder goes to the movie distributor. Write a program that calculates a theater's gross and net box office profit for a night. Assume the theater keeps 20 percent of the gross box office profit. The program should ask for the name of the movie, and how many adult and child tickets were sold. (The price of an adult ticket is \$10.00 and a child's ticket is \$6.00.) It should display a report similar to:

Movie Name:	“Wheels of Fury”
Adult Tickets Sold:	382
Child Tickets Sold:	127
Gross Box Office Profit:	\$4,582.00
Net Box Office Profit:	\$916.40
Amount Paid to Distributor:	\$3,665.60

10. How Many Widgets?

The Yukon Widget Company manufactures widgets that weigh 12.5 pounds each. Write a program that calculates how many widgets are stacked on a pallet, based on the total weight of the pallet. The program should ask the user how much the pallet weighs by itself and how much it weighs with the widgets stacked on it. It should then calculate and display the number of widgets stacked on the pallet.

11. How Many Calories?

A bag of cookies holds 30 cookies. The calorie information on the bag claims there are 10 "servings" in the bag and that a serving equals 300 calories. Write a program that asks the user to input how many cookies he or she actually ate, then reports how many total calories were consumed.

12. How Much Insurance?

Many financial experts advise that property owners should insure their homes or buildings for at least 80 percent of the amount it would cost to replace the structure. Write a program that asks the user to enter the replacement cost of a building, and then displays the minimum amount of insurance he or she should buy for the property.

13. Currency

Write a program that will convert U.S. dollar amounts to Japanese yen and to Euros, storing the conversion factors in the constants `YEN_PER_DOLLAR` and `EUROS_PER_DOLLAR`. To get the most up-to-date exchange rates, search the Internet using the term "currency exchange rate". Format your currency amounts in fixed-point notation, with two decimal places of precision, and be sure the decimal point is always displayed. (See section 3.7 for formatting outputs)