

**COMSATS University, Islamabad**

**Lab Assignment . 1**

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**SP22-BSE-036 1A**

**Course: Programming Fundamentals**

**Instructor: Sir Rizwan Rashid**

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**LAB . 2**

* **Activity 1:**

a. Write Java statements that declare the following variables: num1 , num2 , and num3 , and  
average of type int .  
b. Write Java statements that store 125 into num1 , 28 into num2 , and -25 into num3 .  
c. Write a Java statement that stores the average of num1 , num2 , and num3 into average.  
d. Write Java statements that output the values of num1 , num2 , num3 , and average .  
e. Compile and run your program

**Solution:**

public class Activity1{  
 public static void main(String [] args){  
 int num1, num2, num3, average;

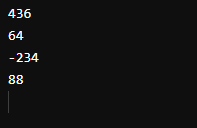
num1 = 436; num2 = 64; num3 = -234;

average = (num1 + num2 + num3) / 3;

System.out.println(num1); System.out.println(num2);

System.out.println(num3); System.out.println(average);  
 }  
}

**Output:**

****

* **Activity 2:**

Consider the following Java program in which the statements are in the incorrect order. Rearrange and format the statements so that it prompts the user to input the length and width of a rectangle and output the area and perimeter of the rectangle

**Solution:**

import java.util.Scanner;

Public class Activity2{  
 public static void main(String [] args){

Scanner console = new Scanner(System.in);

System.out.print("Enter the length: ");

int length = console.nextInt();

System.out.print("Enter the width: ");

int width = console.nextInt();

int area = length \* width;

int perimeter = 2 \* (length + width);

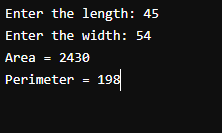
System.out.println("Area = " + area);

System.out.println("Perimeter = " + perimeter);

}

}

**Output:**

****

* **Activity 3:**

**Solution:**

import java.util.Scanner;

public class Activity3{

public static void main(String[] args){

Scanner console = new Scanner(System.in);

final double RATE = 12.50;

final int SECRET = 11;

int num1;

int num2;

int num3;

int newNum;

String name;

double String;

double hoursWorked;

double wages;

double payRate;

double salary;

// Prompt the user to input the value

System.out.println("Enter two values separated by spaces.");

num1 = console.nextInt();

num2 = console.nextInt();

System.out.println("num1 =" + num1);

System.out.println("num2 =" + num2);

newNum = (num1 \* num2) + num2;

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

newNum = newNum + SECRET;

System.out.println("updated newNum = " + newNum);

System.out.println("Enter a person's last name");

name = console.next();

System.out.println("Enter a decimal no b/w 0 and 70");

hoursWorked = console.nextDouble();

// Calculate wages

wages = RATE \* hoursWorked;

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

System.out.println("pay rate = " + RATE);

System.out.println("hours worked = " + hoursWorked);

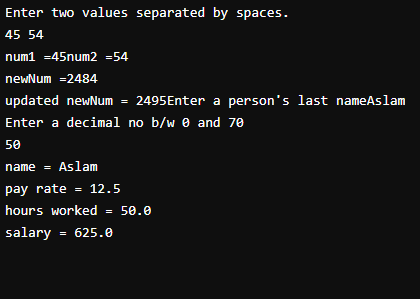
// Display results

System.out.println("salary = " + wages);

}

}

**Output:**

****

**LAB . 3**

* **Activity 1:**

Suppose you want to develop a program that changes a given amount of money into smaller monetary units. The program lets the user enter an amount as a double value representing a total in dollars and cents, and outputs a report listing the monetary equivalent in the maximum number of dollars, quarters, dimes, nickels, and pennies, in this order, to result in the minimum number of coins

**Solution:**

import java.util.Scanner;

public class Activity1{

public static void main(String [] args){

Scanner s = new Scanner(System.in);

System.out.println("Enter amount: ");

double amount = s.nextDouble();

int cents = (int)amount \* 100;

double dollars = (double)cents / 100;

double remaining\_cents = dollars % 100;

double dimes = remaining\_cents % 10;

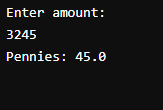
double nickels = dimes % 10;

System.out.println("Pennies: " + remaining\_cents);

}

}

**Output:**

****

* **Activity 2:**

N students take K apples and distribute them among each other evenly. The remaining (the undivisible) part remains in the basket. How many apples will each single student get? How many apples will remainin the basket?  
The program reads the numbers **N** and **K.** It should print the two answers for the questions above.

**Solution:**

import java.util.Scanner;

public class Activity2{

public static void main(String [] args){

Scanner s = new Scanner(System.in);

System.out.print("Enter N and then K:");

int N = s.nextInt(), K = s.nextInt();

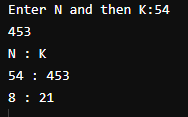
System.out.println("N : K\n");

System.out.printf("\n%d : %d\n", N, K);

System.out.printf("%d : %d\n", K / N, K % N);

}

} **Output:**

****

* **Activity 3:**

A school decided to replace the desks in three classrooms. Each desk sits two students. Given the number of students in each class, print the smallest possible number of desks that can be purchased.  
The program should read three integers: the number of students in each of the three  
classes, a, b and c respectively

**Solution:**

import java.util.Scanner;

public class Activity3{

public static void main(String [] args){

Scanner s = new Scanner(System.in);

System.out.println("Enter 3 classes' students: ");

int s1 = s.nextInt(), s2 = s.nextInt(), s3 = s.nextInt();

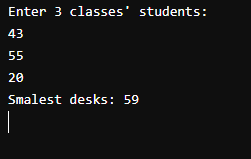
int smallest\_desks = (s1+s2+s3) / 2;

System.out.println("Smalest desks: " + smallest\_desks);

}

}

**Output:**

****

* **Activity 4:**

Given the integer N – the number of minutes that is passed since midnight - how many hours and minutes are displayed on the 24h digital clock? The program should print two numbers: the number of hours (between 0 and 23) and the number of minutes (between 0 and 59). For example, if N = 150, then 150 minutes have passed since midnight - i.e. now is 2:30 am. So the program should print 2 30.

**Solution:**

**Output:**

import java.util.Scanner;

public class Activity4{

public static void main(String [] args){

int N = 150;

int hours = N / 60; // ?

int minutes = N % 60; // ?

System.out.println(hours);

System.out.println(minutes);

}

}

**Output:**

****

* **Activity 5:**

A milk carton can hold 3.78 liters of milk. Each morning, a dairy farm ships cartons of milk to a local grocery store. The cost of producing one liter of milk is $0.38, and the profit of each carton of milk is $0.27. Write a program that does the following:  
a. Prompts the user to enter the total amount of milk produced in the morning  
b. Outputs the number of milk cartons needed to hold milk (Round your answer to the nearest integer.)  
c. Outputs the cost of producing milk  
d. Outputs the profit for producing milk

**Solution:**

import java.util.Scanner;

public class Activity5{

public static void main(String [] args){

Scanner s = new Scanner(System.in);

System.out.print("Milk produced: ");

double milkProduced = s.nextDouble();

int cartons = (int)(milkProduced / 3.78);

double cost = milkProduced \* 0.38;

double profit = cost \* 0.27;

System.out.println(cartons);

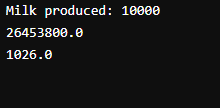
System.out.println(cost);

System.out.println(profit);

}

}

**Output:**

****

* **Activity 6:**

You found an exciting summer job for five weeks. It pays $15.50 per hour. Suppose that the total tax you pay on your summer job income is 14%. After paying the taxes, you spend 10% of your net income to buy new clothes and other accessories for the next school year and 1% to buy school supplies. After buying clothes and school supplies, you use 25% of the remaining money to buy savings bonds. For each dollar you spend to buy savings bonds, your parents spend $0.50 to buy additional savings bonds for you. Write  
a program that prompts the user to enter the pay rate for an hour and the number of hours you worked  
each week. The program then outputs the following:  
a. Your income before and after taxes from your summer job  
b. The money you spend on clothes and other accessories  
c. The money you spend on school supplies  
d. The money you spend to buy savings bonds  
e. The money your parents spend to buy additional savings bonds for you

**Solution:**

import java.util.Scanner;

public class Activity6{

public static void main(String [] args){

Scanner sc = new Scanner(System.in);

System.out.print("enter the pay rate for each hour: ");

float payRate = sc.nextFloat();

System.out.print("enter total hour: ");

float totalHours = sc.nextFloat();

float grossPay\_before\_Tax = totalHours \* payRate;

float tax = grossPay\_before\_Tax \* 14 / 100;

float grossPay\_after\_tax = grossPay\_before\_Tax - tax;

System.out.printf("your gross pay before tax is %.2f$ and your gross pay after tax is %.2f$" , grossPay\_before\_Tax, grossPay\_after\_tax);

float clothes = grossPay\_after\_tax \* 10 / 100;

System.out.println();

System.out.printf("you spend %.2f$ on clothes and accessories" , clothes);

System.out.println();

float schoolSupplies = grossPay\_after\_tax \* 1 / 100;

System.out.printf("you spend %.2f$ on school supplies" , schoolSupplies);

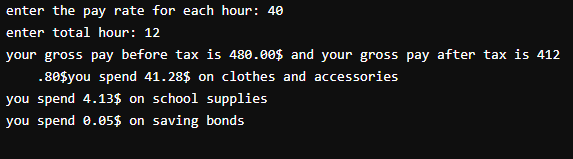
System.out.println();

System.out.println("you spend 0.05$ on saving bonds");

}

}

**Output:**

****

* **Activity 7:**

A cricket game is to be held in a stadium and there are four seating categories available for the audience. Class A seats cost $20, Class B seats cost $15, Class C seats cost $10, and Class D seats cost $5. You should write a JAVA program that asks how many tickets for each class of seats were sold and finally display the total income generated and income corresponding to ticket sales.

**Solution:**

import java.util.Scanner;

public class Activity7{

public static void main(String [] args){

Scanner s = new Scanner(System.in);

int n = s.nextInt();

char class\_ = s.next().charAt(0);

if (class\_ == 'A') System.out.println(20 \* n);

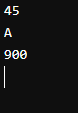
if (class\_ == 'B') System.out.println(15 \* n);

if (class\_ == 'C') System.out.println(5 \* n);

}

}

**Output:**

****

* **Activity 8:**

Write a program that reads an integer between 0 and 1000 and adds all the digits in the integer. For example, if an integer is 932, the sum of all its digits is 14

**Solution:**

import java.util.Scanner;

public class Activity8{

public static void main(String [] args){

Scanner sc = new Scanner(System.in);

System.out.println(" Enter a number between 0 to 1000");

int num = sc.nextInt();

int firstDigit = num % 10;

int remaining2 = num / 10;

int secondDigit = remaining2 % 10;

int lastDigit = remaining2 / 10;

System.out.println("your integer sum is " + (firstDigit + secondDigit + lastDigit ));

}

}

**Output:**

**Text

Description automatically generated**

* **Activity 9:**

Consider the statements:  
double x = 75.3987;  
double y = 982.89764;  
What is the output of the following statements?  
System.out.printf("%.2f %n", x);  
System.out.printf("%.2f %n", y);  
System.out.printf("%.3f %n", x);  
System.out.printf("%.3f %n", y);

**Output:**

****

* **Activity 10:**

Write JAVA statements using System.out.prinf() statement to display output as given below  
Degrees Radians Sine Cosine Tangent  
30 0.5236 0.5000 0.8660 0.5773  
60 1.0472 0.8660 0.5000 1.7320

**Solution:**

import java.util.Scanner;

public class Activity10{

public static void main(String [] args){

Scanner console = new Scanner(System.in);

//Declaring variables

final int SECRET = 11;

final double RATE = 12.50;

int num1;

int num2;

int num3;

int newNum;

String name;

double String;

double hoursWorked;

double wages;

double payRate;

double salary;

// Prompt the user to input the value

System.out.println("Enter two values separated by spaces.");

num1 = console.nextInt();

num2 = console.nextInt();

System.out.println("num1 =" + num1);

System.out.println("num2 =" + num2);

newNum = (num1 \* num2) + num2;

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

newNum = newNum + SECRET;

System.out.println("updated newNum = " + newNum);

System.out.println("Enter a person's last name");

name = console.next();

System.out.println("Enter a decimal no b/w 0 and 70");

hoursWorked = console.nextDouble();

// Calculate wages

wages = RATE \* hoursWorked;

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

System.out.println("pay rate = " + RATE);

System.out.println("hours worked = " + hoursWorked);

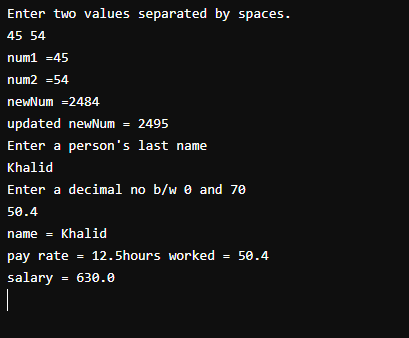
// Display results

System.out.println("salary = " + wages);

}

}

**Output:**

****

**LAB . 4**

* **Activity 1:**

Suppose that x, y, and z are int variables and x = 10 , y = 15 , and z = 2 0. Determine whether thefollowing expressions evaluates to true or false .  
!(x > 1 0)  
x <= 5 || y < 15  
(x != 5 ) && (y != z)  
x >= z || (x + y >= z)  
(x <= y – 2) && (y >= z) || (z – 2 != 20)

**Solution:**

import java.util.Scanner;

public class Activity1{

public static void main(String [] args){

int x=10, y=15, z=20;

System.out.println(!(x > 10));

System.out.println(x <= 5 || y < 15);

System.out.println((x != 5 ) && (y != z));

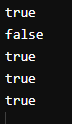
System.out.println(x >= z || (x + y >= z));

System.out.println((x <= y - 2) && (y >= z) || (z - 2 != 20));

}

}

**Output:**

****

* **Activity2:**

Suppose that x, y, z,and w are int variables and x = 3, y = 4, z = 7,and w =1. What is the output of the following statements?  
System.out.println("x == y: " + (x == y ));  
System.out.println("x != z: " + (x != z ));  
System.out.println("y == z – 3: " + (y == z – 3) );  
System.out.println("!(z > w): " + ! (z > w));  
System.out.println("x + y < z: " + (x + y < z));

**Solution:**

Public class Activity2{  
public static void main(String [] args){

int x = 3, y = 4, z = 7,and w =1;

System.out.println("x == y: " + (x == y ));

System.out.println("x != z: " + (x != z ));

System.out.println("y == z – 3: " + (y == z - 3) );

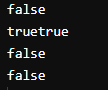
System.out.println("!(z > w): " + ! (z > w));

System.out.println("x + y < z: " + (x + y < z));

}

}

**Output:**

****

* **Activity 3:**

Consider the following code segment. Determine the value of b3  
boolean b1=true;  
boolean b2=false;  
boolean b3=(b1==b2);

**Solution:**

B3 = false

* **Activity 4:**

a) Minimum of two numbers: Given two integers, print the smaller value.  
b) Minimum of two numbers: Given two integers, print the smaller value.  
c) Sign function: For the given integer X print 1 if it's positive, -1 if it's negative, or 0 if it's equal to zero.  
d) Minimum of three numbers: Given three integers, print the smallest value

**Solution:**

Public class Activity4{  
public static void main(String [] args){

int x = 3, y = 4;

int min = x < y ? x : y;

int sx;

System.out.println("minimum: " + min);

if(x < 0)sx = -1; if(x > 0)sx = 1;

else sx = 0;

System.out.println("sign of x: " + sx);

}

}

**Output:**

****

* **Activity 5:**

Equal numbers: Given three integers, determine how many of them are equal to each other. The program must print one of these numbers: 3 (if all are the same), 2 (if two of them are equal to each other and the third is different) or 0 (if all numbers are different)

**Solution:**

Public class Activity5{  
public static void main(String [] args){

int x = 3, y = 4, z = 4;

if(x == y && z == y) System.out.println("ALL EQUAL");

else if(x == y) System.out.println("x.y EQUAL");

else if(z == y) System.out.println("z,y EQUAL");

else System.out.println("NO EQUAL");

}

}

**Output:**

****

* **Activity 6:**

Write a program that prompts the user to enter a number within the range of 1 through 10. The program should display the Roman numeral version of that number. If the number is outside the range of 1 through 10, the program should display an error message. The following table shows the Roman numerals for the numbers 1 through 10

**Solution:**

Public class Activity6{  
public static void main(String [] args){

Scanner sc = new Scanner(System.in);

System.out.print("Enter a value between 1 to 10: ");

int choice = sc.nextInt();

if (choice == 1) {

System.out.println("I");

} else if (choice == 2) {

System.out.println("II");

} else if (choice == 3) {

System.out.println("III");

} else if (choice == 4) {

System.out.println("IV");

} else if (choice == 5) {

System.out.println("V");

}

else if (choice == 6){

System.out.println("VI");

}

else if (choice == 7) {

System.out.println("VII");

}

else if (choice == 8) {

System.out.println("VIII");

}

else if (choice == 9) {

System.out.println("IX");

}

else if (choice == 10) {

System.out.println("X");

}

else {

System.out.println("Enter a valid number");

}

}

}

**Output:**

****

* **Activity 7:**

The area of a rectangle is the rectangle’s length times its width. Write a program that asks for the length and width of two rectangles. The program should tell the user which rectangle has the greater area, or if the areas are the same.

**Solution:**

import java.util.Scanner;

public class Activity7{

public static void main(String [] args){

Scanner sc = new Scanner(System.in);

System.out.println("enter the length of 1st rectangle ");

double length1 = sc.nextDouble();

System.out.println("enter the width of 1st rectangle ");

double width1 = sc.nextDouble();

System.out.println("enter the length of 2nd rectangle ");

double length2 = sc.nextDouble();

System.out.println("enter the width of 2nd rectangle ");

double width2 = sc.nextDouble();

if((length1 \* width1) > (length2 \* width2)){

System.out.println("Area of 1st rectangle is greater than the area of 2nd rectangle");

} else if ((length1 \* width1) < (length2 \* width2)) {

System.out.println("Area of 2nd rectangle is greater than the area of 1st rectangle");

}

else {

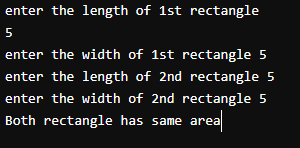
System.out.println("Both rectangle has same area");

}

}

}

**Output:**

****

* **Activity 8:**

The date June 10, 1960, is special because when it is written in the following format, the month times the day equals the year: 6/10/60 Design a program that asks the user to enter a month (in numeric form), a day, and a two-digit year. The program should then determine whether the month times the day equals the year. If so, it should display a  
message saying the date is magic. Otherwise, it should display a message saying the date is not magic

**Solution:**

Public class Activity1{  
public static void main(String [] args){

Scanner sc = new Scanner(System.in);

System.out.print("Enter the day: ");

int day = sc.nextInt();

System.out.print("Enter the month: ");

int month = sc.nextInt();

System.out.print("Enter the 2 digit year: ");

int year = sc.nextInt();

if (day \* month == year) {

System.out.println("the date is magic");

}

else {

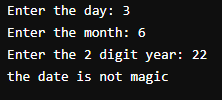
System.out.println("the date is not magic");

}

}

}

**Output:**

****

* **Activity 9:**

Create a change-counting game that gets the user to enter the number of coins required to make exactly one dollar. The program should prompt the user to enter the number of pennies, nickels, dimes, and quarters. If the total value of the coins entered is equal to one dollar, the program should congratulate the user for winning the game. Otherwise, the program should display a message indicating whether the amount entered was more than or less than one dollar

**Solution:**

Public class Activity9{  
public static void main(String [] args){

Scanner sc = new Scanner(System.in);

float ONE\_DOLLAR = 1.00f;

float PENNY = 0.01f;

float NICKEL = 0.05f;

float DIME = 0.10f;

float QUARTER = 0.25f;

float total\_coins;

System.out.println("How many pennies do you have?");

float pennies = sc.nextFloat();

System.out.println("How many nickels do you have?");

float nickels = sc.nextFloat();

System.out.println("How many dimes do you have?");

float dimes = sc.nextFloat();

System.out.println("How many quarters do you have?");

float quarters = sc.nextFloat();

total\_coins = (pennies \* PENNY +

nickels \* NICKEL +

dimes \* DIME +

quarters \* QUARTER);

if (total\_coins == ONE\_DOLLAR){

System.out.println("congratulations, you won");

} else if (total\_coins > ONE\_DOLLAR) {

System.out.println("Amount is greater than one dollar");

}

else

System.out.println("Amount is lesser than one dollar");

}

}

**Output:**

**Text

Description automatically generated**

* **Activity 10:**
* If a customer purchases 0 books, he or she earns 0 points.
* If a customer purchases 1 book, he or she earns 5 points.
* If a customer purchases 2 books, he or she earns 15 points.
* If a customer purchases 3 books, he or she earns 30 points.
* If a customer purchases 4 or more books, he or she earns 60 points.  
  Write a program that asks the user to enter the number of books that he or she has purchased this month and displays the number of points awarded

**Solution:**

Public class Activity10{  
public static void main(String [] args){

Scanner sc = new Scanner(System.in);

System.out.println("enter the number of books that you have purchased this month");

int no\_of\_books = sc.nextInt();

switch ( no\_of\_books ){

case 0:

System.out.println("you earn 0 points."); break;

case 1:

System.out.println("you earn 5 points."); break;

case 2:

System.out.println("you earn 15 points."); break;

case 3:

System.out.println("you earn 30 points."); break;

case 4:

System.out.println("you earn 60 points."); break;

}

}

}

**Output:**

**Text

Description automatically generated**