

PSG COLLEGE OF TECHNOLOGY, COIMBATORE – 641 004
Department of Applied Mathematics and Computational Sciences
MSc Software Systems – Semester V
20XW57– Java Programming Lab
PROBLEM SHEET 1 – Basics – Variables, Data Types and Operators

Completion Date: 28/06/2024

Note: *Use Text Editors/IntelliJ IDEA/Apache NetBeans tools to develop, compile and execute the below programs*

1. Write a java program to convert the temperature expressed in Fahrenheit degree into Celsius degree.
2. Write a program that converts distances measured in kilometers to miles. One kilometer is approximately 0.62 miles.
3. Develop a program to calculate Simple Interest & Compound Interest.
4. Write a program to calculate the volume and surface area of a sphere from its radius, given as input.
5. Write a program that calculates the cost per square inch of a circular pizza, given its diameter and price.
6. Write a program that determines the distance to a lightning strike based on the time elapsed between the flash and the sound of thunder. The speed of sound is approximately 1100 ft/sec and 1 mile is 5280 ft.
7. The distance between two cities (in km.) is given as an input. Write the program to convert and print this distance in miles and feet.

Sample Calculation:

Enter the distance between two cities: 50 km.

The distance between the two cities is 50 km or 31.07miles or 164042 foot.

Hint: 1 km is 0.621371mile and 3280.84 foot.

8. Two points in a plane are specified using the coordinates (x1, y1) and (x2, y2). Write a program that calculates the slope of a line through two (non-vertical) points entered by the user.
9. Write a program that determines the molecular weight of a hydrocarbon based on the number of hydrogen, carbon, and oxygen atoms. You should use the following weights:

Atom	Weight (grams/mole)
H	1.0079
C	12.011
O	15.9994

10. Write a program that accepts two points (see previous problem) and determines the distance between them.

$$Distance = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

11. The Gregorian epact is the number of days between January 1st and the previous new moon. This value is used to figure out the date of Easter. It is calculated by these formulas (using integer arithmetic):

$$C = \text{year} / 100$$

$$\text{epact} = (8 + (C/4) - C + (8C + 13) / 25 + 11(\text{year} \% 19)) \% 30$$

Write a program that prompts the user for a 4-digit year and then outputs the value of the epact.

12. Five Bikers Compete in a race such that they drive at a constant speed which may or may not be the same as the other. To qualify the race, the speed of a racer must be more than the average speed of all 5 racers. Take as input the speed of each racer and print back the speed of qualifying racers
13. Meadowdale Dairy Farm sells organic brown eggs to local customers. It charges \$3.25 for a dozen eggs, or 45 cents for individual eggs that are not part of a dozen. Write a program that prompts a user for the number of eggs in the order and then display the amount owed with a full explanation. For example, typical output might be, *You ordered 27 eggs. That's 2 dozen at \$3.25 per dozen and 3 loose eggs at 45 cents each for a total of \$7.85.*
14. Use the web to determine the current world population and the annual world population growth rate. Write an application that inputs these values, then displays the estimated world population after one, two, three, four and five years.
15. Write a program that calculates your daily driving cost, so that you can estimate how much money could be saved by car pooling, which also has other advantages such as reducing carbon emissions and reducing traffic congestion. The application should input the following information and display the user's cost per day of driving to work:
- a) Total miles driven per day.
 - b) Cost per gallon of gasoline.
 - c) Average miles per gallon.
 - d) Parking fees per day.
 - e) Tolls per day.

16. Suppose you save \$100 each month into a savings account with the annual interest rate 5%.

Thus, the monthly interest rate is After the first month, the value in the account becomes

$$100 * (1 + 0.00417) = 100.417$$

After the second month, the value in the account becomes

$$(100 + 100.417) * (1 + 0.00417) = 201.252$$

After the third month, the value in the account becomes

$$(100 + 201.252) * (1 + 0.00417) = 302.507 \text{ and so on.}$$

Write a program that prompts the user to enter a monthly saving amount and displays the account value after the sixth month.

17. Body Mass Index (BMI) is a measure of health on weight. It can be calculated by taking your weight in kilograms and dividing by the square of your height in meters. Write a program that prompts the user to enter a weight in pounds and height in inches and displays the BMI. Note that one pound is 0.45359237 kilograms and one inch is 0.0254 meters.

18. How cold is it outside? The temperature alone is not enough to provide the answer. Other factors including wind speed, relative humidity, and sunshine play important roles in determining coldness outside. In 2001, the National Weather Service (NWS) implemented the new wind-chill temperature to measure the coldness using temperature and wind speed. The formula is:

$$t_{wc} = 35.74 + 0.6215t_a - 35.75v^{0.16} + 0.4275t_av^{0.16}$$

where t_a is the outside temperature measured in degrees Fahrenheit and v is the speed measured in miles per hour. t_{wc} is the wind-chill temperature. The formula cannot be used for wind speeds below 2 *mph* or temperatures below -58 degree Fahrenheit or above 41 degree Fahrenheit. Write a program that prompts the user to enter a temperature between -58 degree Fahrenheit and 41 degree Fahrenheit and a wind speed greater than or equal to 2 and displays the wind-chill temperature.

19. Write a program that reads in investment amount, annual interest rate, and number of years, and displays the future investment value using the following formula:

$$\text{futureInvestmentValue} = \text{investmentAmount} \times (1 + \text{monthlyInterestRate})^{\text{numberOfYears} \times 12}$$

20. Write an application that inputs one number consisting of five digits from the user, separates the number into its individual digits and prints the digits separated from one another by three spaces each. For example, if the user types in the number 42339, the program should print

4 2 3 3 9