

Elementary Programming

CMPT220L

Due on Feb 11,2022 by 11:59PM

Points: 100

Problems

1. (*Circle diameter, area*) Write a program that prompts the user to enter the radius of a circle and displays the diameter and area. Here is a sample run:

```
Enter the radius of a circle: 23.4
The diameter is 46.8
The area is 1720.21
```

2. (*Physics: one dimensional motion*) By one dimension, we mean that the object is moving in a straight line. There are five variables that put together in several equations for describing this motion:

$Eq1 : v_1 = v_0 + a \times t$
 $Eq2 : d = averageSpeed \times t, averageSpeed = (v_0 + v_1)/2$
 $Eq3 : d = v_0 \times t + a \times t^2/2$ ($Eq3$ is derived from $Eq1$ and $Eq2$)
 $Eq4 : v_1^2 = v_0^2 + 2 \times a \times d$ ($Eq4$ is derived from $Eq1$ and $Eq2$)

Where

v_1 is the final velocity in meters per second (m/s)

v_0 is the initial velocity in meters per second (m/s)

t is the time elapsed in seconds

a is the object's acceleration in meters per square second (m/s²)

d is the distance traveled in meters

Suppose a ball is released from the top of a building, you can write a program to find out the height of the building, given the travel time for the ball to the ground using $Eq3$. Note that the acceleration due to gravity is constant 9.8 m/s.

Here is a sample run:

```
Enter the ball travel time in seconds: 2.5
The height of the building is 30.625 meters
```

3. (*Physics: friction coefficient*) The force pushing or pulling an object is related to the object's mass, acceleration, and a coefficient of friction in the following formula:

$$F = u \times m \times g + m \times a$$

Where

F is the force applied to push or pull an object in Newtons (N)

u is a coefficient of friction (u is small for a smooth surface and large for a rough surface)

m is the object's mass in kilograms (kg)

g is the acceleration due to gravity, which is a constant 9.8 m/s (meters per square second)

a is the object's acceleration in meters per square second (m/s)

Write a program that prompts the user to enter input for F , m , and a , and displays the coefficient of friction.

Here is a sample run:

```
Enter the friction force in Newtons: 150
Enter the object's mass in kg: 24.5
Enter the object's acceleration in m/s^2: 4.5
The coefficient for friction is 0.165556
```

4. (*Find the number of years*) Write a program that prompts the user to enter the minutes (e.g. 1 billion), and displays the maximum number of years and remaining days for the minutes. For simplicity, assume that a year has 365 days. Here is a sample run:

Here is a sample run:

```
Enter the number of minutes: 1000000000
1000000000 minutes is approximately 1902 years and 214 days
```

Submission

Make sure you create one Java file per project. Place your `.java` files under the corresponding folder in your local copy of the GitHub repository, commit and push it to the remote repository. Make sure that the professor has access to the repository (`jfac65-marist`).

```
cmpt220lastname\
  hw02\
    Problem1.java
    Problem2.java
    Problem3.java
    Problem4.java
```