**Program 1:** Practicing with math operators

# Math Operators in Python

# taking two values

a = 10 b = 22

# Using sum operator print ("Sum is:", a+b)

# Using subtract operator

print ("Difference is:”, a-b)

# Using multiplication operator print ("Product is:", a\*b)

# Using division operator print ("Division is:" a/b)

# Using integer division operator print ("Integer Division is:" a//b)

# Using power operator

print ("Raised to the Power is:", a\*\*b)

# Using modulo operator print ("Remainder is:", a%b)

**Output:**

**Program 2:** Write a program to use assignment operators

x = 5

x += 3 print(x)

x = 5

x -= 3 print(x)

x = 5

x \*= 3 print(x)

x = 5 x /= 3 print(x)

x = 5 x%=3 print(x)

x = 5 x//=3

print(x)

x = 5

x \*\*= 3 print(x)

x = 5

x &= 3 print(x)

x = 5 x |= 3 print(x)

x = 5

x ^= 3 print(x)

x = 5

x >>= 3 print(x)

x = 5

x <<= 3 print(x)

**Output:**

**Program 3:** Write a program to perform comparison operators.

x = 20 y = 15

print("X is equal to Y:", x == y) print("X is not equal to Y:", x != y) print("X is Greater than Y:",x > y) print("X is Less than Y:",x < y)

print("X is Greater than or equal to Y:",x >= y)

print("X is Less than or equal to Y:",x <= y)

**Output:**

**Program 4:** Write a program to perform logical operators.

x = 15

print(x > 13 and x < 20)

x = 25

print(x > 23 or x < 24)

x = 35

print(not(x > 33 and x < 40))

**Output:**

**Program 5: Write a program to perform identity operator.**

x = ["ahmed", "bashir"] y = ["ahmed", "bashir"] z = x

print(x is z) print(x is y) print(x == y)

**Output:**

**Program 6: Performing is not identity operation.**

x = ["ahmed", "bashir"] y = ["ahmed", "bashir"] z = x

print(x is not z) print(x is not y) print(x <> y)

**Output:**

**Program 7: Performing 'in' membership operation.**

x = ["wasim", "lubaid", "shahroz", "usman", "faisal", "farhan"]

print("faisal" in x)

**Output:**

**Program 8: Performing 'not in' membership operation.**

x = ["wasim", "lubaid", "shahroz", "usman", "faisal", "farhan"]

print("parkash" not in x)

**Output:**

**Student Name:**

**Roll No:**

**Section:**

**Program 9:** You are planning to throw a small bird at a distance d, with time t, and height h to some structure. Write a code in which you will use the physical quantities such as initial velocity, final velocity, angle in radians, gravity, height, sling shot etc.

import math

# User inputs

velocity = float(input('Give me a velocity to fire at (in m/s): '))

angle = float(input('Give me an angle to fire at: '))

distance = float(input('Give me how far away you are from the structure: ')) height = float(input('Give me the height of the structure (in meters): ')) slingshot = 5 #Height of slingshot in meters

gravity = 9.8 #Earth gravity

# Converting angles to radians angleRad = math.radians(angle)

# Computing our x and y coordinate x = math.cos(angleRad)

y = math.sin(angleRad)

# Calculations

time = distance/(velocity \* x)

vx = x

vy = y + (-9.8 \* time)

finalVelocity = math.sqrt((vx \*\* 2) + (vy \*\* 2))

**Output:**

**Student Name:**

**Roll No:**

**Section:**

**Programming Exercise**

**Question 1**. A ball at the end of a string is revolving uniformly in a horizontal circle of radius 2 meters at constant angular speed 10 rad/s. Determine the magnitude of the linear velocity of a point located:

(a) 0.5 meters from the center

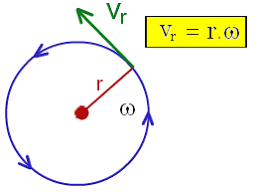
(b) 1 meter from the center

(c) 2 meters from the center

Known: Radius (r) = 0.5 meters, 1 meter, 3 meters, The angular speed = 10 radians/second

Wanted: The linear velocity

Formula: v = r ω



**Input:**

w=float(input("enter the angular speed in rad/sec"))  
r1=float(input("enter radius in metre"))  
r2=float(input("enter radius in meter"))  
r3=float(input("enter radius in meter"))  
v1=r1\*w  
print("the linear velocity at a distance",r1,"from the center is",v1)  
v2=r2\*w  
print("the linear velocity at a distance",r2,"from the center is",v2)  
v3=r3\*w  
print("the linear velocity at a distance",r3,"from the center is",v3)

**Output:**

enter the angular speed in rad/sec 10

enter radius in metre 0.5

enter radius in meter 1

enter radius in meter 2

the linear velocity at a distance 0.5 from the center is 5.0

the linear velocity at a distance 1.0 from the center is 10.0

the linear velocity at a distance 2.0 from the center is 20.0

**Question 2**. The blades in a blender rotate at a rate of 5000 rpm. Determine the magnitude of the linear velocity:

(a) a point located 5 cm from the center (b) a point located 10 cm from the center Known: Radius (r) = 5 cm and 10 cm

The angular speed (ω) = 5000 revolutions / 60 seconds = 83.3 revolutions / second = (83.3)(6.28 radian) /

second = 523.3 radians / second

Wanted: The magnitude of the linear velocity

Formula: v = r ω

**Input:**

w=float(input("enter angular velocity in rpm"))

w1=(w\*2\*pi)/60

r1=float(input("enter distance from center(in cm)"))

r2=float(input("enter distance from center(in cm)"))

r3=r1/100

r4=r2/100

v1=w1\*r3

v2=w1\*r4

print("the linear velocity at a distance of",r1,"cm from the centre is",v1,"m/s")

print("the linear velocity at a distance of",r2,"cm from the centre is",v2,"m/s")

**Output:**

enter angular velocity in rpm 5000

enter distance from center(in cm) 5

enter distance from center(in cm) 10

the linear velocity at a distance of 5.0 cm from the centre is 26.179938779914945 m/s

the linear velocity at a distance of 10.0 cm from the centre is 52.35987755982989 m/s

**Question 3**. A point on the edge of a wheel 30 cm in radius, around a circle at constant speed 10 meters/second.

What is the magnitude of the angular velocity?

Known: Radius (r) = 30 cm = 0.3 meters, The linear velocity (v) = 10 meters/second

Wanted: the angular velocity

Formula: v = r ω

**Input:**

from math import\*

v=float(input("enter linear velocity in m/s"))

r1=float(input("enter radius in cm"))

r2=r1/100

w=v/r2

print("the magnitude of angular velocity is",w,"radian/sec")

**Output:**

enter linear velocity in m/s 10

enter radius in cm 30

the magnitude of angular velocity is 33.333333333333336 radian/sec

**Question 4**. A car with tires 50 cm in diameter travels 10 meters in 1 second. What is the angular speed?

Known:

Radius (r) = 0.25 meter, The linear speed of a point on the edge of tires (v) = 10 meters/second

Wanted: The angular speed

Formula: v = r ω

**Input:**

from math import\*

v=float(input("enter linear speed of a point on the edge of tires"))

d=float(input('enter diameter of tire(in cm)'))

r1=(d/2)

r2=r1/100

w=v/r2

print("the angular speed is",w,"rad/sec")

**Output:**

enter linear speed of a point on the edge of wires 10

enter diameter of tire(in cm) 50

the angular speed is 40.0 rad/sec

**Question 5**. The angular speed of wheel 20 cm in radians is 120 rpm. What is the distance if the car travels in 10 seconds.

Known: Radius (r) = 20 cm = 0.2 meters

The angular speed = 120 rev / 60 seconds = 2 rev / second = (2)(6.28) radians / second = 12.56 radians /

second

Wanted: distance

Formula: v = r ω

**Input:**

from math import\*

w=float(input("enter angular speed in rpm"))

w1=(w\*2\*pi)/60

t=float(input("enter time which car travels(in sec)"))

r=float(input("enter radius in cm"))

r1=r/100

v=r1\*w1

s=v\*t

print("the distance which car travels is",s,"meter")

**Output:**

enter angular speed in rpm 120

enter time which car travels(in sec) 10

enter radius in cm 20

the distance which car travels is 25.132741228718345 meter

**Question 6:** A car is running at a velocity of 50 miles per hour and the driver accelerates the car by 10 miles/hr2. How far the car travels from this point in the next 2 hours, if the acceleration is constant. Formula: v = u + at

**Input:**

u=float(input("enter velocity at which the car is travelling(in miles/hr)"))

a=float(input("enter acceleration of the car(in miles/hr\*\*2)"))

t=float(input("enter time in which the car travels(in hr)"))

v=u+a\*t

print("the final velocity of car",v,"miles/hr")

**Output:**

enter velocity at which the car is travelling(in miles/hr) 50

enter acceleration of the car(in miles/hr\*\*2) 10

enter time in which the car travels(in hr)2

the final velocity of car 70.0 miles/hr

**Question 7:** A Stone is dropped freely from a height of 100 feet. With what velocity will it hit the ground? (Neglect the air resistance and assume the acceleration due to gravity is 32ft/s2). Formula: v2 – u2 = 2as

**Input:**

**Output:**