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In [ ]: import math # Import math module for pi and square root functions

# Cylinder class with methods for CSA, TSA, and Volume
class Cylinder:
    def __init__(self, radius, height):
        self.r = radius
        self.h = height

    def csa(self):
        return 2 * math.pi * self.r * self.h # Curved Surface Area

    def tsa(self):
        return 2 * math.pi * self.r * (self.r + self.h) # Total Surface Area

    def volume(self):
        return math.pi * self.r**2 * self.h # Volume

# Cone class with slant height calculation
class Cone:
    def __init__(self, radius, height):
        self.r = radius
        self.h = height
        self.l = math.sqrt(radius**2 + height**2) # Slant height

    def csa(self):
        return math.pi * self.r * self.l

    def tsa(self):
        return math.pi * self.r * (self.r + self.l)

    def volume(self):
        return (1/3) * math.pi * self.r**2 * self.h

# Cube class with side Length
class Cube:
    def __init__(self, side):
        self.a = side

    def csa(self):
        return 4 * self.a**2

    def tsa(self):
        return 6 * self.a**2

    def volume(self):
        return self.a**3

# Cuboid class with Length, breadth, and height
class Cuboid:
    def __init__(self, length, breadth, height):
        self.l = length
        self.b = breadth
        self.h = height

    def csa(self):
        return 2 * self.h * (self.l + self.b)

    def tsa(self):
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        return 2 * (self.l*self.b + self.b*self.h + self.h*self.l)

    def volume(self):
        return self.l * self.b * self.h

# Sphere class with radius
class Sphere:
    def __init__(self, radius):
        self.r = radius

    def csa(self):
        return 4 * math.pi * self.r**2 # CSA and TSA are the same

    def tsa(self):
        return 4 * math.pi * self.r**2

    def volume(self):
        return (4/3) * math.pi * self.r**3

# Main program to interact with the user
print("Choose a shape:")
print("1. Cylinder\n2. Cone\n3. Cube\n4. Cuboid\n5. Sphere")
choice = int(input("Enter your choice (1-5): "))

print("Choose operation:")
print("1. Curved Surface Area\n2. Total Surface Area\n3. Volume")
op = int(input("Enter your choice (1-3): "))

# Create object based on shape choice
if choice == 1:
    r = float(input("Enter radius: "))
    h = float(input("Enter height: "))
    shape = Cylinder(r, h)
elif choice == 2:
    r = float(input("Enter radius: "))
    h = float(input("Enter height: "))
    shape = Cone(r, h)
elif choice == 3:
    a = float(input("Enter side length: "))
    shape = Cube(a)
elif choice == 4:
    l = float(input("Enter length: "))
    b = float(input("Enter breadth: "))
    h = float(input("Enter height: "))
    shape = Cuboid(l, b, h)
elif choice == 5:
    r = float(input("Enter radius: "))
    shape = Sphere(r)
else:
    print("Invalid shape choice")
    exit()

# Perform selected operation
if op == 1:
    print("Curved Surface Area =", shape.csa())
elif op == 2:
    print("Total Surface Area =", shape.tsa())
elif op == 3:
    print("Volume =", shape.volume())

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else:  
    print("Invalid operation choice")
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Choose a shape:

- 1. Cylinder
- 2. Cone
- 3. Cube
- 4. Cuboid
- 5. Sphere

In []: