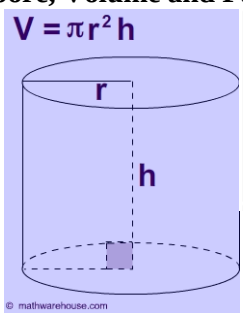
Principles of Engineering

Assignment:	**Surface Area, Volume and Pascal's Law Calculations**

Name (s)_____ **(_____/ _____pts)**

Directions: Calculate the Area of the bore, Volume and Pascal's law of the following objects. Show all your work!

Note: Bore=Base. Height=Stroke



Circle

Area = πr^2

Circumference=$2\pi r$

r = radius

1. If you are given a single acting cylinder with a bore of .625" and a stroke length of 6.00". Perform the following calculations: Hint: 25.4= 1"

Surface Area of Bore: _____ inches² Volume of the Cylinder:_____ inches³

Surface Area of Bore: _____ mm² Volume of the Cylinder:_____ mm³

Force (in pounds) that this cylinder produces if 80 PSI is applied to it:_____ pounds

2. If you are given a single acting cylinder with a bore of 39mm and a stroke length of 195mm. Perform the following calculations: Hint: 25.4= 1"

Surface Area of Bore: _____ mm² Volume of the Cylinder:_____ mm³

Surface Area of Bore: _____ inches² Volume of the Cylinder:_____ inches³

Force (in pounds) that this cylinder produces if 100 PSI is applied to it:_____ pounds

3. If you are given a single acting cylinder with a bore of .3125" and a stroke length of 3.5". Perform the following calculations: Hint: 25.4= 1"

Surface Area of Bore: _____ inches² Volume of the Cylinder:_____ inches³

Surface Area of Bore: _____ mm² Volume of the Cylinder:_____ mm³

Force (in pounds) that this cylinder produces if 120 PSI is applied to it:_____ pounds

4. If you are given a single acting cylinder with a bore of 28mm and a stroke length of 150mm. Perform the following calculations: Hint: 25.4= 1"

Surface Area of Bore: _____ mm² Volume of the Cylinder:_____ mm³

Surface Area of Bore: _____ inches² Volume of the Cylinder:_____ inches³

What would the pressure need to be set at for the force to be able to push 10 pounds:_____

5. A company is trying to automate their assembly line to be more efficient by using a robotic arm to move product on their line. They plan on using a pneumatic cylinder attached to the end effector of the robot for this process. It is determined that a minimum of 50 pounds of force is needed to hold the product safely and securely. The maximum PSI that can be used is 125.

What is the minimum bore size that can be used: _____inch

What is the actual force being applied to the product:_____pounds

6. Ask your instructor for the soup can samples. You will need to use a dial caliper to measure and record your data below.

Cylinder:	Bore (Diameter)	Bore Radius	Stroke (Height)	Area of Bore (in^2)	Area of Bore (mm^2)	Calculated Volume (in^3)	Calculated Volume (mm^3)	Calculated Volume (ounces)	Measured Volume (ounces)
Can 1									
Can 2									
Can 3									

In order to complete the table you will have to use the note below to help convert cubic inches to fluid ounces.

Note: 1 Cubic Inch = 0.554112554 Ounces