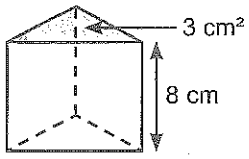
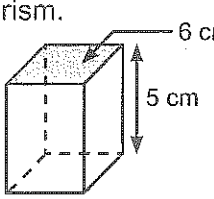
ME8-13 Volume of Cylinders

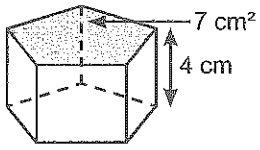
1. Calculate the volume of the prism.

a) 

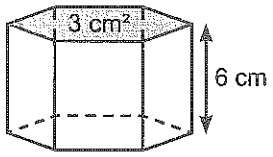
$V =$ _____ cm³

b) 

$V =$ _____ cm³

c) 

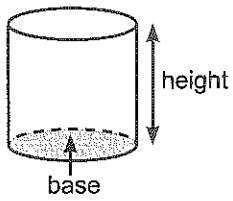
$V =$ _____ cm³

d) 

$V =$ _____ cm³

A **cylinder** is like a prism, but with circles for bases.

INVESTIGATION ▶ What is the formula for the volume of a cylinder?



A. Predict the formula for the volume of a cylinder in terms of its base and height. Explain your prediction.

B. The volume of a can of food is given on the label. Bilal estimates the inside radius and inside height of four cans, and creates this table.

Can	Inside Radius (r)	r^2	Inside Height (h)	$h \times r^2$	Volume of Food (V)	$\frac{V}{hr^2}$
pea soup	4.8 cm		11 cm		796 cm³	
pasta sauce	4.1 cm		13 cm		680 cm³	
mixed beans	4 cm		10.8 cm		540 cm³	
tomato paste	2.5 cm		8 cm		156 cm³	

Bilal measured the outside height of the pea soup can to be 11.8 cm. Why did he estimate a smaller number for the inside height? _____

Bilal measured the outside diameter of the pea soup can to be 10 cm. What is the outside radius? _____ Why did he estimate 4.8 cm for the inside radius? _____

C. Complete Bilal's table.

D. Which column has values always close to $\pi \approx 3.14$? _____

E. Use your answer in part D to write a formula for the volume of a can.

$\pi \approx V \div$ (_____) so the formula is: $V = \pi \times$ _____

F. The base of a cylinder is a circle with radius r. The area of the circle is _____.

G. Use your answer in F to rewrite your formula from E for the volume of a cylinder:

$V =$ (area of base circle) $\times$ _____

H. How is the formula for the volume of a cylinder like the formula for the volume of a prism? Why does this make sense? Hint: Think about how cylinders are like prisms.

_____

_____

I. Was your prediction in part A correct? _____

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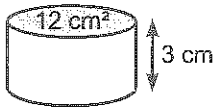
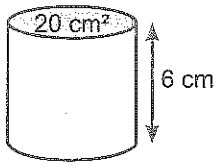
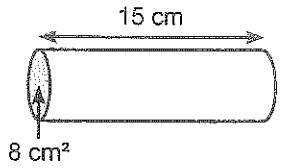
2. The volume of a cylinder is equal to (area of base) × height. Find the volume (V) of the cylinder.

a) 

$V =$ _____ cm³

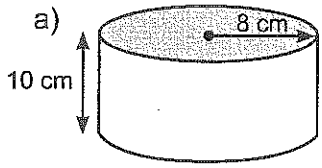
b) 

$V =$ _____ cm³

c) 

$V =$ _____ cm³

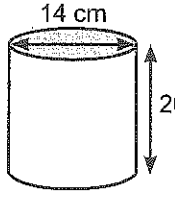
3. Use the radius or diameter to find the area of the base and the volume of the cylinder.

a) 

area of base ≈ _____ cm²

height = _____ cm

volume ≈ _____ cm³

b) 

area of base ≈ _____ cm²

height = _____ cm

volume ≈ _____ cm³

4. Tina has a jar 20 cm high. She can fit 30 candies flat on the bottom of the jar. Each candy is 1 cm high. How many candies can she fit into the jar if...

a) the jar is a cylinder?

b) the jar is a right prism?

Are the two answers the same? Why does this happen?

5. Regular polygons with many sides look a lot like circles. Some Canadian pennies are circular, but some are polygonal.

a) Estimate the volume of a penny by pretending all pennies are perfect cylinders.

Step 1: Measure the diameter of a penny. Diameter = _____ mm

Step 2: Calculate the radius of the penny. Radius = _____ mm

Step 3: Measure the height of the penny.

First, measure the height of one coin individually. _____ mm.

Next, measure the height of 10 coins by stacking them.

Then divide your answer by 10.

Height of 1 coin = Height of 10 coins ÷ 10

= _____ cm ÷ 10

= _____ mm

Which answer for the height of one coin is more accurate? Explain.

Step 4: Calculate the volume of the penny using the radius and height you found.

_____

b) Sara fills a graduated cylinder to the 30 mL mark. She then adds 10 pennies. Where should the water level be now?