So, its volume is: V = base area × height

$\qquad = \pi(3.7)^2 \times 10.5$

Key in: $\boxed{\pi}$ $\boxed{\times}$ 3.7 $\boxed{x^2}$ $\boxed{\times}$ 10.5 $\boxed{\text{ENTER} \atop =}$ to display 451.588236

$V \doteq 451.6$

The volume of the can of baked beans is about 452 cm³.

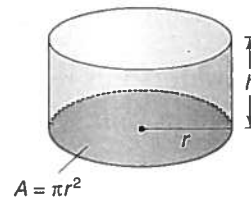We can apply this idea to write a formula for the volume of any cylinder.

Its radius is r.

So, its base area is πr^2.

Its height is h.

So, its volume is: V = base area × height

$\qquad = \pi r^2 \times h$

$\qquad = \pi r^2 h$

So, a formula for the volume of a cylinder is $V = \pi r^2 h$, where r is the radius of its base, and h its height.

$A = \pi r^2$

Example

The base of a juice can is a circle with diameter 6.8 cm.

The height of the can is 12.2 cm.

What is the volume of the can?

6.8 cm

12.2 cm

Solution

The radius of the base is: $\frac{6.8 \text{ cm}}{2} = 3.4$ cm

Use the formula for the volume of a cylinder:

$V = \pi r^2 h$

Substitute: $r = 3.4$ and $h = 12.2$

$V = \pi(3.4)^2 \times 12.2$

Key in: $\boxed{\pi}$ $\boxed{\times}$ 3.4 $\boxed{x^2}$ $\boxed{\times}$ 12.2 $\boxed{\text{ENTER} \atop =}$ to display 443.0650951
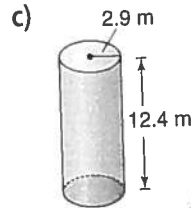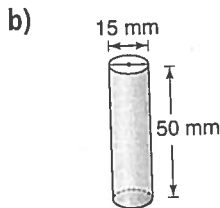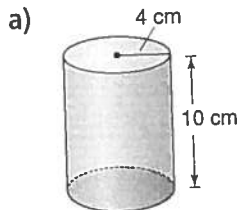
$V \doteq 443.07$

The volume of the can is about 443 cm³.

Capacity is measured in litres or millilitres.

Since 1 cm³ = 1 mL, the capacity of the can in the *Example* is about 443 mL.

Give each volume to the nearest cubic unit.

1. Calculate the volume of each cylinder.

a)   4 cm   10 cm

b)   15 mm   50 mm

c)   2.9 m   12.4 m

the sum of the
posite numbers
veen 1 and 40.

2. A candle mould is cylindrical. Its radius is 5 cm
and its height is 20 cm. What is the capacity
of the mould?

3. Frozen apple juice comes in cylindrical cans.
A can is 12 cm high and has radius 3.5 cm.
a) What is the capacity of the can?
b) Apple juice expands when it freezes.
The can is filled to 95% of its volume.
What is the volume of apple juice in the can?

150 mm

300 mm

4. A core sample of earth is cylindrical.
The length of the core is 300 mm.
Its diameter is 150 mm.
Calculate the volume of earth in cubic millimetres
and cubic centimetres.
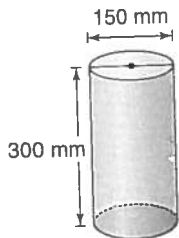
5. **Assessment Focus** A concrete column in a parkade is
cylindrical. The column is 10 m high and has diameter 3.5 m.
a) What is the volume of concrete in one column?
b) There are 127 columns in the parkade.
What is the total volume of concrete?
c) What if the concrete in part a is made into a cube.
What would the dimensions of the cube be?

Reflect

How is the volume of a cylinder related to the volume of a
triangular prism?
How are these volumes different?