ST. JEAN DE BREBEUF

MATHEMATICS

CHAPTER 9.3

SURFACE AREA and VOLUME of CYLINDERS

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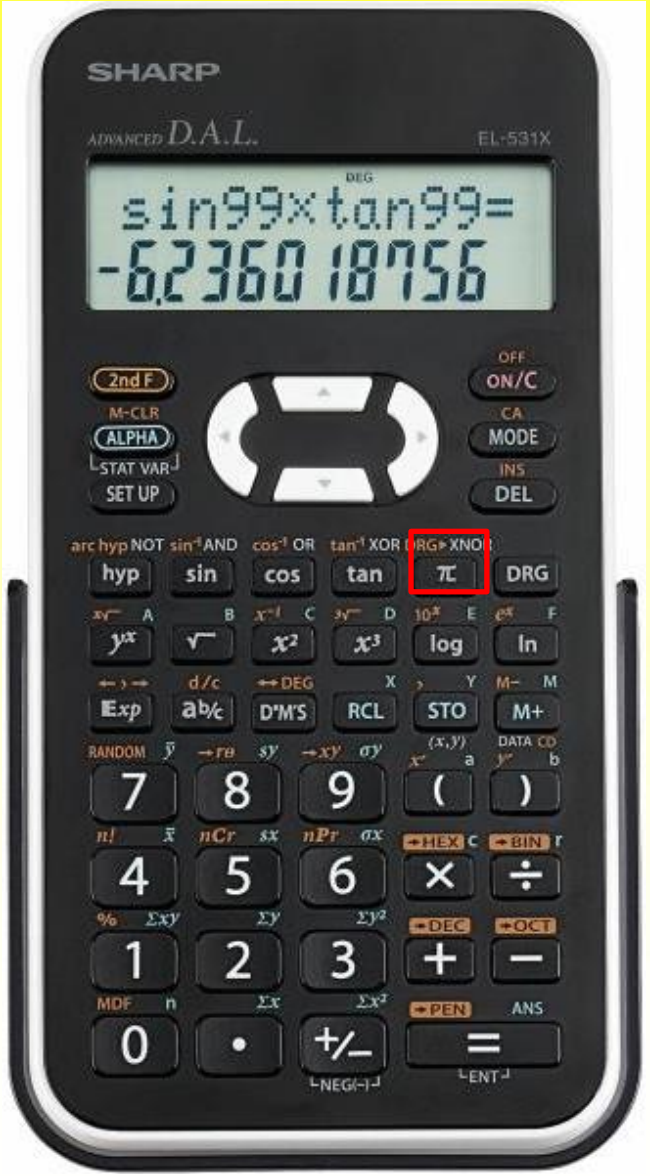
USING YOUR CALCULATOR

"Pi" key
→Use this key instead of using "3.14"
→Uses *all* of the decimal places for "Pi" and gives you a more accurate answer



CHAPTER 9.3 SURFACE AREA and VOLUME of CYLINDERS

KEY CONCEPTS

SURFACE AREA

The surface area of a cylinder is the **sum of the areas of the two circular ends and the curved side.**

Measured in **square units** (ie. cm^2)

FORMULA:

$$SA = 2\pi r^2 + 2\pi rh$$

VOLUME

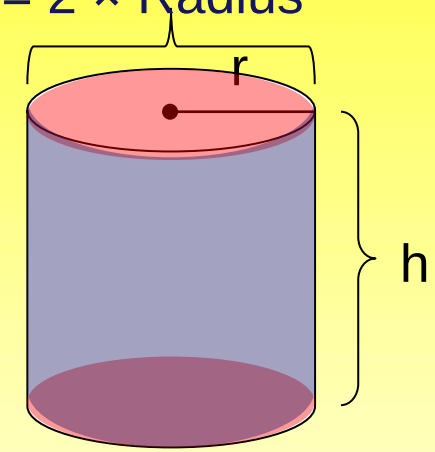
The volume of a cylinder is the area of the circular base times the height of the cylinder.

Measured in **cubic units** (ie. cm^3)

FORMULA:

$$V = \pi r^2 h$$

Diameter
= 2 × Radius



CHAPTER 9.3 SURFACE AREA and VOLUME of CYLINDERS

EXAMPLE 1 *Surface Area and Volume of a Can*

(a) Calculate the **surface area** of the can

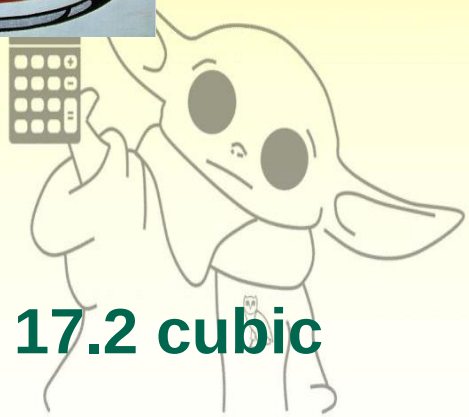
$$SA = 2\pi r^2 + 2\pi rh$$
$$= 2\pi(1.25)^2 + 2\pi(1.25)(3.5)$$
$$= 37.30 in^2$$

The surface area of the can is **37.30 square inches**

(b) Calculate the **volume** of the can

$$V = \pi r^2 h$$
$$= \pi(1.25)^2(3.5)$$
$$= 17.2 in^3$$

The volume of the can is **17.2 cubic inches**



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EXAMPLE 2

Calculate the *surface area* and *volume* of a cylinder with a **diameter of 36 inches** and height of **24 inches**.

h

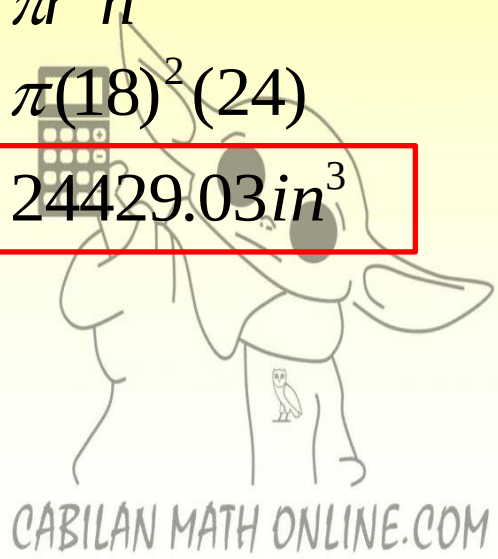
Radius (r) = diameter ÷ 2
= 36 ÷ 2
= **18 in**

SURFACE AREA

$$SA = 2\pi r^2 + 2\pi rh$$
$$= 2\pi(18)^2 + 2\pi(18)(24)$$
$$= 4750.09\,in^2$$

VOLUME

$$V = \pi r^2 h$$
$$= \pi(18)^2(24)$$
$$= 24429.03\,in^3$$



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EXAMPLE 3 *A Cylinder Inside a Cylinder*

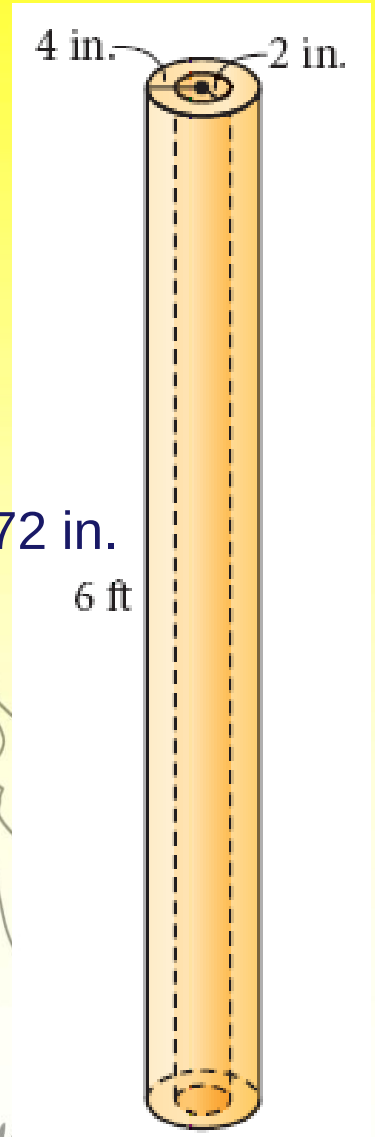
The padding around the support posts of a mesh enclosure for a trampoline is in the shape of a cylinder that has been hollowed out by removing a smaller cylinder.

The height of the padding is **6 ft**.

Convert to **inches**
→Multiply by **12**
= 6 × 12
= **72 in.**

Each piece has an outer radius of **4 in.** and an inner radius of **2 in.**

Find the volume of one piece of foam padding in **cubic inches (in³)**.



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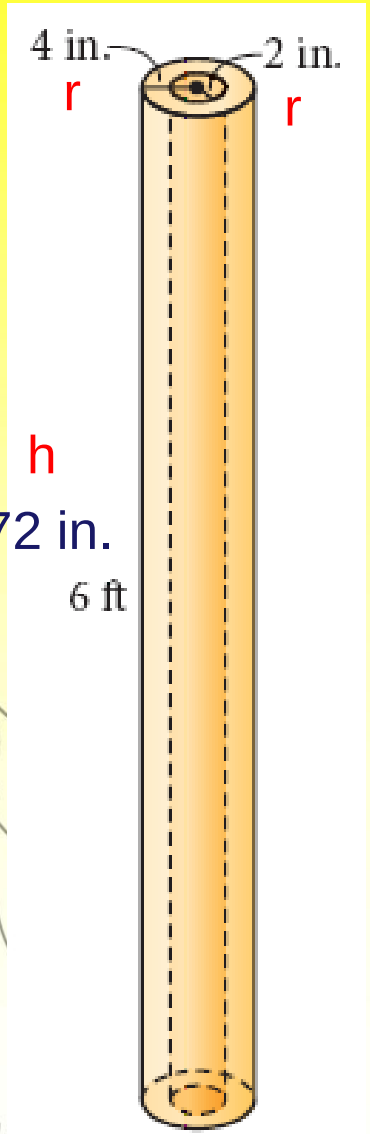
EXAMPLE 3 *A Cylinder Inside a Cylinder*

Find the volume of one piece of foam padding in **cubic inches (in³)**.



Step 1: Calculate the volume of the *outer* cylinder

$$V = \pi r^2 h$$
$$= \pi(4)^2(72)$$
$$= 3619.11 in^3$$

Step 2: Calculate the volume of the *inner* cylinder

$$V = \pi r^2 h$$
$$= \pi(2)^2(72)$$
$$= 904.78 in^3$$

Step 3: Subtract the *inner* volume from the *outer* volume

Total volume = 3619.11 – 904.78
= 2714.33 in³

The volume of the foam padding is **2713.33 cubic inches**.

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EXAMPLE 4 *Solving for Specific Dimensions*

A company that manufactures fruit juice needs to make a new cylindrical container that can hold a volume of **4000 m³** of fruit juice**.**

V

h

If the tank has a height of **25 metres**,

(a) What **radius** will the container have?

$$V = \pi r^2 h$$

$$4000 = \pi r^2 (25)$$

* Multiply

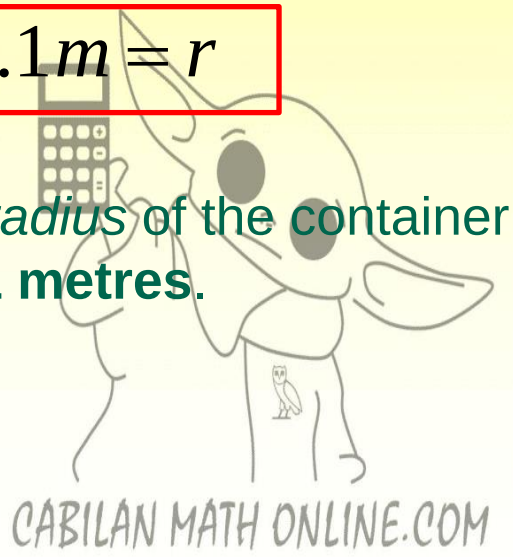
$$\frac{4000}{25\pi} = \frac{25\pi r^2}{25\pi}$$

$$50.9296 = r^2$$

$$\sqrt{50.9296} = \sqrt{r^2}$$

$$7.1m = r$$

The *radius* of the container is **7.1 metres**.



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EXAMPLE 4 *Solving for Specific Dimensions*

A company that manufactures fruit juice needs to make a new cylindrical container that can hold a volume of **4000 m³** of fruit juice**.**

V

h

If the tank has a height of **25 metres**,

(b) What **diameter** will the container have?

Diameter = Radius × 2

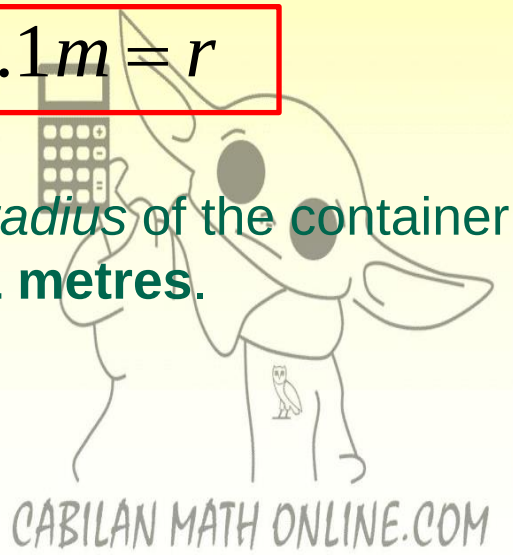
= 7.1 × 2

= **14.2 m**

The *diameter* of the container is **14.2 metres**.

$$7.1m = r$$

The *radius* of the container is **7.1 metres**.



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Homework:

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