

# Circle and Cylinder Word Problems

Oct 20-08:19

## Circumference of a Circle

- The Circumference of a circle can be calculated using the formulae:
- $C = 2\pi r$  or  $C = \pi d$
- Where ***d*** is the diameter, ***r*** is the radius and  **$\pi = 3.14$**  to 2 decimal places

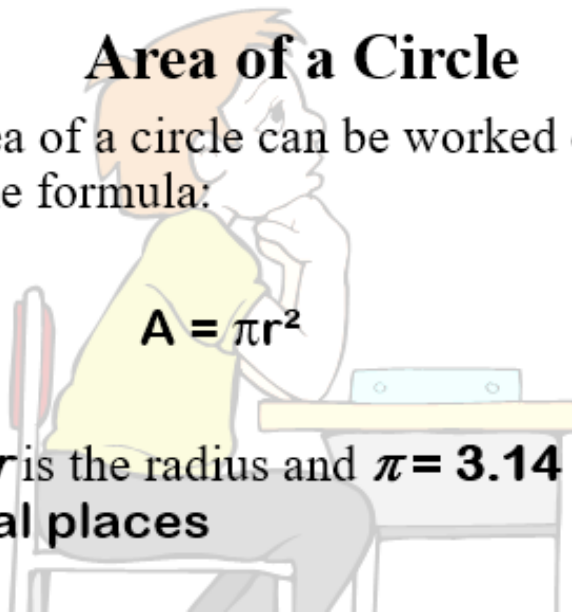
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## Area of a Circle

- The Area of a circle can be worked out by using the formula:

$$A = \pi r^2$$

- Where  $r$  is the radius and  $\pi = 3.14$  to 2 decimal places

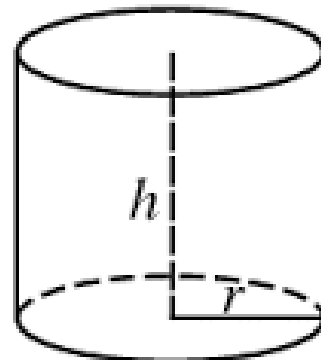


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To calculate the volume we need to know the height of the cylinder and its radius.

$$\text{Volume}_{\text{cylinder}} = \pi r^2 h$$

The " $\pi r^2$ " represents the area of the circle and the " $h$ " represents the height of the stack of circles.

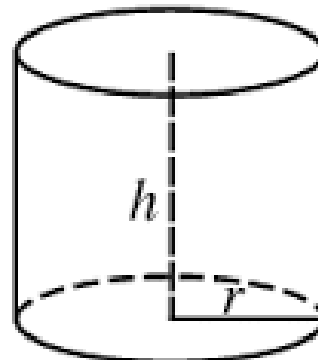


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To calculate the surface area we again need to know the height of the cylinder and its radius.

$$\text{Surface Area}_{\text{cylinder}} = 2\pi r^2 + 2\pi rh$$

The " $2\pi r^2$ " represents the area of the two circles (top and bottom) and the " $2\pi rh$ " represents the area of the rectangle that joins the circles together.



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## Online Cylinder Calculator!

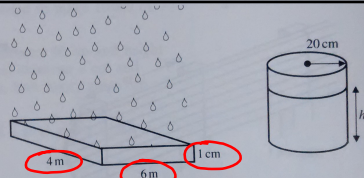
[http://www.numberempire.com/cylinder\\_calculator.php](http://www.numberempire.com/cylinder_calculator.php)

Yes, just put in the radius and height and it will calculate the volume and surface area for you.

Great for checking your answers, not so great for tests when you have to show your working.

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12. Rain which falls onto a flat rectangular surface of length 6 m and width 4 m is collected in a cylinder of internal radius 20 cm. What is the depth of water in the cylinder after a storm in which 1 cm of rain fell?



Careful with the units!

Find the volume of the tray in  $\text{cm}^3$

$$\begin{aligned} \text{Volume of tray} &= l \times w \times h \\ &= 400 \times 600 \times 1 \\ &= 240,000 \text{ cm}^3 \end{aligned}$$

Volume of cylinder = area of base  $\times$  height

$$\begin{aligned} &= \pi r^2 \times h \\ &= 3.14 \times 20^2 \times h \\ &= 1256 \times h \end{aligned}$$

Volume water =  $240,000 \text{ cm}^3$

$$\Rightarrow \text{height} = \frac{\text{Volume}}{\text{area}} = \frac{240,000}{1256} = 191.08 \text{ cm}$$

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Cylinder A has a diameter of 8 cm and a height of 3 cm. Cylinder B has a radius of 5 cm and a height of 2 cm. Which cylinder has the greater surface area? Explain.

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

A

$$\begin{aligned} &= 2 \times 3.14 \times 4^2 + 2 \times 3.14 \times 4 \times 3 \\ &= 100.48 + 75.36 \\ &= 175.84 \text{ cm}^2 \end{aligned}$$

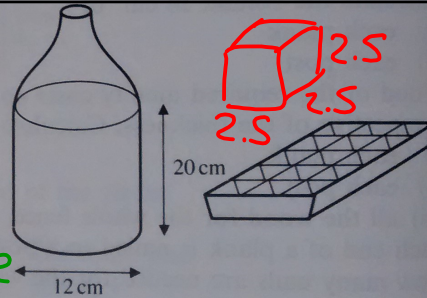
B

$$\begin{aligned} &= 2 \times 3.14 \times 5^2 + 2 \times 3.14 \times 5 \times 2 \\ &= 157 + 62.8 \\ &= 219.8 \text{ cm}^2 \end{aligned}$$

$\Rightarrow$  Cylinder B has the greater surface area.

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14. Water is poured from the cylindrical bottle shown into ice-cube moulds which are then put in a freezer. How many complete ice cubes of side 2.5 cm can be made?



Find volume of water in the bottle

$$\begin{aligned}
 &= \pi r^2 h \\
 &= 3.14 \times 6^2 \times 20 \\
 &= 2260.8 \text{ cm}^3
 \end{aligned}$$

$$\begin{aligned}
 &= l \times w \times h \\
 &= 2.5 \times 2.5 \times 2.5 \\
 &= 15.625 \text{ cm}^3
 \end{aligned}$$

$$\begin{aligned}
 \# \text{ cubes} &= \frac{\text{volume of water}}{\text{volume of cube}} \\
 &= \frac{2260.8}{15.625} = 144.6912
 \end{aligned}$$

$\Rightarrow$  can make 144 complete cubes.

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A can has radius of 8cm. If the can has a volume of  $2500 \text{ cm}^3$  find its height.

$$\text{Volume} = \pi r^2 h$$

$$2500 = 3.14 \times 8^2 \times h$$

$$2500 = 200.96 \times h$$

$$\frac{2500}{200.96} = h = 12.44 \text{ cm}$$

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11. A cylindrical tin of height 15 cm and radius 4 cm is filled with sand from a rectangular box. How many times can the tin be filled if the dimensions of the box are 50 cm by 40 cm by 20 cm?

$$V_{\text{box}} = l \times w \times h \quad V_{\text{cylinder}} = \pi r^2 h$$

$$= 50 \times 40 \times 20 \quad = 3.14 \times 4^2 \times 15$$

$$= 40,000 \text{ cm}^3 \quad = 753.6 \text{ cm}^3$$

$$\# \text{ of times can be filled} = \frac{40000}{753.6}$$

$$= 53.08 \text{ times}$$

$$\Rightarrow 53 \text{ times}$$

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A cylindrical garden roller has a diameter of 40cm and a width of 50cm.

a) Calculate the amount of water needed to fill the roller in litres.

(1 litre = 1000cm<sup>3</sup>)

b) Calculate the area in m<sup>2</sup> rolled after 50 revolutions.

a)  $V_{\text{cylinder}} = \pi r^2 h$



$$V = 3.14 \times 20^2 \times 50$$

$$V = 62,800 \text{ cm}^3$$

$\Rightarrow$  litres, you need to divide by 1000

$$\frac{62800}{1000} = 62.8 \text{ litres}$$

b) lateral area touches the ground  
NOT the circles.

$$\text{Area} = 2\pi r h$$

$$= 2 \times 3.14 \times 0.2 \times 0.5$$

$$= 0.628 \text{ m}^2$$

$$\Rightarrow 50 \times 0.628 = 31.4 \text{ m}^2$$

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