

Surface Area of Cylinders, Spheres and Cones

Starter

1. **(Review of last lesson)** The base radius, r , of a cone is the same as the radius of a sphere. Given that the volume of the solids is the same, express the height of the cone h in terms of its radius, r .

Working:

Volume of cone = Volume of sphere

$$\frac{1}{3}\pi r^2 h = \frac{4}{3}\pi r^3$$

Times by 3:

$$\pi r^2 h = 4\pi r^3$$

Divide by πr^2 :

$$h = 4r$$

- E.g. 1** Write down the formula for the surface area of cylinder which is open at the top.

Working: There is only one circular part so $S = \pi r^2 + 2\pi r h$

- E.g. 2** A hemisphere is half a sphere. Write down the formula for:

- (a) the curved surface area of a hemisphere (i.e. not including the base)
 (b) total surface area of a hemisphere. (i.e. including the base)

Working: (a) $S = \frac{1}{2} \times 4\pi r^2 = 2\pi r^2$

(b) We now need to include the base so $S = 2\pi r^2 + \pi r^2 = 3\pi r^2$

- E.g. 3** The volume of a sphere is 6044 m^3 . Find the surface area, correct to the nearest integer.

Working **From the volume, work out the radius:** $\frac{4}{3}\pi r^3 = 6044$

$$r^3 = \frac{3 \times 6044}{4\pi}$$

$$r = 11.30$$

Now substitute into the formula:

$$\text{Surface area} = 4\pi r^2$$

$$\text{SA} = 4\pi \times 11.30^2$$

$$\text{Surface area} = 1605 \text{ cm}^2$$

- E.g. 4** A cone has base radius of 56 cm and **perpendicular** height 33 cm . Find the exact surface area of the cone. Express your answer in terms of π .

Working **We need the slant height:** $l^2 = 56^2 + 33^2$
 which gives $l = 65$

Now substitute: Surface area = $\pi r^2 + \pi r l$

$$= \pi \times 56^2 + \pi \times 56 \times 65$$

The surface area of the cone is $6776\pi \text{ cm}^2$.

Video: [Surface area of a cylinder](#)

Video: [Surface area of a sphere](#)

Video: [Surface area of cone](#)

Exercise

9-1 class textbook:	p445 E13.8 Qu 1-13
A*-G class textbook:	p401 E13.5 Qu 1-14
9-1 homework book:	p153 E13.8 Qu 1-8
A*-G homework book:	p112 E13.5 Qu 1-6

[Homework book answers \(only available during a lockdown\)](#)

