

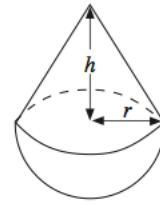
## 2.7 Further Change of Subject

1. The volume of a cylinder is given by

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

where  $r$  is the base radius and  $h$  the height.

- (a) Make  $r$  the subject of the formula.  
(b) Find  $r$  when  $V = 300 \text{ cm}^3$  and  $h = 5 \text{ cm}$



2. The volume of a toy, consisting of a base hemisphere and cone top, is given by

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

Make  $h$  the subject of this equation and find  $h$  when  $V = 300 \text{ cm}^3$  and  $r = 3 \text{ cm}$ .

3. The surface area of a sphere is given by

$$S = 4\pi r^2$$

- (a) Make  $r$  the subject of this equation.  
(b) Find  $r$  when (i)  $S = 100 \text{ cm}^2$  (ii)  $S = 200 \text{ cm}^2$

By what factor does the radius change when the surface area is doubled?

4. Make  $x$  the subject of

(a)  $y = 4x + 2$       (b)  $y = 1 - 3x$       (c)  $y = mx + c$

(d)  $y = \frac{1}{x+1}$       (e)  $y = 1 + \sqrt{x}$       (f)  $y = \frac{1}{1 + \sqrt{x}}$

(g)  $y = \sqrt{\frac{5x}{a}}$       (h)  $y = \sqrt{x+1}$       (i)  $\frac{1}{y} = \frac{1}{x} + 1$

(j)  $\frac{1}{y} = \frac{2}{3} - \frac{1}{x}$       (k)  $y = \frac{1}{4} + \frac{1}{x}$       (l)  $y = \frac{4}{\sqrt{2+x}}$

5. If  $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$ , make  $u$  the subject of this formula.

Find  $u$  when: (a)  $f = 5$  and  $v = 1$  (b)  $f = 3$  and  $v = -2$

6. The percentage profit,  $p$ , on the sale of an item is given by the formula

$$p = \frac{100(s - c)}{c}$$

where  $s$  is the selling price and  $c$  is the cost price.  
Express  $c$  in terms of  $s$  and  $p$ .

(MEG)

7. Students conduct an experiment to find  $g$ , the acceleration due to gravity.

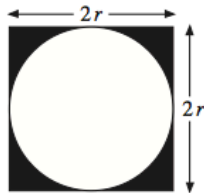
They measure the time,  $T$  seconds, for one complete swing of a pendulum of length  $L$  centimetres.

The formula for  $g$  is  $g = \frac{4\pi^2 L}{T^2}$

- (a) Find  $g$  when  $L = 39.24$  and  $T = 1.26$ .  
Take  $\pi = 3.142$  or use the  $\pi$  button on your calculator.  
(b) Rearrange the formula to express  $T$  in terms of  $L$ ,  $\pi$  and  $g$ .

(SEG)

8. A star shape is made by cutting quadrants of a circle from a square of side  $2r$ .



- (a) Show that the shaded area is given by the formula

$$A = 4r^2 - \pi r^2$$

- (b) Rearrange the formula to make  $r$  the subject.

(AQA)