

## Changing the subject of a formula

1. Sales Price = Cost Price + Profit  
 $S = C + P$ 
  - a. What is the sales price if a pair of skates cost \$50 and the profit was \$30?
  - b. Make C the subject of the formula.
  - c. What is the cost price if a pair of skates sold for \$120, and the profit was \$60?
  - d. Make P the subject of the formula.
  - e. What is the profit if a pair of skates cost \$65 and were sold for \$110?
  
2. Supplementary angles add to 180 degrees.  
 $A + B = 180$ 
  - a. Make A the subject of the formula.
  - b. Find A if  $B = 135^\circ$ .
  - c. Make B the subject of the formula.
  - d. Find B if  $A = 27^\circ$ .
  
3. Perimeter of a rectangle  
 $P = 2L + 2W$ 
  - a. Make L the subject of the formula.
  - b. What is the length if the perimeter is 45 cm and the width is 9 cm?
  - d. Make W the subject of the formula.
  - e. What is the width if the perimeter is 86 cm and the length is 31 cm?
  
4. Perimeter of a triangle with sides of length A, B and C.  
 $P = A + B + C$ 
  - a. Make A the subject of the formula
  - b. Find A, if  $B = 26$  cm,  $C = 41$  cm, and  $P = 89$  cm.
  - c. Make B the subject of the formula.
  - d. Find B, if  $A = 27$  cm,  $C = 18$  cm, and  $P = 62$  cm.
  
5. Distance = Speed x Time  
 $D = S \times T$ 
  - a. What distance does a car travel if it travels at 45 km/hr for 3 hours?
  - b. Make S the subject of the formula.
  - c. If a car travels 120 km in 5 hours, what is its average speed?
  - d. Make T the subject of the formula.
  - e. A car travels 250 km in 4 hours. How long is the journey?

*You will need a calculator for these two questions*

- 6\*. Area of a circle =  $\pi \times$  radius squared  
 $A = \pi r^2$ 
  - a. Find the area if the radius is 6 cm?
  - b. Make r the subject of the formula.
  - c. Find the radius of the area is 100 cm<sup>2</sup>.
  
- 7\*. Volume of a cylinder =  $\pi \times$  radius squared x height  
 $V = \pi r^2 h$ 
  - a. Find the volume of a cylinder if  $r = 4$  cm and  $h = 5$  cm.
  - b. Make h the subject of the formula.
  - c. Find the height of the cylinder if  $r = 4$  cm and  $V = 120$  cm<sup>3</sup>.
  - d. Make r the subject of the formula.
  - e. Find r if  $h = 3$  and  $V = 30$  cm<sup>3</sup>.

## Solutions

1a. \$80	b. $C = A - P$	c. \$60	d. $P = S - C$	e. \$45
2.	a. $A = 180 - B$	b. $45^\circ$	c. $B = 180 - A$	d. $B = 153^\circ$
3.	a. $L = \frac{P - 2W}{2}$	b. 13.5 cm	c. $W = \frac{P - 2L}{2}$	d. 12
4.	a. $A = P - C - B$	b. 22 cm	c. $B = P - C - A$	d. 17cm
5a 135 km	b. $S = \frac{D}{T}$	c. 24 kph	d. $T = \frac{D}{S}$	e. 62.5 hr
6a. 113.0	b. $r = \sqrt{\frac{A}{\pi}}$	c. 5.64 cm		
7a. 251.2	b. $h = \frac{V}{\pi * r^2}$	c. 2.39 cm	d. $r = \sqrt{\frac{V}{\pi * h}}$	e. 1.78 cm

## Changing the Subject of a Formula

For each of the questions below

- Sketch a diagram, showing all dimensions.
- Write the formula, if needed.
- Change the subject of the formula to the new subject, showing working.

Question	Quantity	Formula	New Subject
1	Circumference of a circle	$C = \pi \times D$	D
2	Area of a square	$A = s^2$	s
3	Perimeter of a rectangle	$P = 2L + 2W$	W
4	Area of a circle	$A = \pi \times r^2$	r
5.	Area of a triangle	$A = B \times H \div 2$	H
6.	Volume of a cube	$V = s^3$	s
7.	Volume of a rectangular prism	$V = LWH$	H
8.	Volume of a cylinder	$V = \pi r^2 H$	H
9.	Volume of a cylinder	$V = \pi r^2 H$	r
10.	Volume of a cone	?	r
<b>Challenge!</b>	Area of a trapezium	?	H

## Transposing Formulas

Show your working!

- Given the formula  $distance = speed \times time$ , *this is a formula for distance*
  - make  $speed$  the subject
  - make  $time$  the subject
- Given the formula  $Area = Length \times Width$ , *this is a formula for the area of a rectangle*
  - make  $Length$  the subject
  - make  $Width$  the subject.
- Given the formula  $Circumference = \pi \times Diameter$ , *this is a formula for the circumference of a circle*
  - make  $Diameter$  the subject
  - make  $\pi$  the subject.
- Given the formula  $v = u + at$ , *this is a formula for velocity*
  - make  $u$  the subject
  - make  $a$  the subject.
  - make  $t$  the subject.
- Given the equation  $y = mx + c$ , *this is an equation of a line*
  - make  $c$  the subject
  - make  $m$  the subject
  - make  $x$  the subject
- Given the formula  $P = 2L + 2B$ , *this is a formula for perimeter of a rectangle*
  - make  $L$  the subject
  - make  $B$  the subject
- Given the formula  $A = \frac{bh}{2}$ , *this is a formula for the area of a triangle*
  - make  $b$  the subject
  - make  $h$  the subject

### Challenge!

- Given the formula  $I = Prt$ , *this is a formula for simple interest*
  - make  $P$  the subject
  - make  $r$  the subject
  - make  $t$  the subject
- Given the formula  $A = \pi r^2$ , *this is the formula for the area of a circle*
  - make  $\pi$  the subject
  - make  $r$  the subject
- Given the formula  $A = \frac{h}{2}(a + b)$ , *this is a formula for the area of a trapezium*
  - make  $h$  the subject
  - make  $a$  the subject
  - make  $b$  the subject
- Given the formula  $A = P + Prt$ , *this is a formula for the amount of an investment*
  - make  $r$  the subject
  - make  $t$  the subject
  - make  $P$  the subject

### Answers

- a.  $speed = \frac{distance}{time}$  b.  $time = \frac{distance}{speed}$  2. a.  $Length = \frac{Area}{Width}$  b.  $Width = \frac{Area}{Length}$
- a.  $Diameter = \frac{Circumference}{\pi}$  b.  $\pi = \frac{Circumference}{Diameter}$  4. a.  $u = v - at$  b.  $a = \frac{v - u}{t}$  c.  $t = \frac{v - u}{a}$
- a.  $c = y - mx$  b.  $m = \frac{y - c}{x}$  c.  $x = \frac{y - c}{m}$  6. a.  $L = \frac{P - 2B}{2}$  b.  $B = \frac{P - 2L}{2}$  7. a.  $b = \frac{2A}{h}$  b.  $h = \frac{2A}{b}$
- a.  $P = \frac{I}{rt}$  b.  $r = \frac{I}{Pt}$  c.  $t = \frac{I}{Pr}$  9. a.  $\pi = \frac{A}{r^2}$  b.  $r = \sqrt{\frac{A}{\pi}}$  10. a.  $h = \frac{2A}{a + b}$  b.  $a = \frac{2A}{h} - b$  c.  $b = \frac{2A}{h} - a$
- a.  $r = \frac{A - P}{Pt}$  b.  $t = \frac{A - P}{Pr}$  c.  $P = \frac{A}{1 + rt}$