

1 Write two hundred thousand and seventeen in figures.



.....200 017..... [1]

2 Insert one pair of brackets to make this calculation correct.



$$7 - (5 - 3) + 4 = 9 \quad [1]$$

3 Solve the equation.



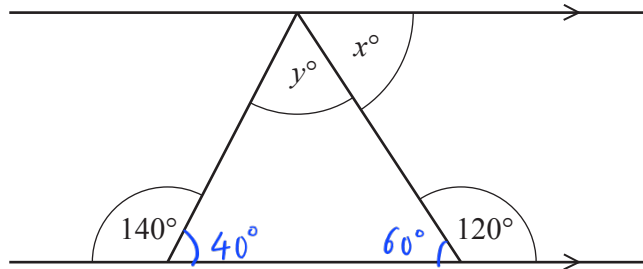
$$6 - 2x = 3x$$

$$6 = 5x$$

$$\frac{6}{5} = x$$

$x = \frac{6}{5}$ [2]

4



NOT TO SCALE

The diagram shows a triangle drawn between a pair of parallel lines.

Find the value of x and the value of y .

$$x = 180 - 120 = 60$$

$$y = 180 - 40 - 60 = 80$$

$x = 60$

$y = 80$ [3]

5 Increase 42 by 16%.



$$42 + 42 \times 16\% = 48.72$$

.....48.72..... [2]

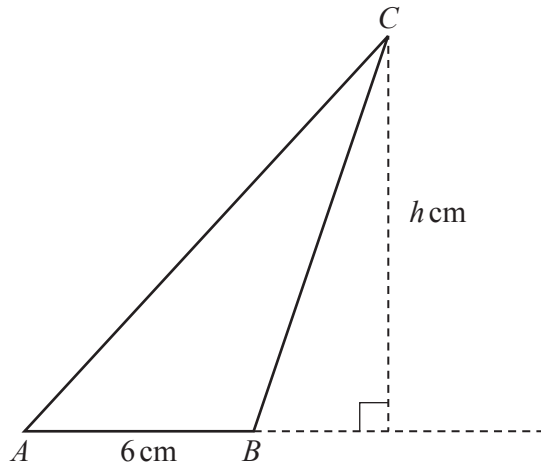
6 Factorise completely.



$4 - 8x$

$4(1 - 2x)$ [1]

7

NOT TO
SCALEThe area of triangle ABC is 27 cm^2 and $AB = 6 \text{ cm}$.Calculate the value of h .

$$\frac{1}{2} \times 6h = 27$$

$$h = 9$$

$h = 9$ [2]

8 Calculate the size of one interior angle of a regular polygon with 40 sides.



$$\frac{(40 - 2) 180^\circ}{40} = 171^\circ$$

171° [2]

9 Solve the simultaneous equations.



$$2x + y = 7$$

$$3x - y = 8$$

$$5x = 7 + 8 = 15$$

$$x = 3$$

$$\Rightarrow 2 \times 3 + y = 7$$

$$y = 1$$

$$x = \dots 3 \dots$$

$$y = \dots 1 \dots [2]$$

10 Without using a calculator, work out $\frac{5}{6} \div 1\frac{1}{3}$.



You must show all your working and give your answer as a fraction in its simplest form.

$$\frac{5}{6} \div \frac{4}{3}$$

$$= \frac{5}{6} \times \frac{3}{4}$$

$$= \frac{5 \times \cancel{3}}{2 \times \cancel{3} \times 4} = \frac{5}{8}$$

$$\dots \frac{5}{8} \dots [3]$$

11 Simplify.



$$2x^2 \times 5x^5$$

$$\dots 10x^7 \dots [2]$$

- 12 Alex and Chris share sweets in the ratio Alex : Chris = 7 : 3.

Ⓚ Alex receives 20 more sweets than Chris.

Work out the number of sweets Chris receives.

$$\frac{A}{C} = \frac{7}{3}$$

$$\Rightarrow \frac{A}{7} = \frac{C}{3} = \frac{A-C}{7-3} = \frac{20}{4} = 5$$

$$C = 5 \times 3 = 15$$

..... 15 [2]

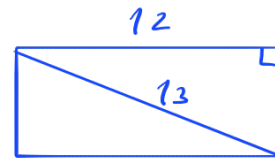
- 13 The length of one side of a rectangle is 12 cm.

Ⓚ The length of the diagonal of the rectangle is 13 cm.

Calculate the area of the rectangle.

$$\text{The other side} = \sqrt{13^2 - 12^2} = 5$$

$$\text{Area} = 5 \times 12 = 60$$



..... 60 cm² [3]

- 14 Work out $(3 \times 10^{199}) + (2 \times 10^{201})$.

Ⓚ Give your answer in standard form.

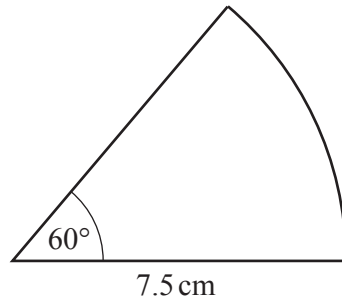
$$0.03 \times 10^{201} + 2 \times 10^{201}$$

$$(0.03 + 2) \times 10^{201}$$

$$2.03 \times 10^{201}$$

..... 2.03×10^{201} [2]

15


NOT TO
SCALE

Calculate the area of this sector of a circle.

$$\frac{1}{2} \times 7.5^2 \times \frac{60 \pi}{180} = \frac{75}{8} \pi$$

$$\approx 29.5$$

..... 29.5 cm² [2]

16 The selling price of a shirt is \$26.50 .



This includes a tax of 6%.

Calculate the price of the shirt before the tax was added.

$$S_{\text{before}} + S_{\text{before}} \times 6\% = 26.5$$

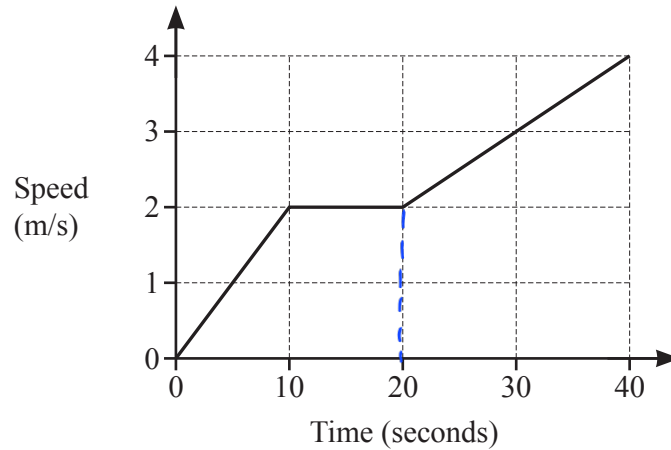
$$1.06 S_{\text{before}} = 26.5$$

$$S_{\text{before}} = 25$$

\$ 25 [2]

17

K



The diagram shows the speed–time graph for the first 40 seconds of a cycle ride.

(a) Find the acceleration between 20 and 40 seconds.

$$\frac{2}{20}$$

..... 0.1 m/s² [1]

(b) Find the total distance travelled.

$$\frac{10 + 20}{2} \times 2 + \frac{2 + 4}{2} \times 20 = 90$$

..... 90 m [3]

18 The sides of an isosceles triangle are measured correct to the nearest millimetre.

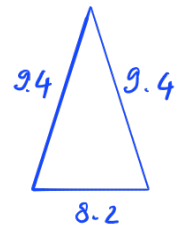
K

One side has a length of 8.2 cm and another has a length of 9.4 cm. 0.1 cm

Find the largest possible value of the perimeter of this triangle.

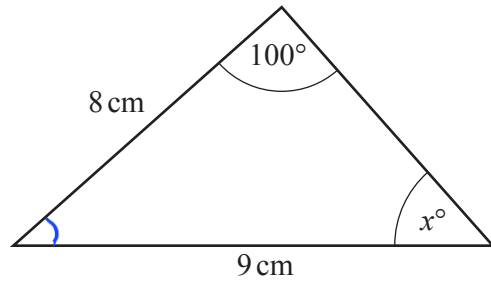
To have the largest perimeter, the side of length 9.4 has to appear twice

$$2 \times \left(9.4 + \frac{0.1}{2} \right) + \left(8.2 + \frac{0.1}{2} \right)$$



..... 27.15 cm [3]

19



NOT TO SCALE

- (a) Calculate the value of
- x
- .

$$\frac{8}{\sin x} = \frac{9}{\sin 100^\circ}$$

$$\sin x = \frac{8 \sin 100^\circ}{9} \approx 0.8754$$

$$x = \dots 61.1 \dots [3]$$

- (b) Calculate the area of the triangle.

$$180^\circ - 100^\circ - 61.1^\circ = 18.9^\circ$$

$$A_{\Delta} = \frac{1}{2} \times 8 \times 9 \sin 18.9^\circ \approx 11.661$$

$$\dots 11.7 \dots \text{ cm}^2 [3]$$

- 20 A model of a statue has a height of
- 4 cm
- .

The volume of the model is 12 cm^3 .The volume of the statue is $40\,500\text{ cm}^3$.

Calculate the height of the statue.

$$\text{Ratio volume} = \left(\text{Ratio side} \right)^3$$

$$\frac{40\,500}{12} = \left(\frac{\text{height statue}}{4} \right)^3$$

$$\Rightarrow 15 = \frac{\text{height statue}}{4}$$

$$\Rightarrow \text{height statue} = 60$$

$$\dots 60 \dots \text{ cm} [3]$$

21 (a) Differentiate $6 + 4x - x^2$.

7

$$\dots 4 - 2x \dots [2]$$

(b) Find the coordinates of the turning point of the graph of $y = 6 + 4x - x^2$.

$$4 - 2x = 0$$

$$2x = 4$$

$$x = 2$$

$$\text{When } x = 2, \quad y = 6 + 4 \times 2 - 2^2 = 10$$

$$(\dots 2 \dots, \dots 10 \dots) [2]$$

25 Solve the equation $\tan x = 2$ for $0^\circ \leq x \leq 360^\circ$.

7

$$x = 63.4^\circ \quad \text{or} \quad x = 63.4^\circ + 180^\circ = 243.5^\circ$$

$$x = \dots 63.4^\circ \dots \text{or } x = \dots 243.5^\circ \dots [2]$$

26 Simplify.

7

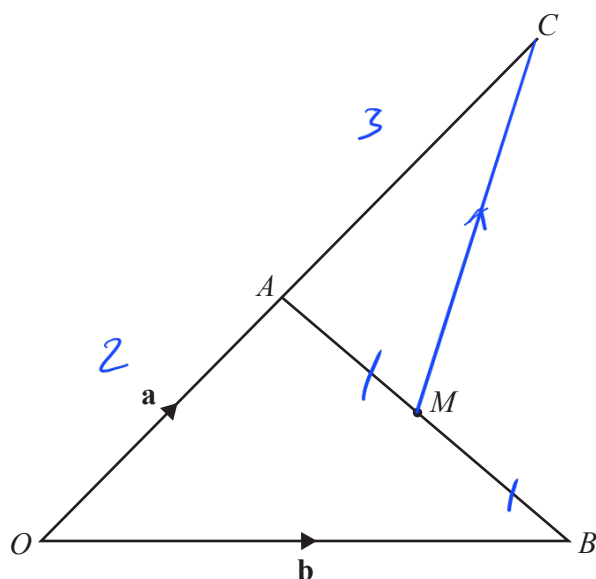
$$\frac{ux - 2u - x + 2}{u^2 - 1}$$

$$\frac{(ux - x) - (2u - 2)}{(u-1)(u+1)}$$

$$\frac{x(u-1) - 2(u-1)}{(u-1)(u+1)}$$

$$\frac{(x-2)(u-1)}{(u-1)(u+1)}$$

$$\frac{x-2}{u+1} \dots [4]$$



NOT TO
SCALE

The diagram shows a triangle OAB and a straight line OAC .

$OA : OC = 2 : 5$ and M is the midpoint of AB .

$\vec{OA} = \mathbf{a}$ and $\vec{OB} = \mathbf{b}$.

Find, in terms of \mathbf{a} and \mathbf{b} , in its simplest form

(a) \vec{AB} ,

$$\begin{aligned}\vec{AB} &= \vec{AO} + \vec{OB} \\ &= -\mathbf{a} + \mathbf{b}\end{aligned}$$

$$\vec{AB} = \dots -\mathbf{a} + \mathbf{b} \dots [1]$$

(b) \vec{MC} .

$$\vec{MA} = \frac{1}{2} \vec{BA} = \frac{1}{2} (\mathbf{a} - \mathbf{b})$$

$$\vec{AC} = \frac{3}{2} \vec{OA} = \frac{3}{2} \mathbf{a}$$

$$\begin{aligned}\vec{MC} &= \vec{MA} + \vec{AC} \\ &= \frac{1}{2} \mathbf{a} - \frac{1}{2} \mathbf{b} + \frac{3}{2} \mathbf{a}\end{aligned}$$

$$\vec{MC} = \dots 2\mathbf{a} - \frac{1}{2}\mathbf{b} \dots [3]$$

23 Write as a single fraction in its simplest form.

Ⓚ

$$2 - \frac{2x-1}{x+1}$$

$$\frac{2(x+1) - (2x-1)}{x+1}$$

$$= \frac{2x + 2 - 2x + 1}{x+1}$$

$$= \frac{3}{x+1}$$

$$\frac{3}{x+1} \dots \dots \dots [3]$$

24 A line from the point (2, 3) is perpendicular to the line $y = \frac{1}{3}x + 1$.
The two lines meet at the point P.

Ⓚ

Find the coordinates of P.

$$m_l = -1 : \frac{1}{3} = -3$$

Equation of line l: $y - 3 = -3(x - 2)$

sub $y = \frac{1}{3}x + 1$ into the above equation:

$$\frac{1}{3}x + 1 - 3 = -3x + 6$$

$$\frac{10}{3}x = 8$$

$$x = 2.4$$

$$\Rightarrow y = \frac{1}{3} \times 2.4 + 1 = 1.8$$

$$(\dots 2.4 \dots, \dots 1.8 \dots) [5]$$