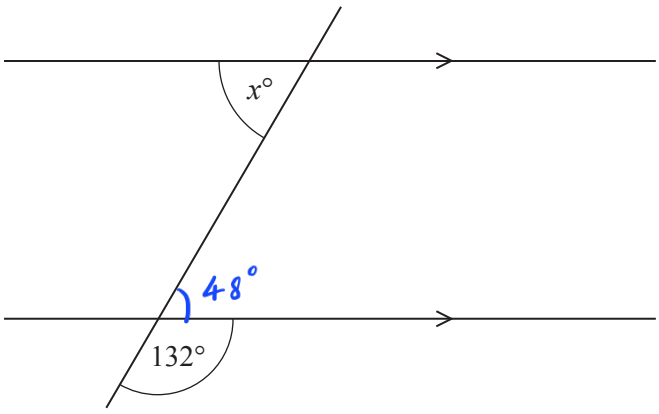
1 Write 26 g as a percentage of 208 g.

$\frac{26}{208} \times 100$

..... 12.5 ..... % [1]

2



NOT TO SCALE

The diagram shows two parallel lines intersecting a straight line.

Find the value of x.

$180° - 132° = 48°$

$x = 48°$ (alternate angles)

$x =$ ..... 48° ..... [2]

3

11 13 15 17 19

From this list, write down the number that is both a prime number and a factor of 195.

..... 13 ..... [1]

4 **(a)** = ≠ > <

Put a ring around each of the symbols that make this statement correct.

0.5 ..... 5% = 0.05 [1]

(b) Insert one pair of brackets to make this statement correct.

$7 - (3 - 1) + 2 = 7$ [1]

5 Nina changes 153 euros into dollars when the exchange rate is \$1 = 0.9 euros.

Calculate the amount Nina receives.

$\frac{153}{0.9} = 170$

\$ ....170.... [1]

6 Marek buys a computer for \$420.
He sells it at a loss of 15%.

Calculate the selling price of this computer.

$420 - 420 \times 15\% = 357$

\$ ....357.... [2]

7 Simplify.

$32g^{32} \div 4g^{4}$

$\frac{32}{4} g^{32-4}$

$8g^{28}$ [2]

8 Beatrice walks 1 km at a speed of 4 km/h and then 2 km at a speed of 4.5 km/h.

Work out Beatrice's average speed for the whole journey.

$t_1 = \frac{1}{4}$ h $\qquad t_2 = \frac{2}{4.5} = \frac{4}{9}$ h

$\text{average speed} = \frac{\text{distance}}{\text{time}} = \frac{1+2}{\frac{1}{4}+\frac{4}{9}}$

....4.32.... km/h [3]

9 Write the recurring decimal $0.\dot{2}\dot{7}$ as a fraction.

$x = 0.27\,27\,27\ldots$

$100x = 27.27\,27\,27\ldots$

$99x = 27$

$x = \frac{27}{99} = \frac{3}{11}$

.....$\frac{3}{11}$..... [1]

10 These are the first four terms of a sequence.

3 $\underset{-4}{\frown}$ −1 $\underset{-4}{\frown}$ −5 $\underset{-4}{\frown}$ −9

(a) Find the next term in this sequence.

.....−13..... [1]

(b) Find the nth term.

.....$-4n+7$..... [2]

11 $P = M(g^2 + h^2)$

(a) Find the value of P when $M = 100$, $g = 3$ and $h = 4.5$.

$P = 100(3^2 + 4.5^2)$

$P =$ .....2925..... [2]

(b) Rearrange the formula to write g in terms of P, M and h.

$\frac{P}{M} = g^2 + h^2$

$\frac{P}{M} - h^2 = g^2$

$g = \pm\sqrt{\frac{P}{M} - h^2}$

$g =$ .....$\pm\sqrt{\frac{P}{M} - h^2}$..... [3]

12 **Without using a calculator**, work out $\frac{11}{12}+\frac{3}{4}$.

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

$\frac{11}{12} + \frac{9}{12} = \frac{20}{12} = \frac{5}{3} = 1\frac{2}{3}$

.....$1\frac{2}{3}$..... [3]

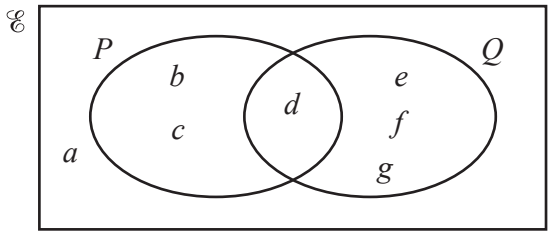
13 Calculate $0.04^2+0.03\times0.28$.

Give your answer in standard form.

$0.01 = 1 \times 10^{-2}$

.....1×10^{-2}..... [2]

14



(a) Complete the statement.

$P \cup Q = \{$ b, c, d, e, f, g $\}$ [1]

(b) Find $n(Q)$.

4 [1]

(c) Find $n(P' \cap Q)$.

3 [1]

15 The cost of a train journey is increased by 6% to a new cost of \$153.70 .

Calculate the original cost of the train journey.

t

$t + 6\% \, t = 153.70$

$1.06t = 153.70$

$t = 145$

\$ 145 [2]

16 Jo and Mo share \$26.
Jo receives \$5 more than Mo.

Find the ratio Jo's money : Mo's money.
Give your answer in its simplest form.

$J + M = 26$

$+ \quad J - M = 5$

$2J = 26 + 5 = 31$

$J = 15.5 \Rightarrow M = 10.5$

$\frac{J}{M} = \frac{15.5}{10.5} = \frac{31}{21}$

31 : 21 [3]

17 Each interior angle of a regular polygon is 178.5°.

Calculate the number of sides of this polygon.

$$\frac{(n-2)180}{n} = 178.5$$

$$180n - 360 = 178.5n$$

$$1.5n = 360$$

$$n = 240$$

..... 240 ..... [2]

18 Find the equation of the straight line that passes through the points (2, −2) and (3, 10).

Give your answer in the form $y = mx + c$.

$$m = \frac{10-(-2)}{3-2} = 12$$

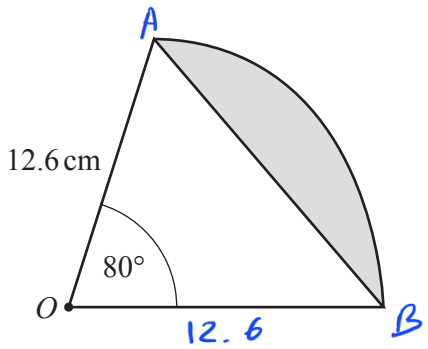
Equation: $y - (-2) = 12(x - 2)$

$$y + 2 = 12x - 24$$

$$y = 12x - 26$$

$y =$ ..... 12x - 26 ..... [3]

19



NOT TO SCALE

The diagram shows a sector of a circle, centre O, radius 12.6 cm.

Calculate the perimeter of the shaded segment.

$AB^2 = 12.6^2 + 12.6^2 - 2 \times 12.6 \times 12.6 \cos 80°$

$AB^2 = 262.383$

$AB = 16.198$

arc $AB = 12.6 \times 80 \times \frac{\pi}{180} = 17.593$

$\Rightarrow$ perimeter shaded $= 16.198 + 17.593$

≈ 33.8

.....33.8..... cm [4]

20 A lake has an area of 3 km^2. $= 3 \times 10^{10}$ cm^2

On a map the area of the lake is 18.75 cm^2.

Find the scale of the map in the form 1 : n.

$\frac{18.75}{3 \times 10^{10}} = \left(\frac{1}{n}\right)^2$

$\frac{1}{40\,000} = \frac{1}{n}$

1 : .....40 000..... [3]

21 Simplify fully.

$(243y^{10})^{\frac{3}{5}}$

$243^{\frac{3}{5}} (y^{10})^{\frac{3}{5}}$

$(\sqrt[5]{243})^3 \; y^{10 \times \frac{3}{5}}$

$3^3 \times y^6$

.....27 y^6..... [2]

22 Solve the simultaneous equations.
You must show all your working.

$y = x^2 - 3x - 13$ (1)

$y = x - 1$

Sub $y = x - 1$ into equation (1)

$x - 1 = x^2 - 3x - 13$

$x^2 - 4x - 12 = 0$

$(x - 6)(x + 2) = 0$

$x = 6$ or $x = -2$

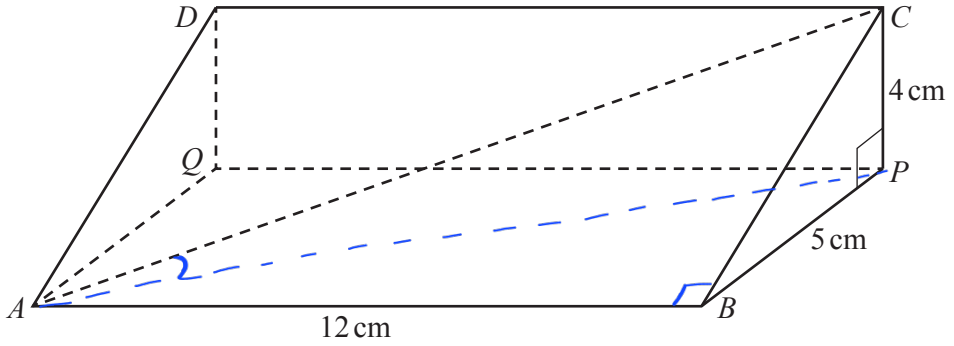
When $x = 6$, $y = 6 - 1 = 5$

When $x = -2$, $y = -2 - 1 = -3$

$x =$ .....6..... , $y =$ .....5.....

$x =$ .....−2..... , $y =$ .....−3..... [5]

23



NOT TO SCALE

The diagram shows a triangular prism.
Angle $BPC = 90°$.

(a) Calculate AC.

$BC^2 = 4^2 + 5^2 = 41$

$AC = \sqrt{AB^2 + BC^2} = \sqrt{12^2 + 41} \approx 13.6$

$AC =$ 13.6 cm [3]

(b) Calculate the angle between AC and the base $ABPQ$.

$AP = \sqrt{5^2 + 12^2} = 13$

$\tan \widehat{CAP} = \frac{4}{13}$

$\widehat{CAP} \approx 17.1°$

17.1° [3]

24 $\tan x = \sqrt{3}$ and $0° \leqslant x \leqslant 360°$.

Find all the possible values of x.

$x = 60°$ or $x = 60° + 180° = 240°$

60°, 240° [2]

25 Simplify.

$$\frac{3x^2-18x}{ax-6a+2cx-12c}$$

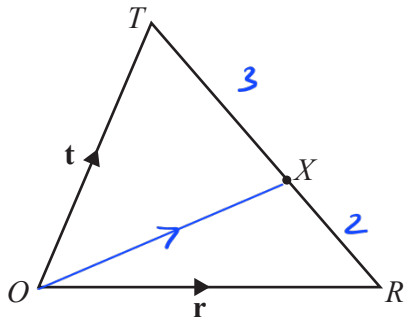
$$= \frac{3x(x-6)}{a(x-6)+2c(x-6)}$$

$$= \frac{3x(x-6)}{(a+2c)(x-6)}$$

$$= \frac{3x}{a+2c}$$

$\frac{3x}{a+2c}$ [4]

26



NOT TO SCALE

ORT is a triangle.
X is a point on TR so that $TX : XR = 3 : 2$.
O is the origin, $\overrightarrow{OR} = \mathbf{r}$ and $\overrightarrow{OT} = \mathbf{t}$.

Find the position vector of X.
Give your answer in terms of $\mathbf{r}$ and $\mathbf{t}$ in its simplest form.

$\overrightarrow{TR} = \overrightarrow{TO} + \overrightarrow{OR} = -t + r$

$\overrightarrow{TX} = \frac{3}{5}\overrightarrow{TR} = \frac{3}{5}(-t+r)$

$\overrightarrow{OX} = \overrightarrow{OT} + \overrightarrow{TX}$

$= t + \frac{3}{5}(-t+r)$

$= \frac{3}{5}r + \frac{2}{5}t$

$\frac{3}{5}r + \frac{2}{5}t$ [3]