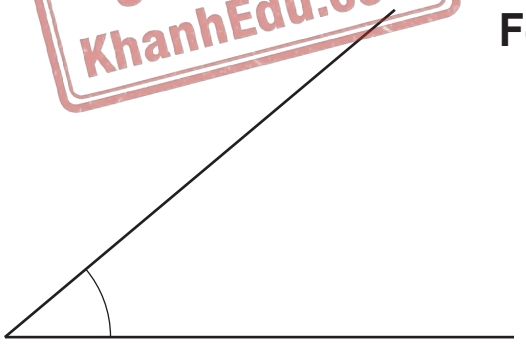
1



Measure the marked angle.

.....40°..... [1]

2 Work out $\sqrt{5} \times 6^2$.
Give your answer correct to 2 decimal places.

.....80.50..... [2]

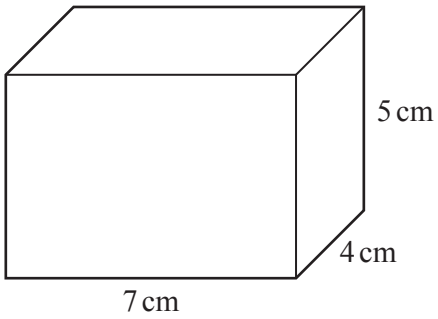
3 A journey starts at 21 15 one day and ends at 04 33 the next day.

Calculate the time taken, in hours and minutes.

21:15 → midnight → 04:33
2h 45′ + 4h 33′ = 6h 78′ = 7h 18′

.....7..... h .....18..... min [1]

4



NOT TO SCALE

Calculate the **total** surface area of this cuboid.

2 (5 × 4 + 7 × 4 + 4 × 5)

.....166..... cm^2 [3]

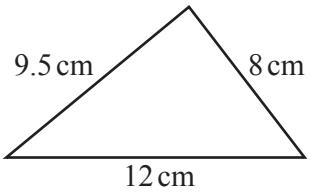
5 **(a)** Write down the gradient of the line $y = 5x + 7$.

.....5..... [1]

(b) Find the coordinates of the point where the line $y = 5x + 7$ crosses the y-axis.

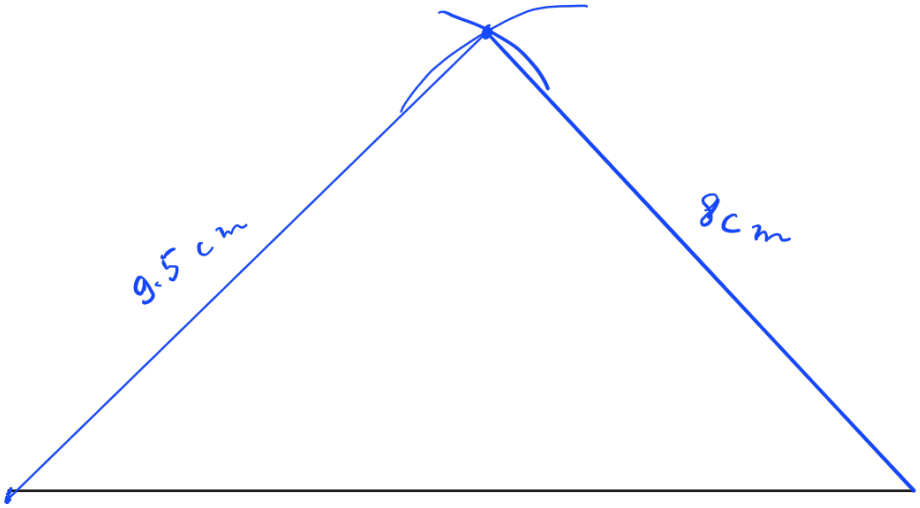
(.....0....., ...7.....) [1]

6



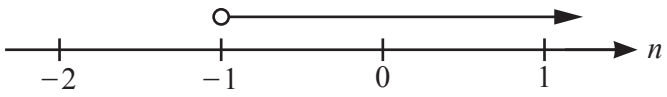
NOT TO SCALE

Using a ruler and compasses only, construct this triangle.
Leave in your construction arcs.
The side of length 12 cm has been drawn for you.



[2]

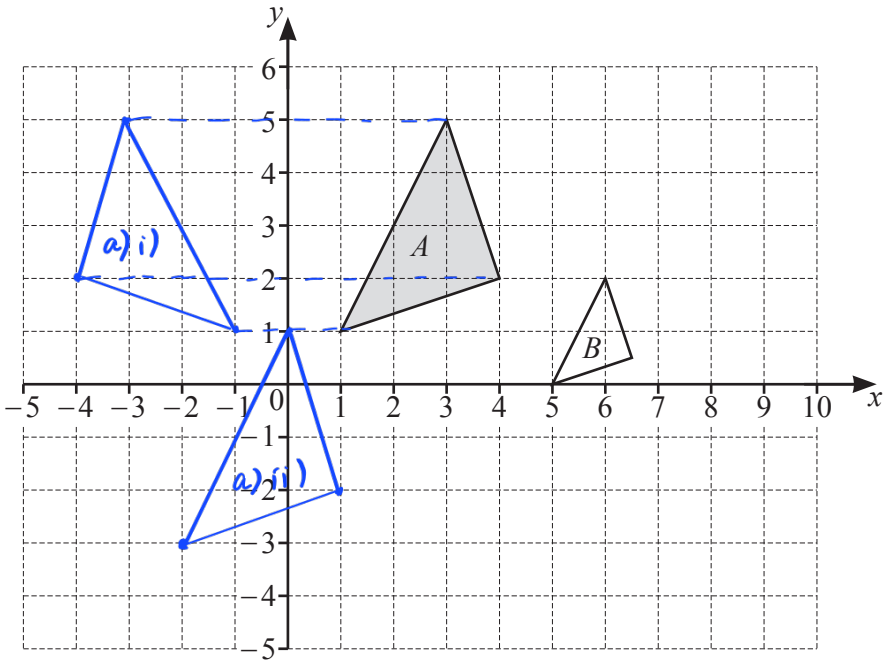
7



Write down the inequality, in terms of n, shown by the number line.

.....n > −1..... [1]

8



(a) On the grid, draw the image of

(i) triangle A after a reflection in the y-axis, [1]

(ii) triangle A after a translation by the vector $\begin{pmatrix}-3\\-4\end{pmatrix}$. [2]

(b) Describe fully the **single** transformation that maps triangle A onto triangle B.

Enlargement, center $(9, -1)$, scale factor $= \frac{1}{2}$

[3]

9 Factorise completely.

$12a^3 - 21a$

$3a(4a^2 - 7)$

$3a[(2a)^2 - (\sqrt{7})^2]$

$3a(2a - \sqrt{7})(2a + \sqrt{7})$ [2]

10 **(a)** The nth term of a sequence is $n^2 + 7$.

Find the first three terms of this sequence.

8, 11, 16 [2]

(b) These are the first four terms of a different sequence.

15, 7, −1, −9 (−8, −8, −8)

Find the nth term of this sequence.

$-8n + 23$ [2]

11 As the temperature increases, people eat more ice cream.

What type of correlation does this statement describe?

positive [1]

12 **(a)** Sanjay invests \$700 in an account paying simple interest at a rate of 2.5% per year.

Calculate the value of his investment at the end of 6 years.

$700 + 700 \times \frac{2.5}{100} \times 6$

\$ 805 [3]

(b) Meera invests \$700 in an account paying compound interest at a rate of r% per year.
At the end of 17 years the value of her investment is \$1030.35 .

Find the value of r.

$1030.35 = 700\left(1 + \frac{r}{100}\right)^{17}$

$\left(1 + \frac{r}{100}\right)^{17} \approx 1.47193$

$1 + \frac{r}{100} \approx 1.023$

$\frac{r}{100} \approx 0.023$

$r =$ 2.30 [3]

13 **(a)** Simplify $h^2 \times h^5$.

h^7 [1]

(b) Simplify $\left(\frac{7}{x}\right)^{-3}$.

$\frac{1}{\left(\frac{7}{x}\right)^3} = \frac{1}{\frac{7^3}{x^3}} = \frac{x^3}{7^3}$

$\frac{x^3}{243}$ [1]

(c) $a^8 \div a^p = a^2$

Find the value of p.

$a^{8-p} = a^2$

$8 - p = 2$

$p = 6$

$p =$ 6 [1]

14 Calculate the circumference of a circle with radius 4.7 cm.

$2\pi \times 4.7 \approx 29.5$

29.5 cm [2]

15 **Without using a calculator**, work out $2\frac{1}{3} \times \frac{11}{14}$.

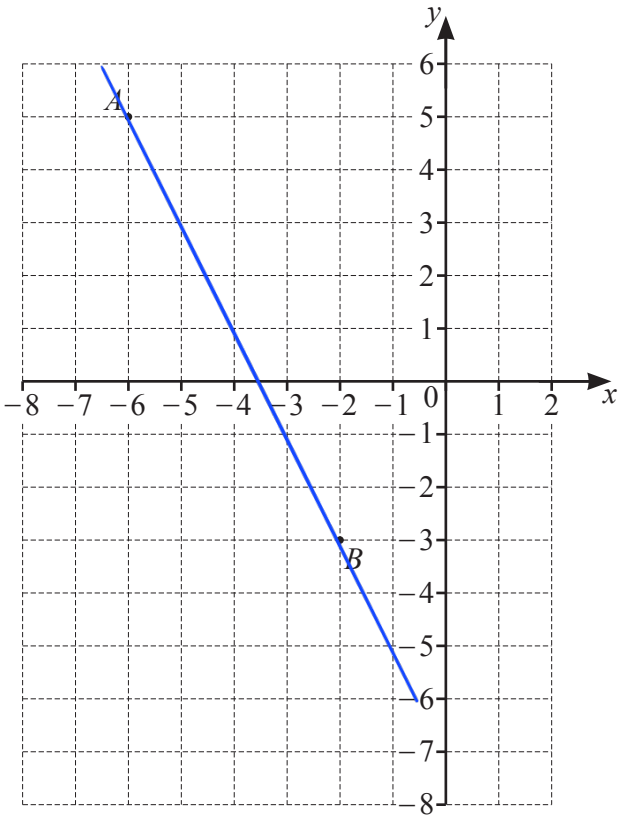
You must show all your working and give your answer as a mixed number in its simplest form.

$\frac{7}{3} \times \frac{11}{14}$

$\frac{7 \times 11}{3 \times 7 \times 2} = \frac{11}{3 \times 2} = \frac{11}{6} = 1\frac{5}{6}$

$1\frac{5}{6}$ [3]

16



A is the point $(-6, 5)$ and B is the point $(-2, -3)$.

(a) Find the equation of the straight line, l, that passes through point A and point B.
Give your answer in the form $y = mx + c$.

$m_{AB} = \frac{-3-5}{-2-(-6)} = -2$

$y - 5 = -2(x - (-6))$

$y - 5 = -2x - 12$

$y =$ ..... $-2x - 7$ ..... [2]

(b) Find the equation of the line that is perpendicular to l and passes through the origin.

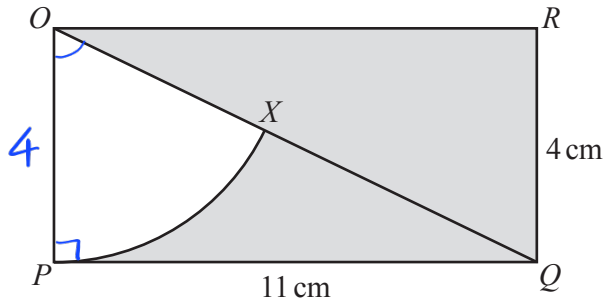
$m_{\text{perpendicular line}} = -1 \div (-2) = 0.5$ — $O(0,0)$

$y - 0 = 0.5(x - 0)$

$y = 0.5x$

..... $y = 0.5x$ ..... [2]

17



NOT TO SCALE

The diagram shows a rectangle $OPQR$ with length 11 cm and width 4 cm.
OQ is a diagonal and OPX is a sector of a circle, centre O.

Calculate the percentage of the rectangle that is shaded.

$\tan \widehat{POQ} = \frac{11}{4}$

$\widehat{POQ} = 1.222$ radian

$A_{\text{sector } OPX} = \frac{1}{2} \times 4^2 \times 1.222 = 9.776$

$A_{\text{shaded}} = A_{PQRO} - A_{\text{sector } OPX}$

$= 11 \times 4 - 9.776 = 34.224$

$\text{percentage shaded} = \frac{34.224}{44} \times 100 \approx 77.8$

..... 77.8 ..... % [5]

18 Mrs Kohli buys a jacket, 2 shirts and a hat.
The jacket costs $\$x$.
The shirts each cost \$24 less than the jacket and the hat costs \$16 less than the jacket.
Mrs Kohli spends exactly \$100.

Write down an equation in terms of x.
Solve this equation to find the cost of the jacket.

$x + 2(x - 24) + (x - 16) = 100$

$x + 2x - 48 + x - 16 = 100$

$4x = 164$

$x = 41$

\$ ..... 41 ..... [3]

19 y is inversely proportional to the square root of $(x+4)$.
When $x = 5$, $y = 2$.

Find y when $x = 77$.

$y \propto \frac{1}{\sqrt{x+4}} \Rightarrow y = \frac{k}{\sqrt{x+4}}$

$2 = \frac{k}{\sqrt{5+4}} \Rightarrow k = 6 \Rightarrow y = \frac{6}{\sqrt{x+4}}$

when $x = 77$, $y = \frac{6}{\sqrt{77+4}} = \frac{2}{3}$

$y =$ $\frac{2}{3}$ [3]

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

$3x + y = 11$
$x^2 - 2y = 18$

$2 \times (3x + y = 11)$
$6x + 2y = 22$

$x^2 + 6x = 18 + 22$

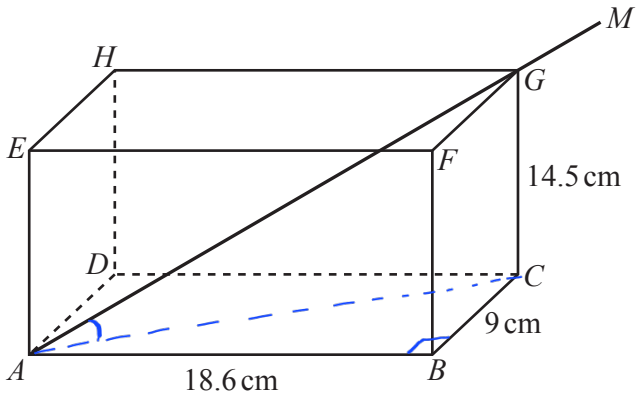
$x^2 + 6x - 40 = 0$
$x^2 - 4x + 10x - 40 = 0$
$x(x-4) + 10(x-4) = 0$
$(x+10)(x-4) = 0$
$x + 10 = 0$ or $x - 4 = 0$
$x = -10$ or $x = 4$

when $x = -10$, $3(-10) + y = 11 \Rightarrow y = 41$
when $x = 4$, $3(4) + y = 11 \Rightarrow y = -1$

$x =$ 4 $y =$ −1

$x =$ −10 $y =$ 41 [5]

21



NOT TO SCALE

The diagram shows an open rectangular box $ABCDEFGH$.
$AB = 18.6$ cm, $BC = 9$ cm and $CG = 14.5$ cm.
A straight stick AGM rests against A and G and extends outside the box to M.

(a) Calculate the angle between the stick and the base of the box.

$AC = \sqrt{9^2 + 18.6^2} = 20.663$

$\tan \widehat{GAC} = \frac{14.5}{20.663}$

$\widehat{GAC} = 35.1^\circ$

..... 35.1° ..... [4]

(b) $AM = 30$ cm.

Show that $GM = 4.8$ cm, correct to 1 decimal place.

$AG = \sqrt{14.5^2 + (9^2 + 18.6^2)} \approx 25.243$

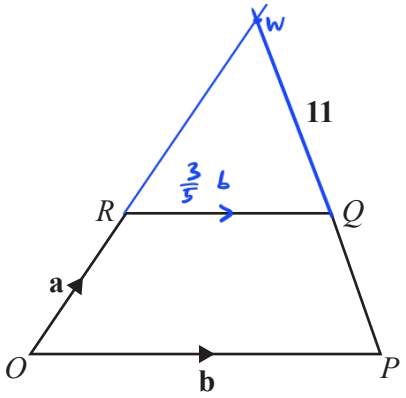
$GM = AM - AG$

$= 30 - 25.243$

$= 4.757 \approx 4.8$

[3]

22



NOT TO SCALE

The diagram shows a trapezium $OPQR$.
O is the origin, $\overrightarrow{OR} = \mathbf{a}$ and $\overrightarrow{OP} = \mathbf{b}$.

$|\overrightarrow{RQ}| = \frac{3}{5}|\overrightarrow{OP}|$

(a) Find $\overrightarrow{PQ}$ in terms of $\mathbf{a}$ and $\mathbf{b}$ in its simplest form.

$\overrightarrow{PQ} = \overrightarrow{PO} + \overrightarrow{OR} + \overrightarrow{RQ}$

$= -b + a + \frac{3}{5}b$

$= a - \frac{2}{5}b$

$\overrightarrow{PQ} =$ ..... $a - \frac{2}{5}b$ ..... [2]

(b) When PQ and OR are extended, they intersect at W.

Find the position vector of W.

$\Delta WRQ \sim \Delta WOP$

$\frac{WR}{WO} = \frac{RQ}{OP} = \frac{3}{5}$

$\frac{WO - OR}{WO} = \frac{3}{5} \Rightarrow 1 - \frac{OR}{WO} = \frac{3}{5} \Rightarrow \frac{OR}{WO} = \frac{2}{5}$

$\Rightarrow WO = \frac{5}{2}OR$

$\Rightarrow \overrightarrow{OW} = \frac{5}{2}\overrightarrow{OR} = \frac{5}{2}a$

..... $\frac{5}{2}a$ ..... [2]