



1 Use your calculator to find  $\sqrt{\frac{45 \times 5.75}{3.1 + 1.5}}$ .

Answer ..... [2]

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2 Work out  $2(3 \times 10^8 - 4 \times 10^6)$ , giving your answer in standard form.

Answer ..... [2]

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3 Write the following in order of size, **largest** first.

$\sin 158^\circ$      $\cos 158^\circ$      $\cos 38^\circ$      $\sin 38^\circ$

Answer ..... > ..... > ..... > ..... [2]

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4 Write down all the working to show that  $\frac{\frac{3}{5} + \frac{2}{3}}{\frac{3}{5} \times \frac{2}{3}} = 3\frac{1}{6}$ .

Answer

[3]

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5 A circle has a radius of 50 cm.

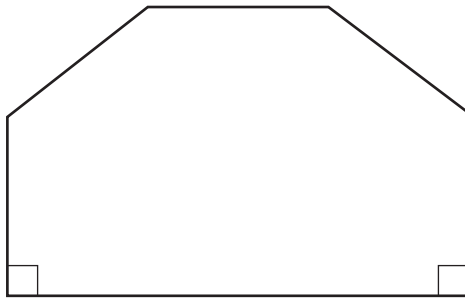
(a) Calculate the area of the circle in  $\text{cm}^2$ .

Answer(a) .....  $\text{cm}^2$  [2]

(b) Write your answer to **part (a)** in  $\text{m}^2$ .

Answer(b) .....  $\text{m}^2$  [1]

6



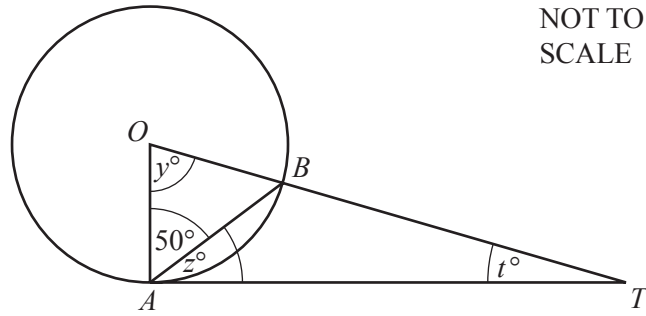
NOT TO  
SCALE

The front of a house is in the shape of a hexagon with two right angles.  
The other four angles are all the same size.

Calculate the size of one of these angles.

Answer ..... [3]

7

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$TA$  is a tangent at  $A$  to the circle, centre  $O$ .  
Angle  $OAB = 50^\circ$ .

Find the value of

(a)  $y$ ,

Answer(a)  $y =$  ..... [1]

(b)  $z$ ,

Answer(b)  $z =$  ..... [1]

(c)  $t$ .

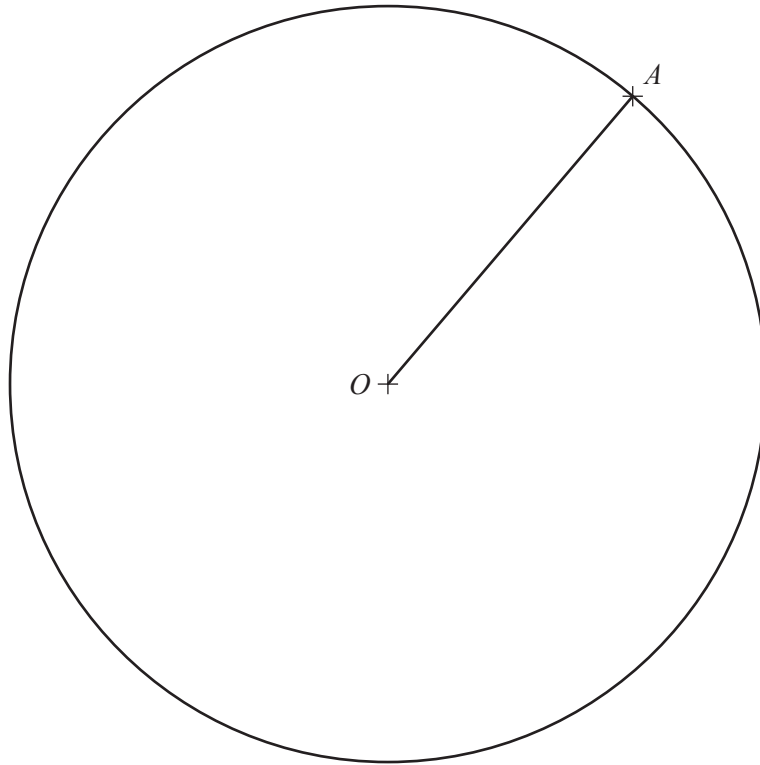
Answer(c)  $t =$  ..... [1]

- 8 Seismic shock waves travel at speed  $v$  through rock of density  $d$ .  
 $v$  varies **inversely** as the **square root** of  $d$ .

$v = 3$  when  $d = 2.25$ .

Find  $v$  when  $d = 2.56$ .

Answer  $v =$  ..... [3]



The point  $A$  lies on the circle centre  $O$ , radius 5 cm.

(a) Using a straight edge and compasses only, construct the perpendicular bisector of the line  $OA$ . [2]

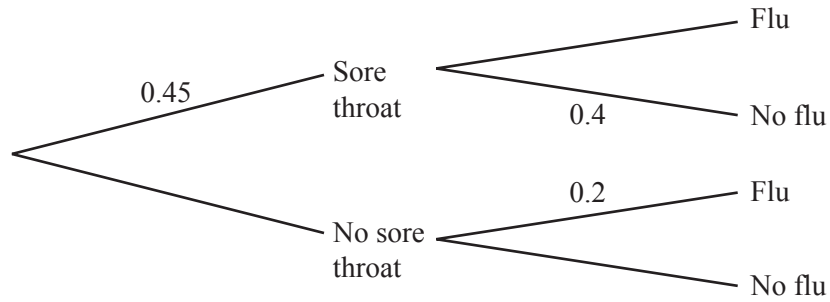
(b) The perpendicular bisector meets the circle at the points  $C$  and  $D$ .

Measure and write down the size of the angle  $AOD$ .

Answer(b) Angle  $AOD$  = ..... [1]

- 10** In a flu epidemic 45% of people have a sore throat.  
 If a person has a sore throat the probability of **not** having flu is 0.4.  
 If a person does not have a sore throat the probability of having flu is 0.2.

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Use*



Calculate the probability that a person chosen at random has flu.

*Answer* ..... [4]

- 11** Work out.

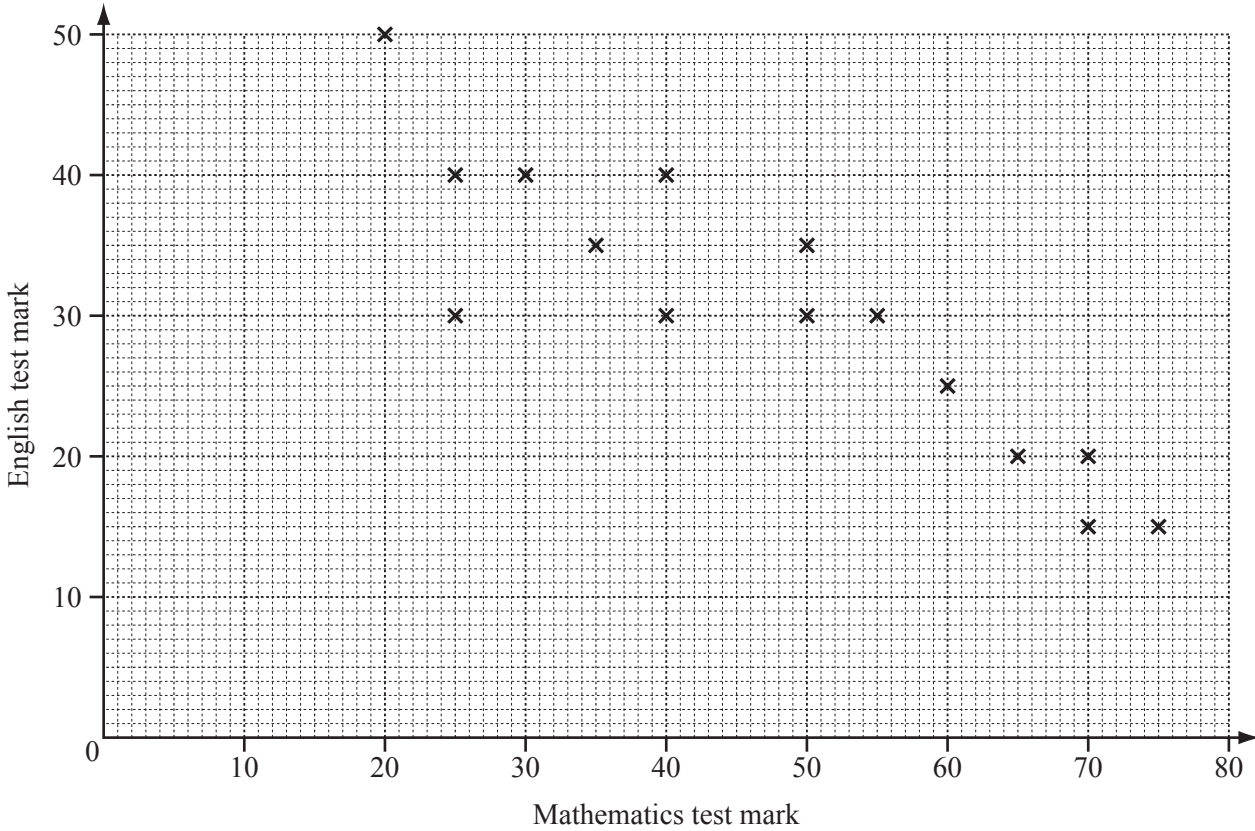
(a)  $\begin{pmatrix} 2 & 1 \\ 4 & 3 \end{pmatrix}^2$

*Answer(a)*  $\begin{pmatrix} & \\ & \end{pmatrix}$  [2]

(b)  $\begin{pmatrix} 2 & 1 \\ 4 & 3 \end{pmatrix}^{-1}$

*Answer(b)*  $\begin{pmatrix} & \\ & \end{pmatrix}$  [2]

12



The scatter diagram shows the marks obtained in a Mathematics test and the marks obtained in an English test by 15 students.

(a) Describe the correlation.

*Answer(a)* ..... [1]

(b) The mean for the Mathematics test is 47.3 .  
The mean for the English test is 30.3 .

Plot the mean point (47.3, 30.3) on the scatter diagram above. [1]

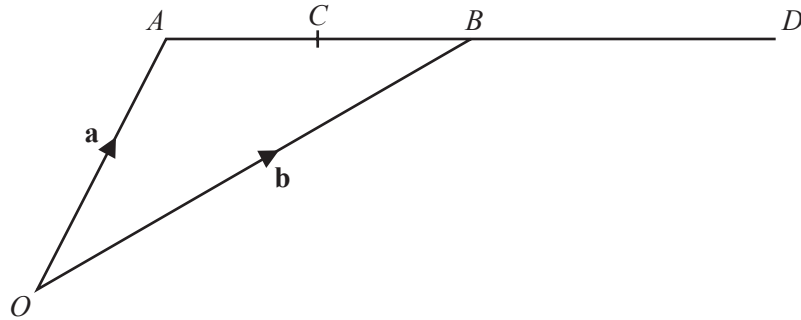
(c) (i) Draw the line of best fit on the diagram above. [1]

(ii) One student missed the English test.  
She received 45 marks in the Mathematics test.

Use your line to estimate the mark she might have gained in the English test.

*Answer(c)(ii)* ..... [1]

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$A$  and  $B$  have position vectors  $\mathbf{a}$  and  $\mathbf{b}$  relative to the origin  $O$ .  
 $C$  is the midpoint of  $AB$  and  $B$  is the midpoint of  $AD$ .

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

- (a) the position vector of  $C$ ,

Answer(a) ..... [2]

- (b) the vector  $\overrightarrow{CD}$ .

Answer(b) ..... [2]

14

$$T = 2\pi \sqrt{\frac{\ell}{g}}$$

- (a) Find  $T$  when  $g = 9.8$  and  $\ell = 2$ .

Answer(a)  $T =$  ..... [2]

- (b) Make  $g$  the subject of the formula.

Answer(b)  $g =$  ..... [3]

For  
Examiner's  
Use

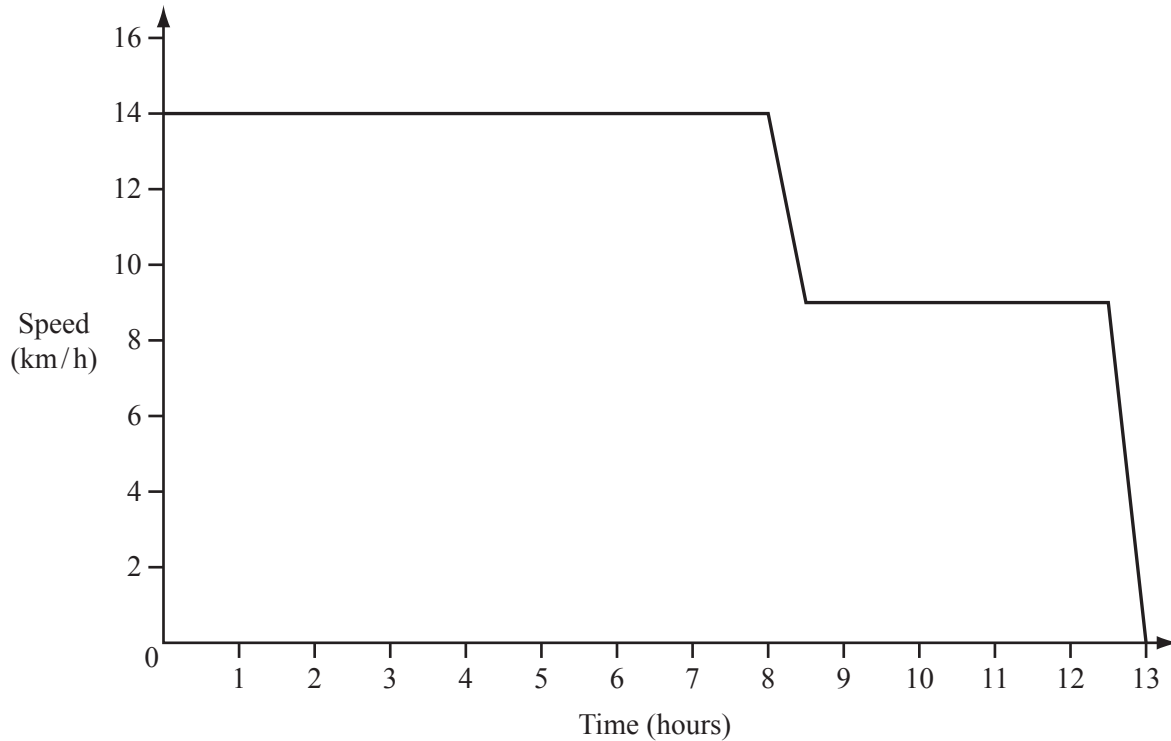


- 15 A container ship travelled at 14 km/h for 8 hours and then slowed down to 9 km/h over a period of 30 minutes.

*For  
Examiner's  
Use*

It travelled at this speed for another 4 hours and then slowed to a stop over 30 minutes.

The speed-time graph shows this voyage.



- (a) Calculate the total distance travelled by the ship.

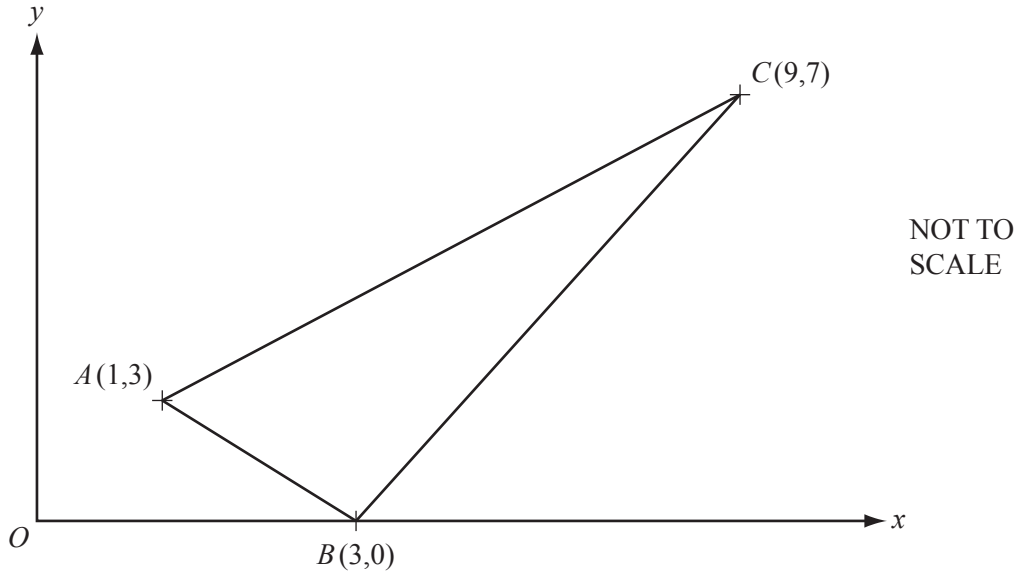
*Answer(a)* ..... km [4]

- (b) Calculate the average speed of the ship for the whole voyage.

*Answer(b)* ..... km/h [1]

16

For  
Examiner's  
Use



The co-ordinates of  $A$ ,  $B$  and  $C$  are shown on the diagram, which is not to scale.

(a) Find the length of the line  $AB$ .

Answer(a)  $AB =$  ..... [3]

(b) Find the equation of the line  $AC$ .

Answer(b) ..... [3]

---

17

$$f(x) = \frac{1}{x+4} \quad (x \neq -4)$$

$$g(x) = x^2 - 3x$$

$$h(x) = x^3 + 1$$

(a) Work out  $fg(1)$ .

Answer(a) ..... [2]

(b) Find  $h^{-1}(x)$ .

Answer(b)  $h^{-1}(x) =$  ..... [2]

(c) Solve the equation  $g(x) = -2$ .

Answer(c)  $x =$  ..... or  $x =$  ..... [3]

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Question 18 is printed on the next page.

18 The first four terms of a sequence are

$$T_1 = 1^2 \quad T_2 = 1^2 + 2^2 \quad T_3 = 1^2 + 2^2 + 3^2 \quad T_4 = 1^2 + 2^2 + 3^2 + 4^2.$$

For  
Examiner's  
Use

(a) The  $n$ th term is given by  $T_n = \frac{1}{6} n(n+1)(2n+1)$ .

Work out the value of  $T_{23}$ .

*Answer(a)*  $T_{23} = \dots\dots\dots$  [2]

(b) A new sequence is formed as follows.

$$U_1 = T_2 - T_1 \quad U_2 = T_3 - T_2 \quad U_3 = T_4 - T_3 \quad \dots\dots$$

(i) Find the values of  $U_1$  and  $U_2$ .

*Answer(b)(i)*  $U_1 = \dots\dots\dots$  and  $U_2 = \dots\dots\dots$  [2]

(ii) Write down a formula for the  $n$ th term,  $U_n$ .

*Answer(b)(ii)*  $U_n = \dots\dots\dots$  [1]

(c) The first four terms of another sequence are

$$V_1 = 2^2 \quad V_2 = 2^2 + 4^2 \quad V_3 = 2^2 + 4^2 + 6^2 \quad V_4 = 2^2 + 4^2 + 6^2 + 8^2.$$

By comparing this sequence with the one in **part (a)**, find a formula for the  $n$ th term,  $V_n$ .

*Answer(c)*  $V_n = \dots\dots\dots$  [2]

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