1. Express 882 as a product of prime numbers in index form.

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2. Find, to the nearest penny, the compound interest when £2000 is invested at 6% per annum for 3 years.

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3. The masses of 90 pupils were measured to the nearest kilogram. The table shows a grouped frequency distribution of the results.

Mass, m (to the nearest kg)	Number of pupils
$30 \leqslant m < 40$	3
$40 \leqslant m < 50$	24
$50 \leqslant m < 60$	30
$60 \leqslant m < 70$	22
$70 \leqslant m < 80$	11

Find an estimate for the mean mass of the pupils.

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4.

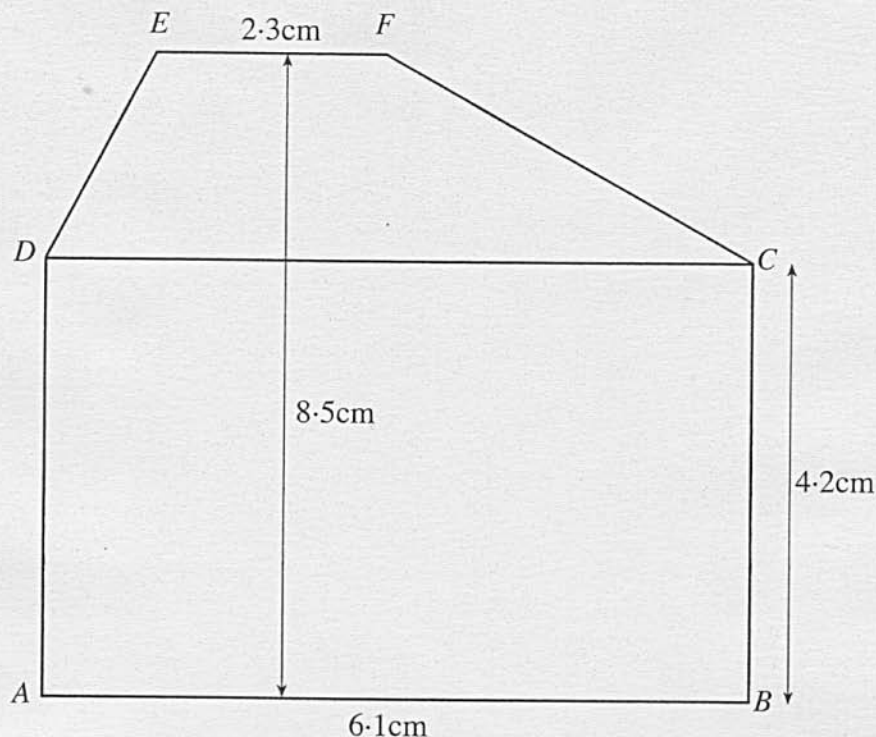*Diagram not drawn to scale.*

ABCFED represents the uniform cross-section of a solid block of material. ABCD is a rectangle in which AB = 6·1 cm and BC = 4·2 cm. EF is of length 2·3 cm and is parallel to AB. The distance between EF and AB is 8·5 cm.

(a) Calculate the area of cross-section of the block.

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(b) The block has this uniform cross-section along its length of 12·6 cm and has a mass of 2 kg. Calculate the density, in g/cm³, of the material from which the block is made.

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5. A solution to the equation

$$x^3 + 6x - 60 = 0$$

lies between 3 and 4.

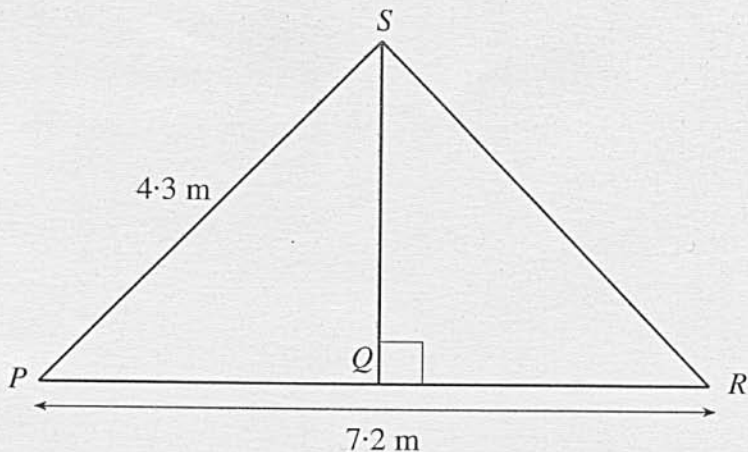Use the method of trial and improvement to find this solution correct to one decimal place.

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6.

Diagram not drawn to scale.

PQRS represents the symmetrical cross-section of the roof of a house, where *SQ* is perpendicular to *PR* and *Q* is the mid-point of *PR*. The width of the house, *PR*, is 7·2 m and the length of the rafter, *PS*, is 4·3 m. Calculate the height *SQ*.

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[3]

7. Solve the following simultaneous equations by an algebraic (not graphical) method.
Show all your working.

$$4x + 5y = -5$$
$$6x + 4y = 3$$

[4]

8. (a) Write **each** of the following numbers in standard form.

   (i) 73 400 000

   [1]

   (ii) 0·00054

   [1]

   (b) Find, in standard form, the value of

   $$(3·6 \times 10^5) \div (7·8 \times 10^{-6}).$$

   [2]

9. (a) The angle of elevation of the top of a building from a point 75 m horizontally from the foot of the building is 48°. Calculate the height of the building, giving your answer to an appropriate degree of accuracy.

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(b) Triangle PQR is right-angled at R. The length of PQ is 35 m and the length of QR is 12 m. Calculate the size of $Q\hat{P}R$.

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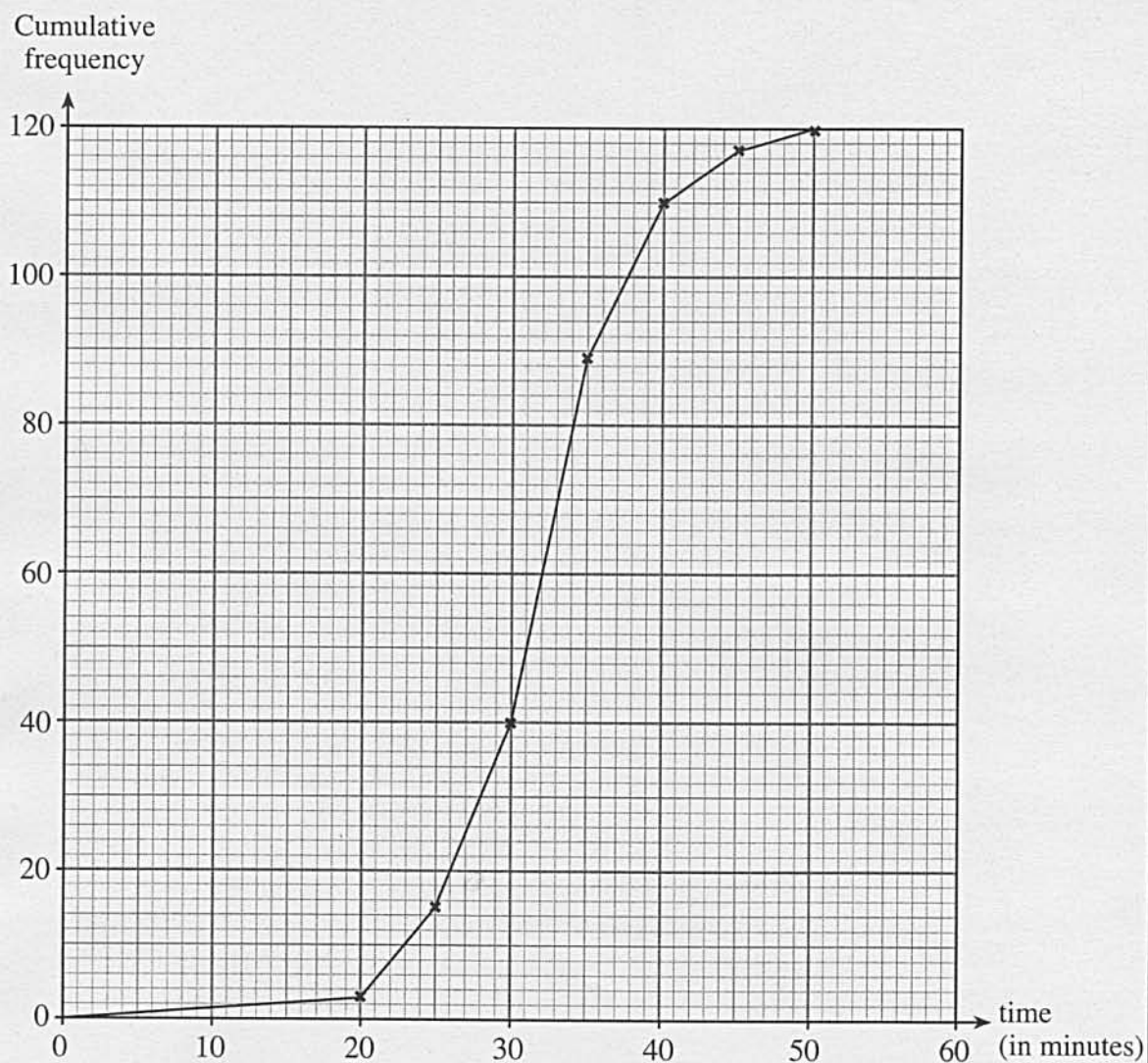...
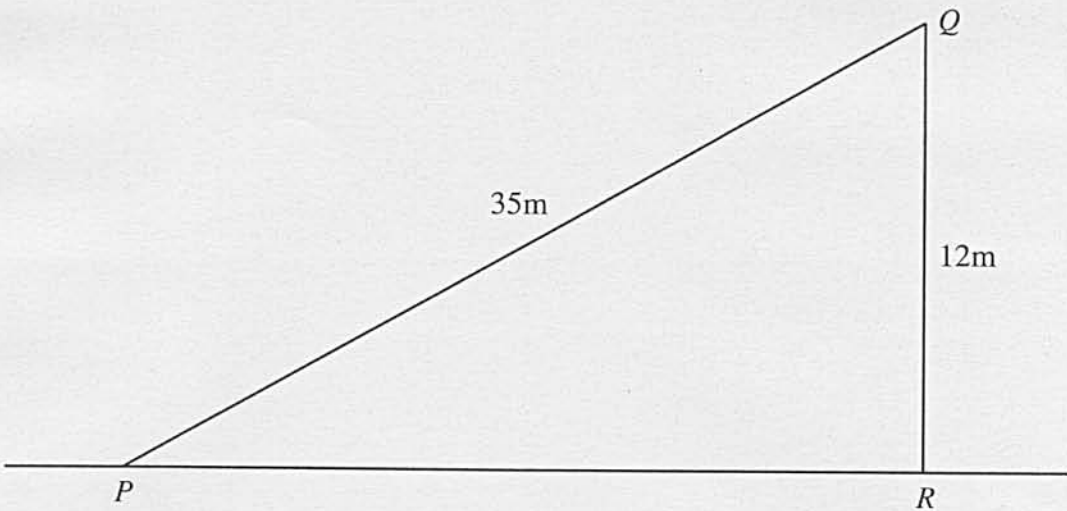
[3]

10. The times taken, in minutes, by 120 people to complete a task were recorded. Below is a cumulative frequency polygon of the results.

Use the cumulative frequency polygon to find

(a) the median time taken to complete the task,

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[1]

(b) how many people took more than 38 minutes to complete the task.

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[2]

11. *(a)* Simplify $2a^5b^2 \times 3a^3b$.

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[2]

(b) Factorise $3a^2 - 6ac$.

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[2]

12. On the graph paper provided on the next page, draw the region which satisfies all of the following inequalities.

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\begin{aligned}
x &\geqslant -3 \\
y &\geqslant 2x - 1 \\
y &\geqslant 0 \\
\text{and} \quad y &\leqslant 3 - x
\end{aligned}
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Make sure that you clearly indicate the region that represents your answer.

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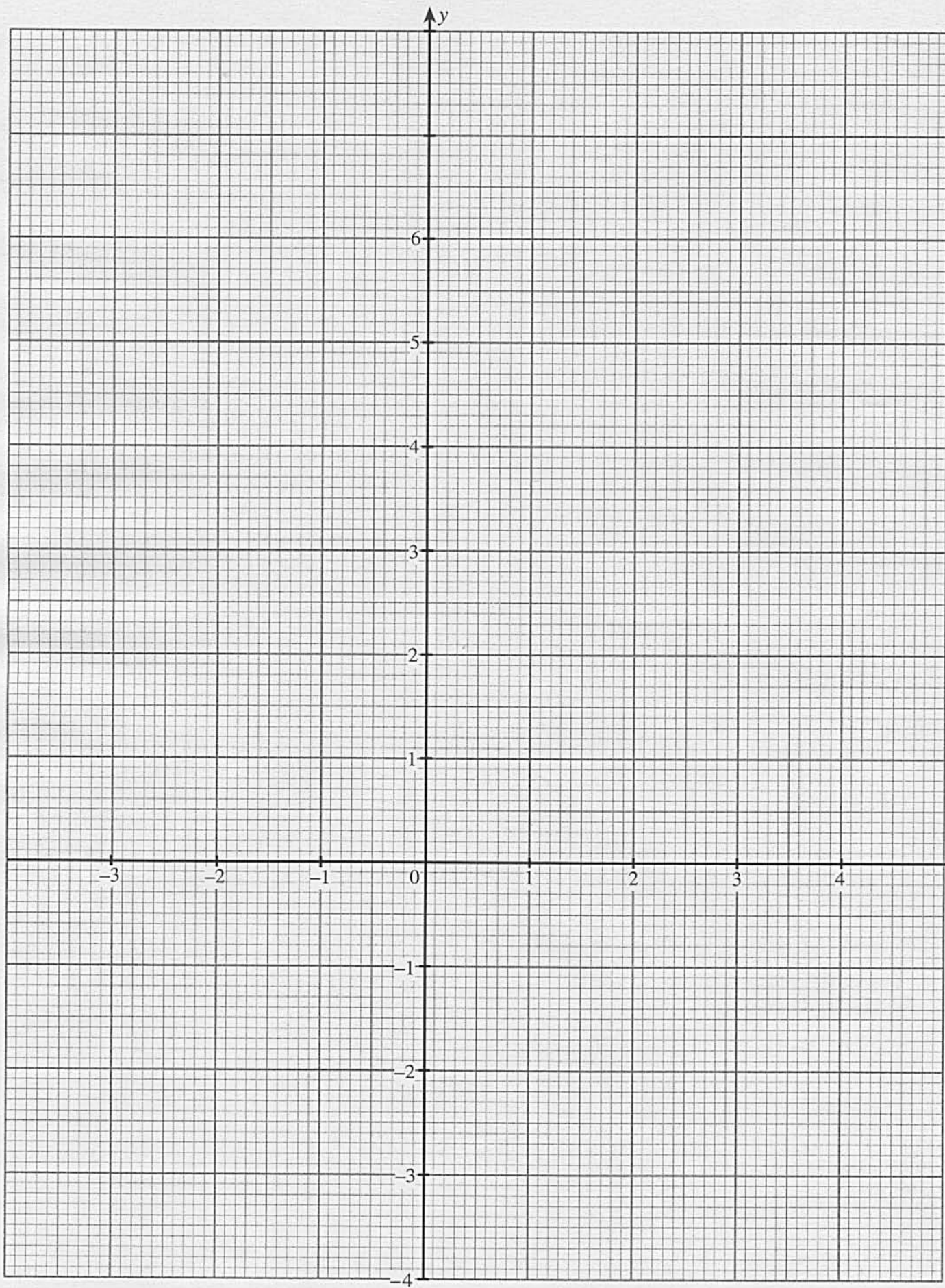
13. *(a)* Using the axes below, **sketch** the graph of $y = \tan x$ for values of x from $-180°$ to $180°$. [3]

y

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x

(b) Find all solutions of the following equation in the range $-180°$ to $180°$.

$$\tan x = -14 \cdot 3$$

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[2]

14. Some of the people visiting a historic site in Wales signed the visitors' book and left their addresses. The table below shows the frequency distribution of the country of origin of this group of visitors.

Country of origin	Number of visitors
Wales	92
England	64
Scotland	22
Ireland	30
France	12

(a) Advertising material is to be sent to some visitors. A random sample of size 20 stratified on the basis of country of origin is to be selected from the above group of visitors for this purpose. Find the number of people from each of the five countries that should be selected for the sample.

[5]

(b) Use the following extract from a table of random digits to show how you would select 8 persons from a list of the 92 visitors from Wales for the sample. Explain your method.

34	45	98	78	13	45	03	65	72	39	92
57	06	34	39	08	99	62	29	81	47	11

[3]

15. Simplify **each** of the following.

(a) $(3x^5y^2)^3$

[2]

(b) $\dfrac{24 \times a^{\frac{5}{2}} \times a^{-\frac{1}{2}}}{8 \times a^4}$

[2]

16. Make e the subject of the following formula.

$$\frac{d(2 + e)}{5 - e} = 3$$

[4]

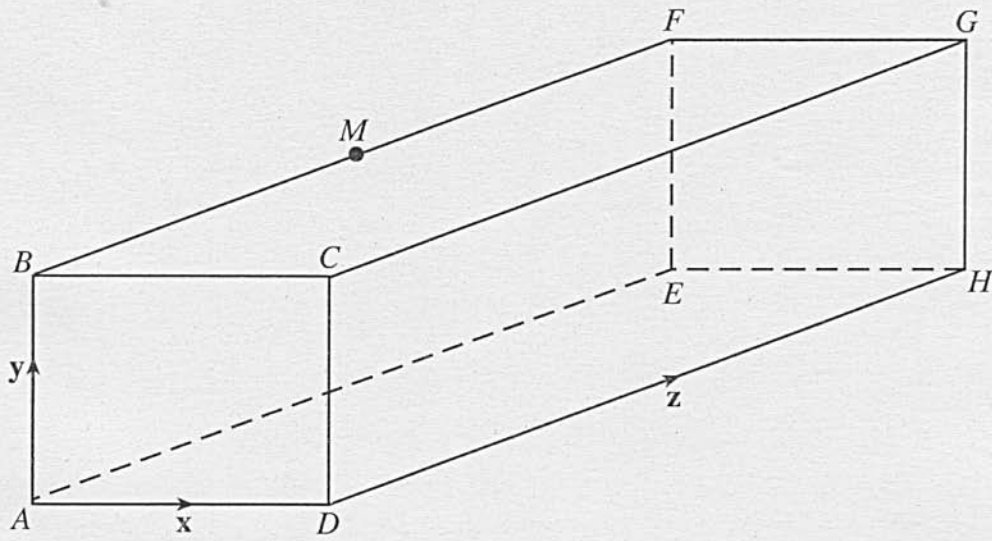**17.** The diagram shows a cuboid *ABCDHGFE* with *M* the mid-point of *BF*.

Diagram not drawn to scale.

Given that **AD** = **x**, **AB** = **y** and **DH** = **z**, express each of the following in terms of **x**, **y** and **z**. Give your answers in the simplest form.

(a) **AC**

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(b) **AM**

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(c) **MH**

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[3]

18. The diagram shows triangle *ABC*.
The point *D* is on the side *BC* of the triangle.
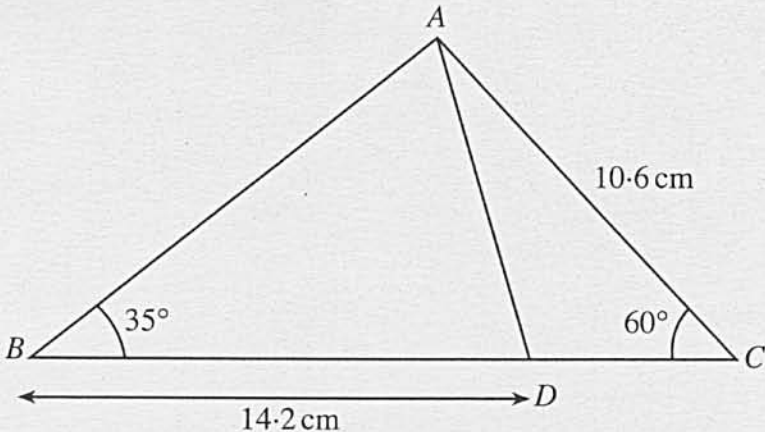
Diagram not drawn to scale.

Given that $A\widehat{B}C = 35°$, $A\widehat{C}B = 60°$, $AC = 10.6\,\text{cm}$ and $BD = 14.2\,\text{cm}$, find the length of *AD*.

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19. The volume of a cuboid with height 8 cm, length $(x + 2)$ cm and width $(x - 5)$ cm is $20 \cdot 6$ cm^3.

(a) Show that x satisfies the equation $8x^2 - 24x - 100 \cdot 6 = 0$.

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(b) Use the formula method to solve the equation $8x^2 - 24x - 100 \cdot 6 = 0$, giving solutions to two decimal places.

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(c) Hence write down the dimensions of the cuboid.

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20. A time of 24·4 seconds, measured to the nearest tenth of a second, was recorded for the winner of a 200 metres race. The race track had been marked out to within an accuracy of ± 0·1%. Explaining clearly your reasoning, calculate the greatest and least possible values of the average speed of the winner, giving your answers in metres per second.

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21. Solve the following equation.

$$\frac{2}{2x+3} + \frac{1}{x+2} = 3.$$

[7]