Cambridge Assessment International Education

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8706246210

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/42**

Paper 4 (Extended) **May/June 2021**

2 hours 15 minutes

You must answer on the question paper.

You will need: Geometrical instruments

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You should use a graphic display calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly and you will be given marks for correct methods, including sketches, even if your answer is incorrect.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.
- For π, use your calculator value.

INFORMATION

- The total mark for this paper is 120.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **24** pages. Any blank pages are indicated.

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Formula List

For the equation $ax^2 + bx + c = 0$ $\quad x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Curved surface area, A, of cylinder of radius r, height h. $\quad A = 2\pi rh$

Curved surface area, A, of cone of radius r, sloping edge l. $\quad A = \pi rl$

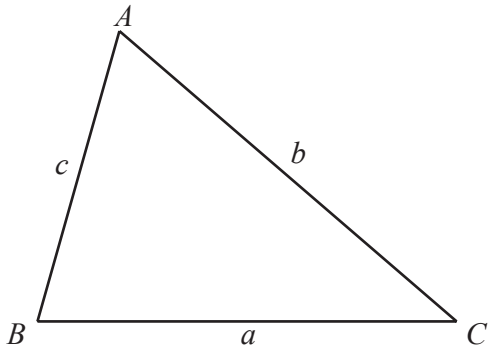
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

Volume, V, of pyramid, base area A, height h. $\quad V = \frac{1}{3}Ah$

Volume, V, of cylinder of radius r, height h. $\quad V = \pi r^2 h$

Volume, V, of cone of radius r, height h. $\quad V = \frac{1}{3}\pi r^2 h$

Volume, V, of sphere of radius r. $\quad V = \frac{4}{3}\pi r^3$



$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc\cos A$$

$$\text{Area} = \frac{1}{2}bc\sin A$$

Answer **all** the questions.

1 Ernst makes chairs.

(a) The total cost of making a chair is \$250.

Total cost = cost of materials + \$26 for each hour worked

Ernst works for $6\frac{1}{2}$ hours to make a chair.

Calculate the cost of the materials as a percentage of the total cost of \$250.

..... % [3]

(b) Ernst sells the chairs to a shop.
The shop makes 24% profit when they sell a chair for \$396.80 .

Calculate the amount the shop pays Ernst for a chair.

\$ ..... [2]

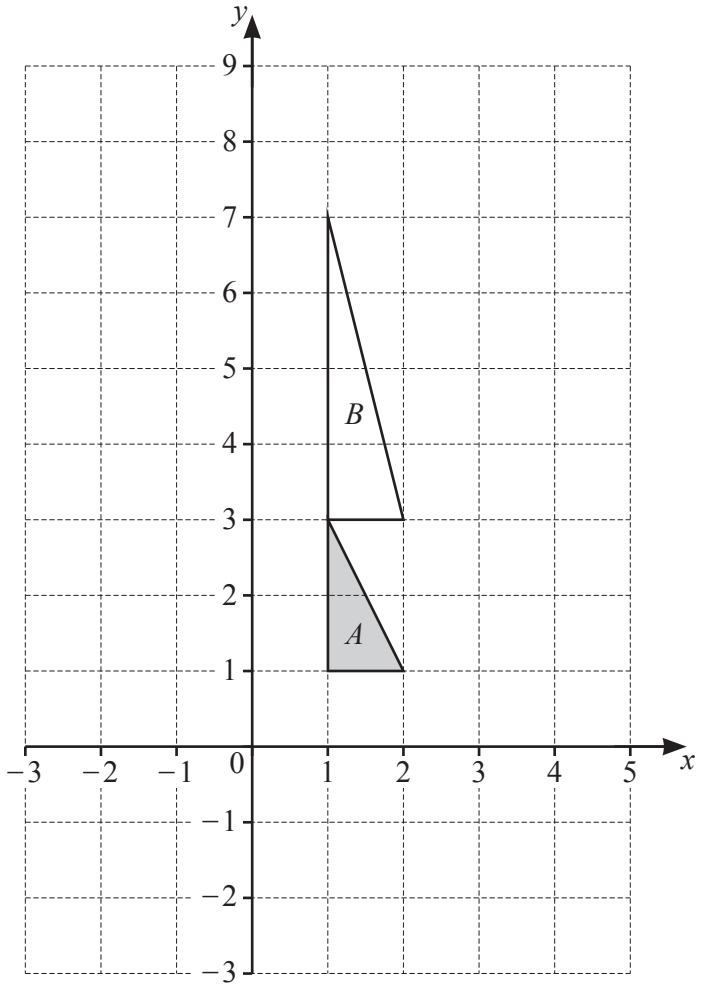
(c) In a sale the shop reduces the price, \$396.80, of each chair by 3% each day until it is sold.

Find the number of days until the price first goes below \$200.

..... [4]

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2 (a)



(i) Rotate triangle A 90° anticlockwise about $(-1, 2)$. [2]

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

.....

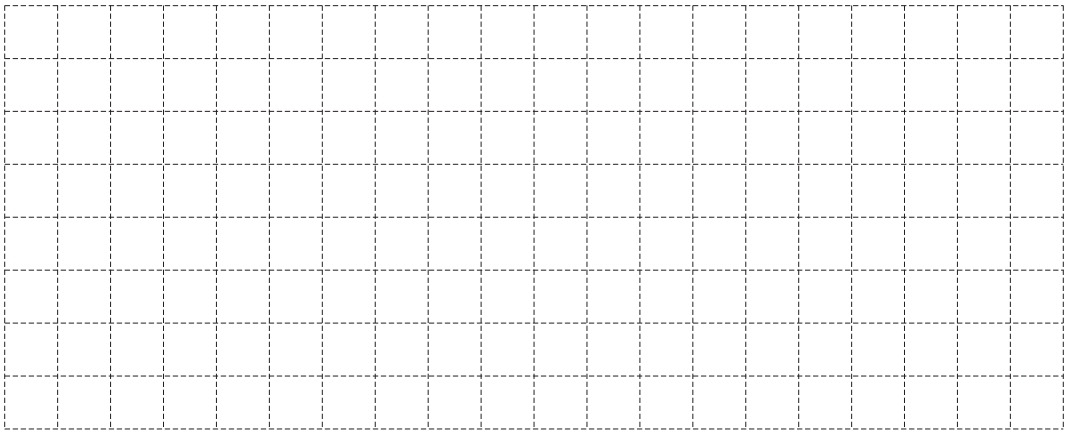
..... [3]

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(b) Describe fully the **single** transformation that is equivalent to

reflection in $x = 3$ followed by reflection in $x = 7$.

You may use the grid below to help you.



.....

..... [2]

3 The table shows the masses of 30 sheep.

Mass, m kg	$60 < m \leqslant 80$	$80 < m \leqslant 100$	$100 < m \leqslant 120$	$120 < m \leqslant 140$
Frequency	8	3	12	7

(a) Write down the modal group.

..... [1]

(b) Write down the class which contains the lower quartile.

..... [1]

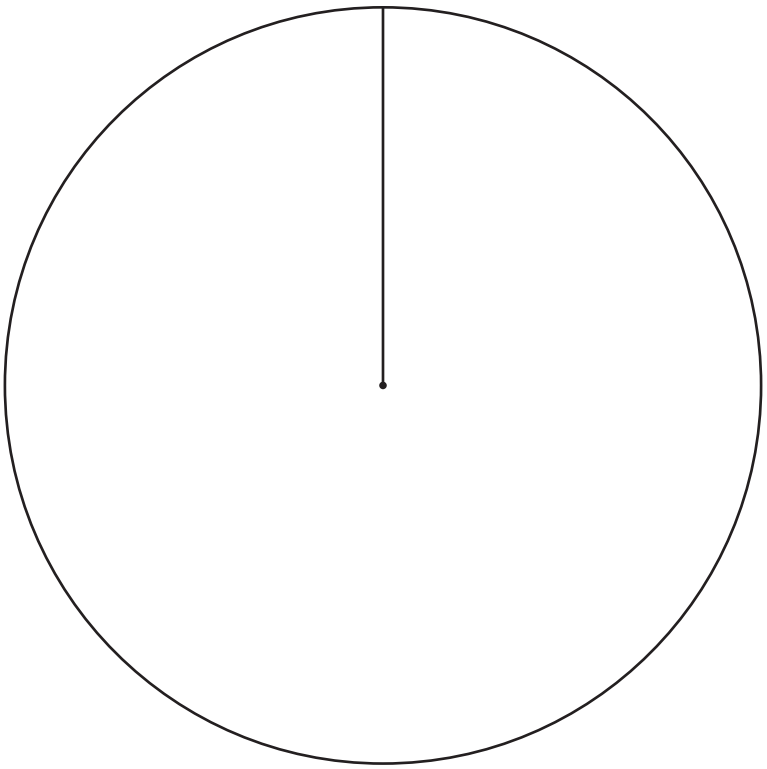
(c) Maria says that the range of masses is 80 kg.

Explain why she is incorrect.

.....

..... [1]

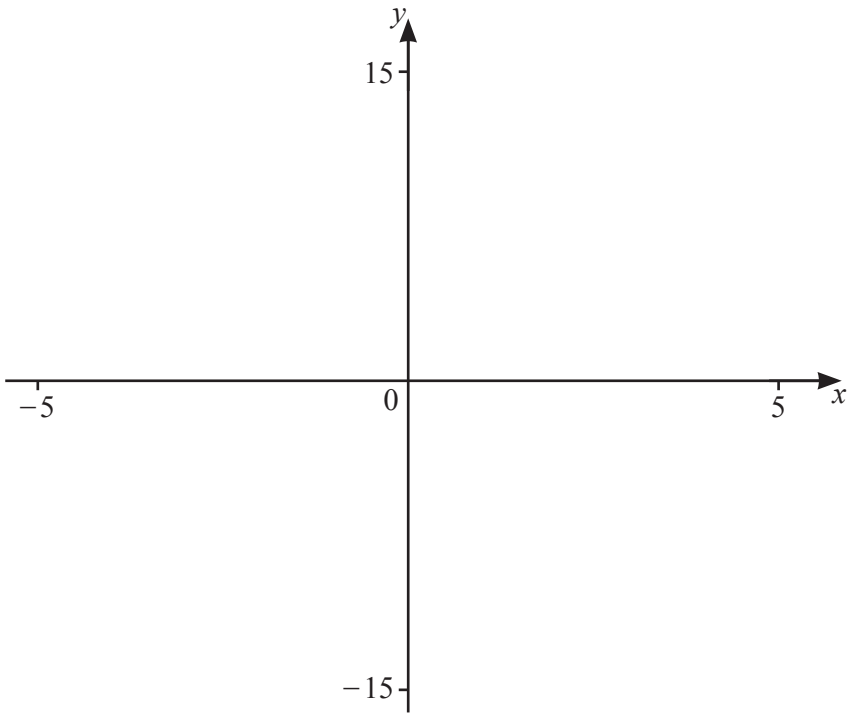
(d) Draw an accurate pie chart to show this information.



[4]

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4



$f(x) = |10 - x^2|$

(a) On the diagram, sketch the graph of $y = f(x)$ for $-5 \leqslant x \leqslant 5$. [2]

(b) Solve the equation $f(x) = 6$.

..... [2]

(c) Solve $f(x) > 6$.

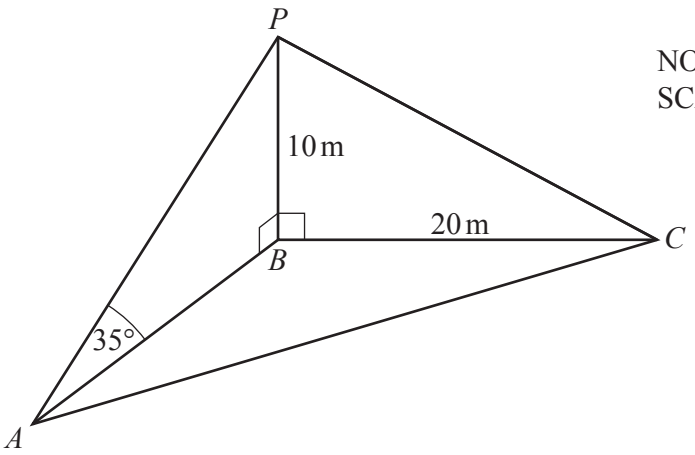
..... [3]

(d) Find the values of k for which $f(x) = k$ has exactly two solutions.

..... [2]

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5



A, *B* and *C* are points on horizontal ground.
BP is a vertical pole.
$BC = 20$ m and $BP = 10$ m.
Angle $PAB = 35°$.

(a) Show that $PC = 22.36$ m correct to 2 decimal places.

[2]

(b) Show that $AB = 14.28$ m correct to 2 decimal places.

[2]

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(c) Calculate AP.

$AP =$ ..... m [2]

(d) Angle $ABC = 125°$.

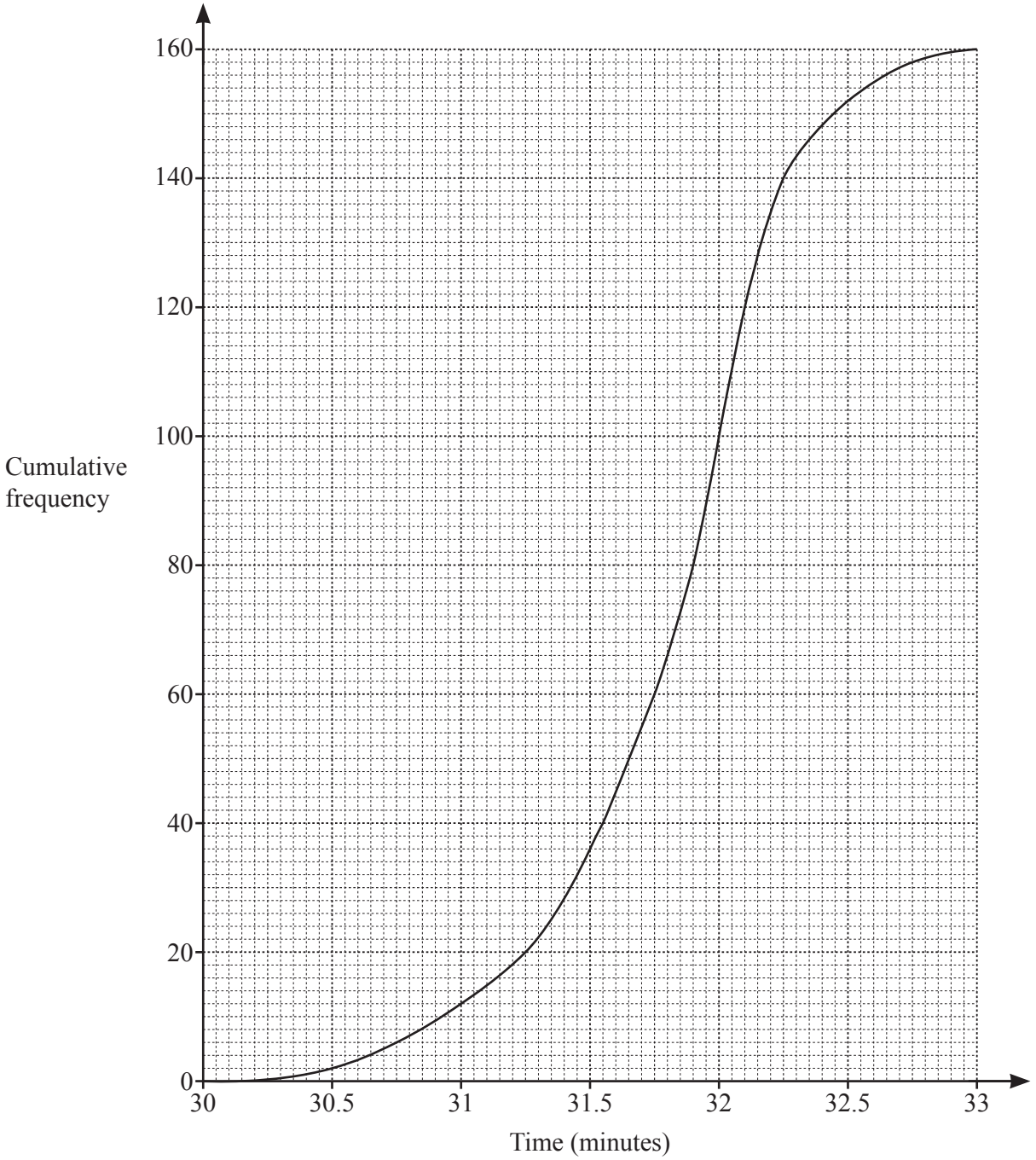
Calculate AC.

$AC =$ ..... m [3]

(e) Calculate angle APC.

Angle $APC =$ ..... [3]

6 The cumulative frequency curve shows the times, in minutes, for runner *A* in 160 races of 10 000 m.



(a) Use the curve to estimate

(i) the median time for runner A,

..... min [1]

(ii) the interquartile range for runner A,

..... min [2]

(iii) the 80th percentile for runner A.

..... min [2]

(b) In the same 160 races, runner B has a median time of 31.7 minutes and an interquartile range of 1 minute.
One of the runners is to be selected for a team.

(i) Give one reason why it may be better to select runner B.

..... [1]

(ii) Give one reason why it may be better to select runner A.

..... [1]

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7 Roisin drives 250 km.
She drives the first 200 km at an average speed of x km/h.

(a) Write down an expression for the time, in hours, it takes to drive the 200 km.

..... h [1]

(b) For the remainder of the journey, Roisin is in heavy traffic and her average speed is 40 km/h less than for the first 200 km.

The total time for the journey is $3\frac{1}{2}$ hours.

Show that $7x^2 - 780x + 16000 = 0$.

[4]

(c) Solve the equation $7x^2 - 780x + 16000 = 0$ to find the time taken to travel the first 200 km.
Give your answer in hours and minutes correct to the nearest minute.

..... h ..... min [5]

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8 **(a)** y is inversely proportional to the square root of x.
When $x = 25$, $y = 0.05$.

(i) Show that $y = \frac{1}{4\sqrt{x}}$.

[2]

(ii) Find y when $x = 9$.

..... [1]

(iii) Find x in terms of y.

$x =$ ..... [2]

(iv) Find x when $y = \frac{1}{2}$.

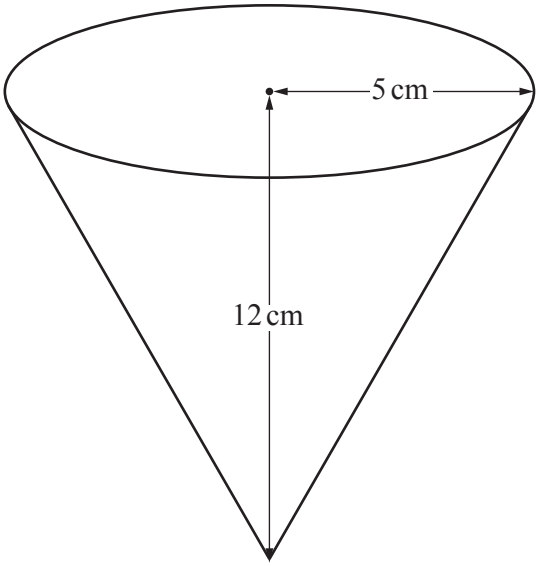
..... [1]

(b) b is inversely proportional to a^3.
When $a = P$, $b = 24$.

Find b when $a = 2P$.

..... [2]

9



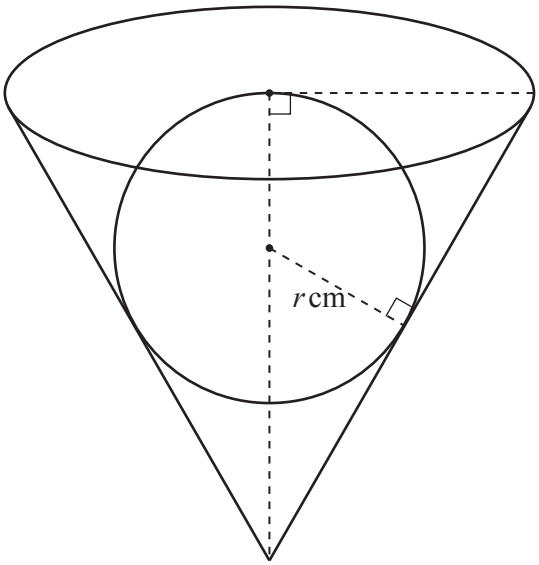
NOT TO SCALE

The diagram shows a cup in the shape of a cone.

(a) Calculate the curved surface area of the cup.

..... cm^2 [3]

(b) The cup is filled with water.
A metal sphere of radius r cm is lowered into the cup.
The top of the sphere is level with the surface of the water.



NOT TO SCALE

(i) Use similar triangles to show that $r = 3.33$ cm correct to 3 significant figures.

[3]

(ii) Calculate the volume of the water in the cup.

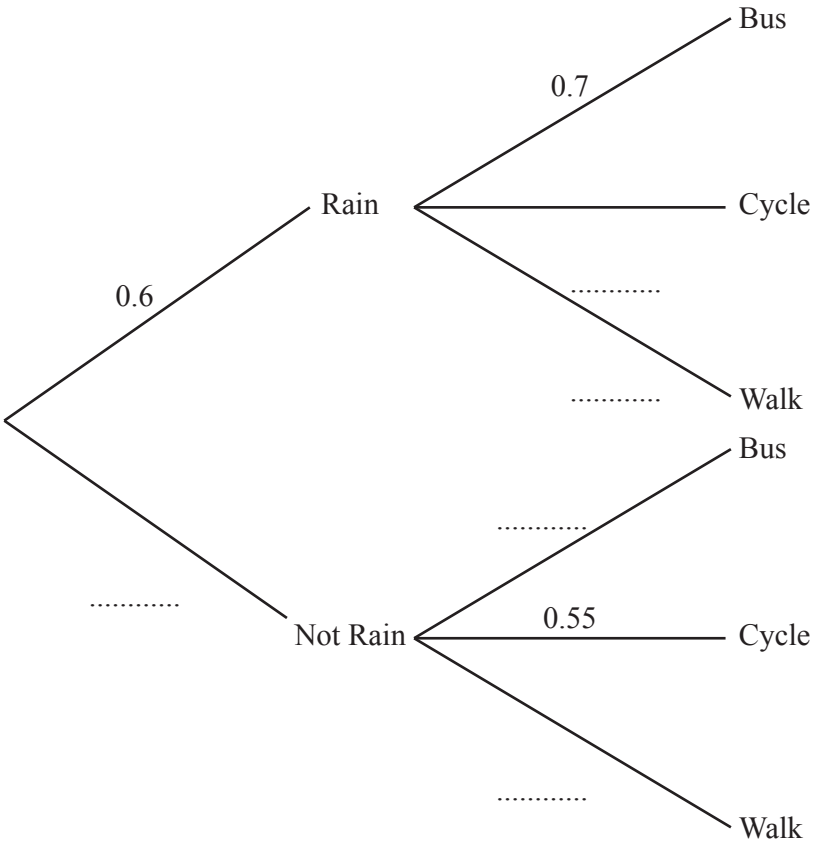
..... cm^3 [3]

10 Hua travels to school by bus or she cycles or she walks.

If it rains, the probability that she travels by bus is 0.7 and the probability that she cycles is 0.25 .
If it does not rain, the probability that she cycles is 0.55 and the probability that she walks is 0.25 .

On any day, the probability that it rains is 0.6 .

(a) Complete the tree diagram to show the probabilities of the three methods of travel.



[2]

(b) Calculate the probability that, on any day,

(i) Hua walks to school,

..... [3]

(ii) Hua does not cycle.

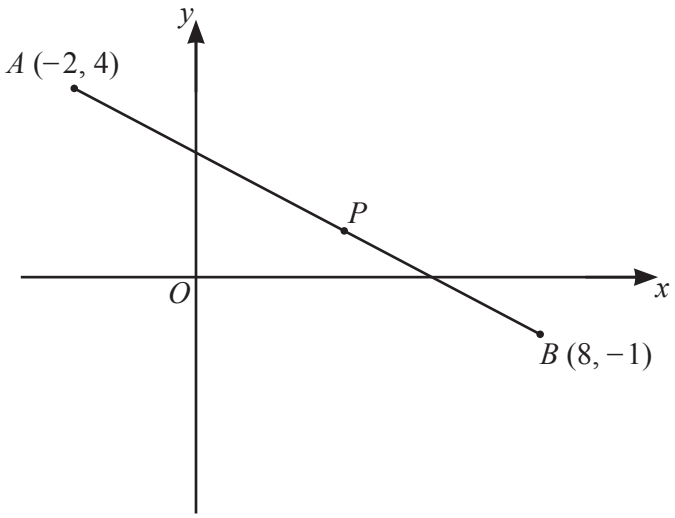
..... [3]

(c) Last week it rained every day of the 5 school days.

Calculate the probability that Hua travelled by bus on exactly 4 of the 5 days.

..... [3]

11



NOT TO SCALE

A is the point $(-2, 4)$ and B is the point $(8, -1)$.
P divides AB in the ratio 3 : 2.

(a) Show that the coordinates of P are $(4, 1)$.

(..... , ...) [2]

(b) The line L is perpendicular to AB and passes through P.

Find the equation of line L.

..... [4]

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(c) The point C has coordinates (6, 5).

Show that point C lies on line L.

[1]

(d) (i) Find the distance AB.
Give your answer in surd form.

..... [2]

(ii) Calculate the area of triangle ABC.

..... [3]

12 $f(x) = 2 - 3x$ $\quad g(x) = \dfrac{5}{2-3x}$

(a) Find f(4).

..... [1]

(b) Solve $g(x) = 4$.

..... [3]

(c) Find $f^{-1}(x)$.

$f^{-1}(x) =$ ..... [2]

(d) Find $g(f(x))$.
Write your answer as a single fraction in its simplest form.

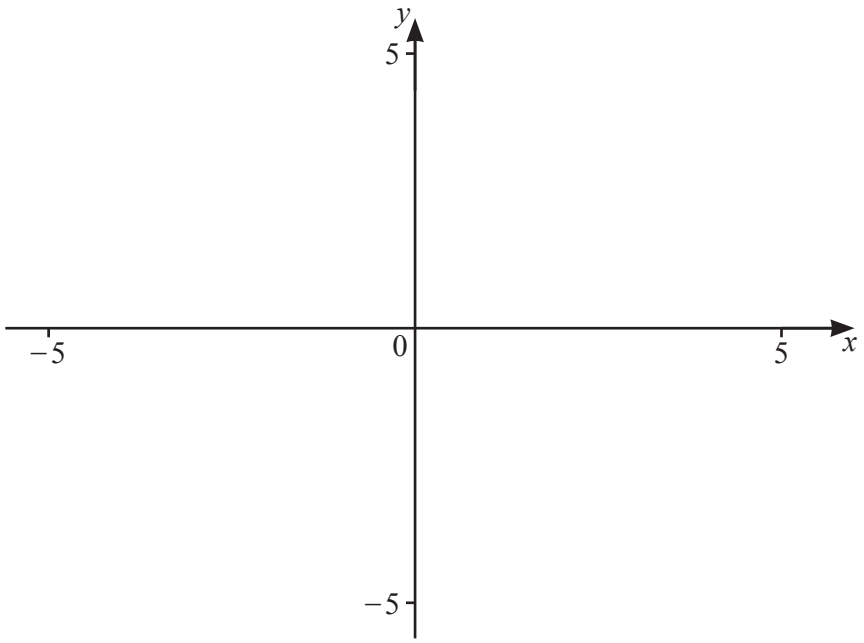
..... [2]

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(e) Find $f(x) - g(x)$.
Write your answer as a single fraction in its simplest form.

..... [3]

13



$$f(x) = \frac{x^2 + 3}{(1 - x)(x + 3)}$$

(a) On the diagram, sketch the graph of $y = f(x)$ for values of x between -5 and 5. [3]

(b) Find the equations of the asymptotes parallel to the y-axis.

..... [2]

(c) Solve $f(x) = 2x + 3$.

..... [3]

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