Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

0048475967

MATHEMATICS **0580/42**

Paper 4 (Extended) **May/June 2014**

2 hours 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Tracing paper (optional)
Geometrical instruments

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
If working is needed for any question it must be shown below that question.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 130.

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **16** printed pages.

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1 Jane and Kate share \$240 in the ratio $5 : 7$.

(a) Show that Kate receives \$140.

Answer(a)

[2]

(b) Jane and Kate each spend \$20.

Find the new ratio Jane's remaining money : Kate's remaining money.
Give your answer in its simplest form.

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

(c) Kate invests \$120 for 5 years at 4% per year simple interest.

Calculate the total amount Kate has after 5 years.

Answer(c) \$ ..... [3]

(d) Jane invests \$80 for 3 years at 4% per year compound interest.

Calculate the total amount Jane has after 3 years.
Give your answer correct to the nearest cent.

Answer(d) \$ ..... [3]

(e) An investment of \$200 for 2 years at 4% per year compound interest is the same as an investment of \$200 for 2 years at r% per year simple interest.

Find the value of r.

Answer(e) r = ... [3]

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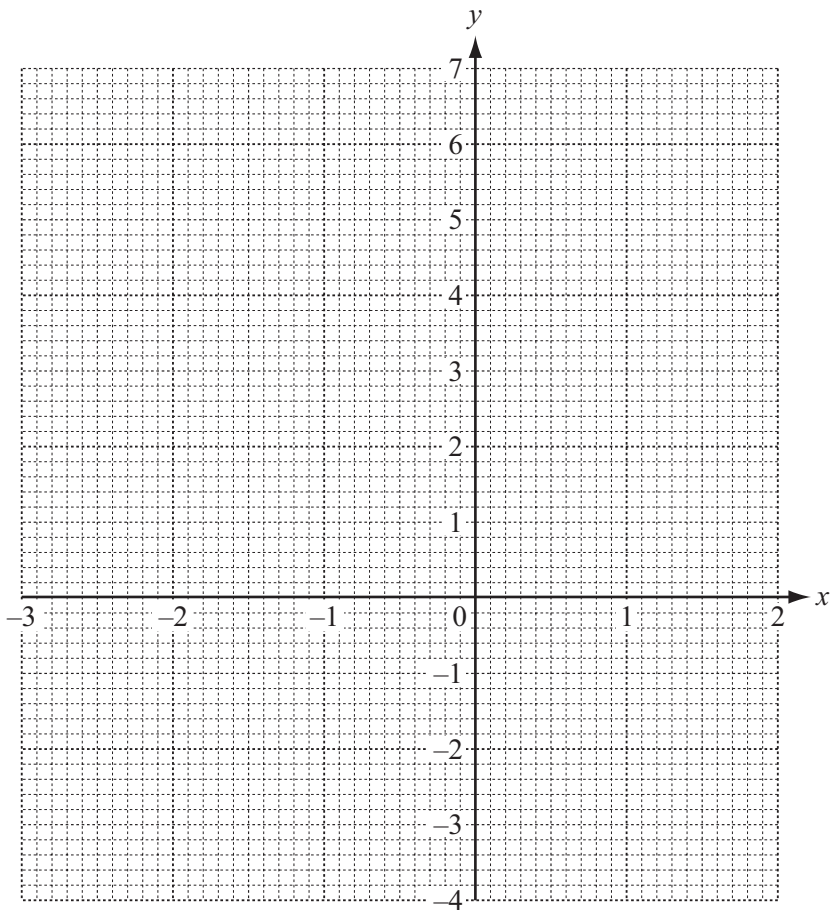
2 $f(x) = \frac{1}{x^2} - 2x$, $x \neq 0$

(a) Complete the table of values for $f(x)$.

x	–3	–2.5	–2	–1.5	–1	–0.5	0.4	0.5	1	1.5	2
$f(x)$	6.1	5.2	4.3	3.4		5	5.5			–2.6	–3.8

[3]

(b) On the grid, draw the graph of $y = f(x)$ for $-3 \leqslant x \leqslant -0.5$ and $0.4 \leqslant x \leqslant 2$.



[5]

(c) Solve the equation $f(x) = 2$.

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

(d) Solve the equation $f(x) = 2x + 3$.

Answer(d) $x =$ ..... [3]

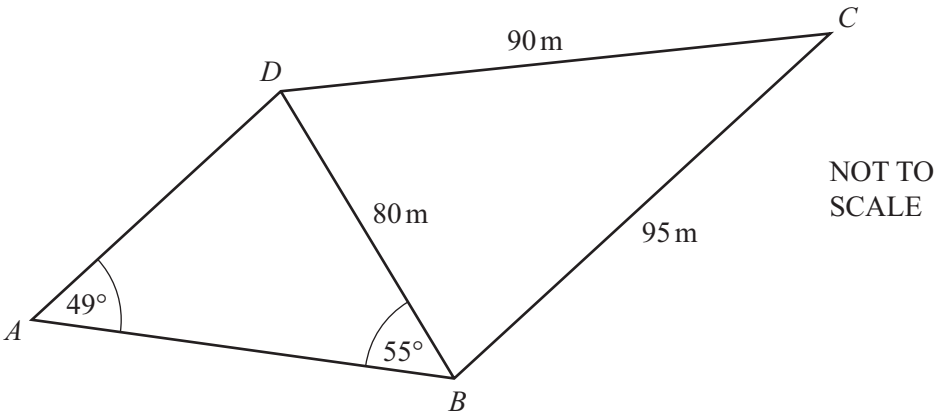
(e) **(i)** Draw the tangent to the graph of $y = f(x)$ at the point where $x = -1.5$. [1]

(ii) Use the tangent to estimate the gradient of the graph of $y = f(x)$ where $x = -1.5$.

Answer(e)(ii) ..... [2]

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3



The diagram shows a quadrilateral $ABCD$.
Angle $BAD = 49°$ and angle $ABD = 55°$.
$BD = 80$ m, $BC = 95$ m and $CD = 90$ m.

(a) Use the sine rule to calculate the length of AD.

Answer(a) $AD =$ ..... m [3]

(b) Use the cosine rule to calculate angle BCD.

Answer(b) Angle $BCD =$ ..... [4]

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(c) Calculate the area of the quadrilateral *ABCD*.

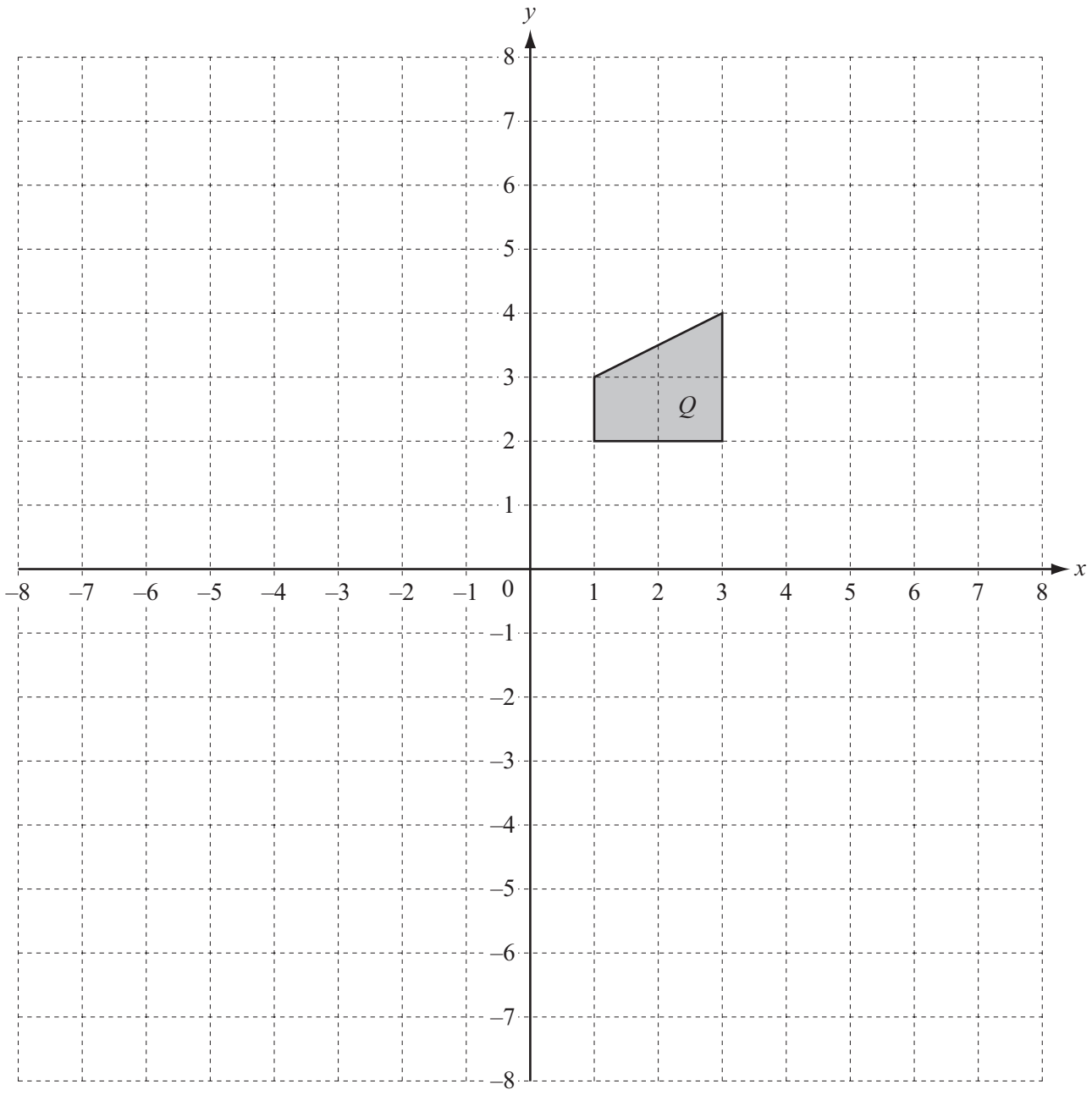
Answer(c) ..... m^2 [3]

(d) The quadrilateral represents a field.
Corn seeds are sown across the whole field at a cost of $3250 per hectare.

Calculate the cost of the corn seeds used.
1 hectare = 10 000 m^2

Answer(d) $ ..... [3]

4



(a) Draw the reflection of shape Q in the line $x = -1$. [2]

(b) **(i)** Draw the enlargement of shape Q, centre (0, 0), scale factor -2. [2]

(ii) Find the 2×2 matrix that represents an enlargement, centre (0, 0), scale factor -2.

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

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(c) (i) Draw the stretch of shape Q, factor 2, x-axis invariant. [2]

(ii) Find the 2×2 matrix that represents a stretch, factor 2, x-axis invariant.

Answer(c)(ii) $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

(iii) Find the inverse of the matrix in **part (c)(ii)**.

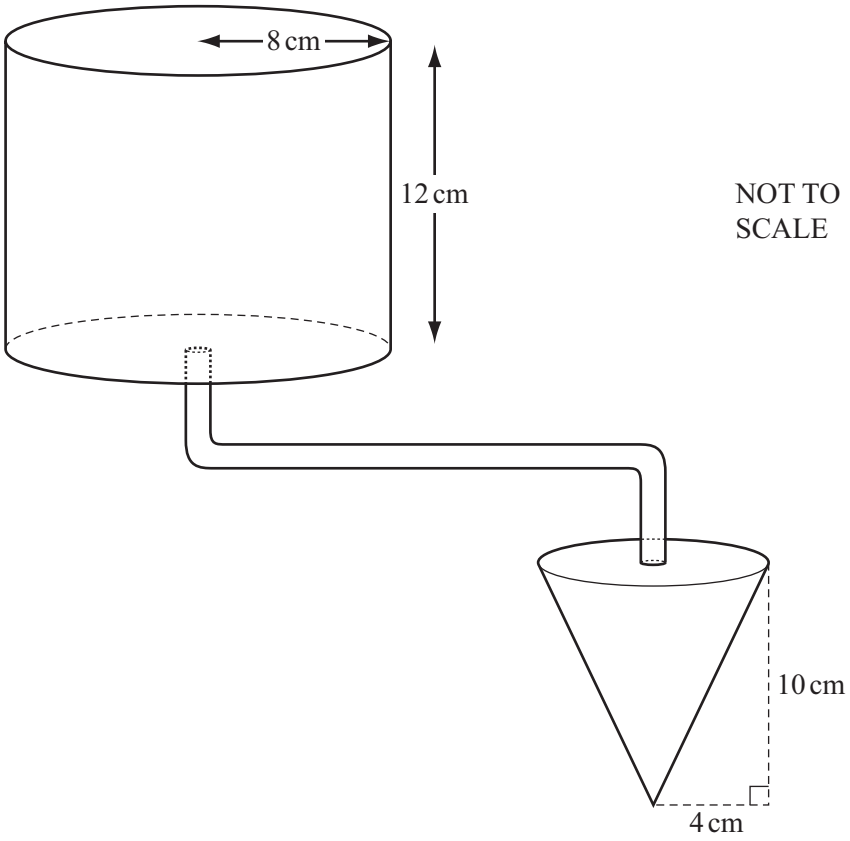
Answer(c)(iii) $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

(iv) Describe fully the **single** transformation represented by the matrix in **part (c)(iii)**.

Answer(c)(iv) .....

..... [3]

5



The diagram shows a cylinder with radius 8 cm and height 12 cm which is full of water.
A pipe connects the cylinder to a cone.
The cone has radius 4 cm and height 10 cm.

(a) (i) Calculate the volume of water in the cylinder.
Show that it rounds to 2410 cm^3 correct to 3 significant figures.

Answer(a)(i)

[2]

(ii) Change 2410 cm^3 into litres.

Answer(a)(ii) ..... litres [1]

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(b) Water flows from the cylinder along the pipe into the cone at a rate of $2\,cm^3$ per second.

Calculate the time taken to fill the empty cone.
Give your answer in minutes and seconds correct to the nearest second.

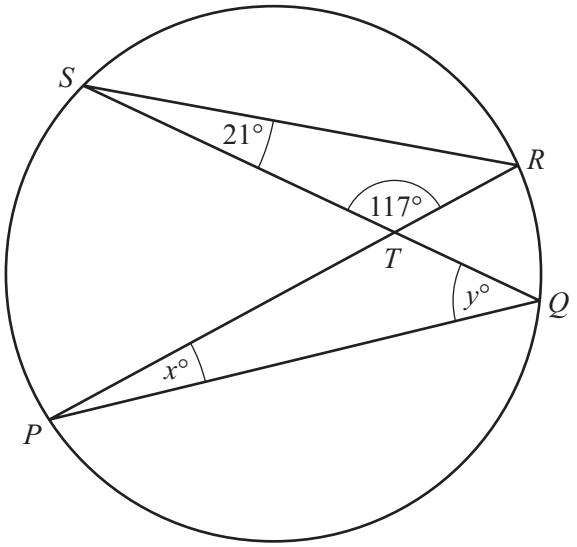
[The volume, V, of a cone with radius r and height h is $V = \frac{1}{3}\pi r^2 h$.]

Answer(b) ..... min ..... s [4]

(c) Find the number of empty cones which can be filled completely from the full cylinder.

Answer(c) ..... [3]

6



NOT TO SCALE

(a) The chords PR and SQ of the circle intersect at T.
Angle $RST = 21°$ and angle $STR = 117°$.

(i) Find the values of x and y.

Answer(a)(i) $x =$ .....

$y =$ ..... [2]

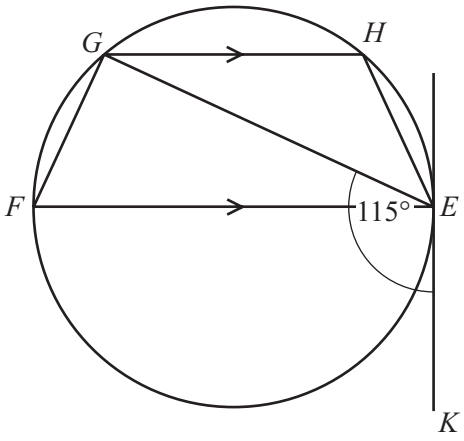
(ii) $SR = 8.23$ cm, $RT = 3.31$ cm and $PQ = 9.43$ cm.

Calculate the length of TQ.

Answer(a)(ii) $TQ =$ ..... cm [2]

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(b) *EFGH* is a cyclic quadrilateral.
EF is a diameter of the circle.
KE is the tangent to the circle at *E*.
GH is parallel to *FE* and angle *KEG* = 115°.

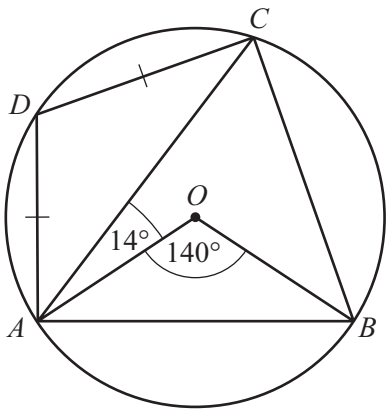


NOT TO SCALE

Calculate angle *GEH*.

Answer(b) Angle *GEH* = ... [4]

(c) *A*, *B*, *C* and *D* are points on the circle centre *O*.
Angle *AOB* = 140° and angle *OAC* = 14°.
AD = *DC*.

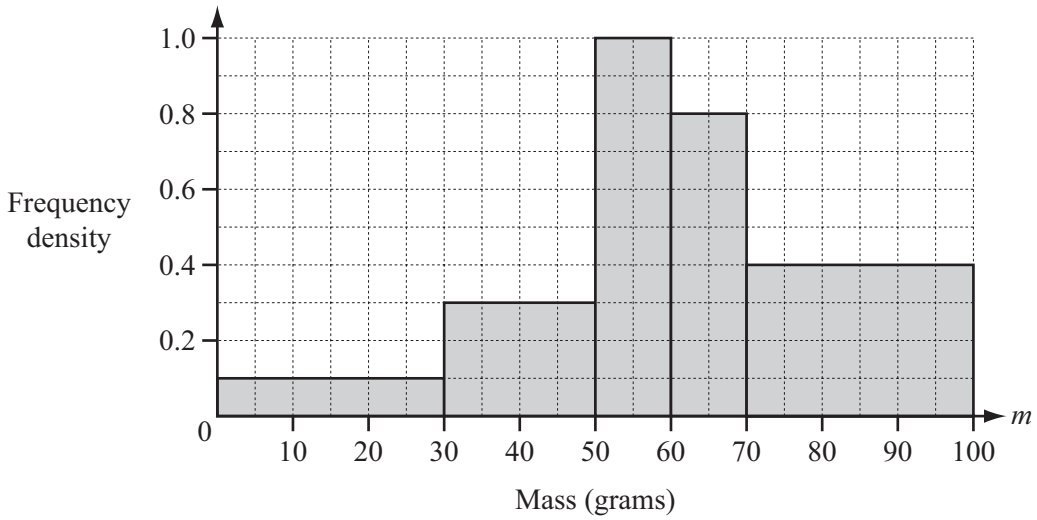


NOT TO SCALE

Calculate angle *ACD*.

Answer(c) Angle *ACD* = ... [5]

7 (a)



The histogram shows some information about the masses (m grams) of 39 apples.

(i) Show that there are 12 apples in the interval $70 < m \leqslant 100$.

Answer(a)(i)

[1]

(ii) Calculate an estimate of the mean mass of the 39 apples.

Answer(a)(ii) ..... g [5]

(b) The mean mass of 20 oranges is 70 g.
One orange is eaten.
The mean mass of the remaining oranges is 70.5 g.

Find the mass of the orange that was eaten.

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

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8 The distance a train travels on a journey is 600 km.

(a) Write down an expression, in terms of x, for the average speed of the train when

(i) the journey takes x hours,

Answer(a)(i) ..... km/h [1]

(ii) the journey takes $(x + 1)$ hours.

Answer(a)(ii) ..... km/h [1]

(b) The difference between the average speeds in **part(a)(i)** and **part(a)(ii)** is 20 km/h.

(i) Show that $x^2 + x - 30 = 0$.

Answer(b)(i)

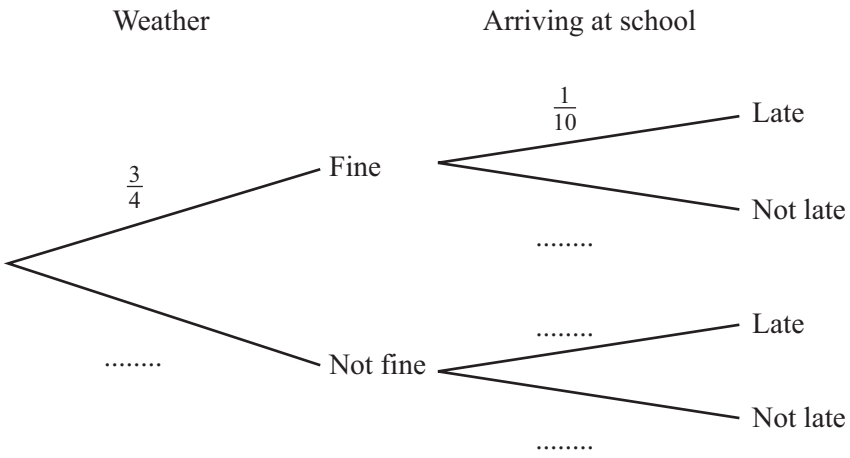
[3]

(ii) Find the average speed of the train for the journey in **part(a)(ii)**.
Show all your working.

Answer(b)(ii) ..... km/h [4]

9 If the weather is fine the probability that Carlos is late arriving at school is $\frac{1}{10}$.
If the weather is not fine the probability that he is late arriving at school is $\frac{1}{3}$.
The probability that the weather is fine on any day is $\frac{3}{4}$.

(a) Complete the tree diagram to show this information.



[3]

(b) In a school term of 60 days, find the number of days the weather is expected to be fine.

Answer(b) ..... [1]

(c) Find the probability that the weather is fine and Carlos is late arriving at school.

Answer(c) ..... [2]

(d) Find the probability that Carlos is not late arriving at school.

Answer(d) ..... [3]

(e) Find the probability that the weather is not fine on at least one day in a school week of 5 days.

Answer(e) ..... [2]

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10 $f(x) = \frac{1}{x}$, $x \neq 0$ $g(x) = 1 - x$ $h(x) = x^2 + 1$

(a) Find $fg\left(\frac{1}{2}\right)$.

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

(b) Find $g^{-1}(x)$, the inverse of $g(x)$.

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

(c) Find $hg(x)$, giving your answer in its simplest form.

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

(d) Find the value of x when $g(x) = 7$.

Answer(d) $x =$ ..... [1]

(e) Solve the equation $h(x) = 3x$.
Show your working and give your answers correct to 2 decimal places.

Answer(e) $x =$ ..... or $x =$ ..... [4]

(f) A function $k(x)$ is its own inverse when $k^{-1}(x) = k(x)$.

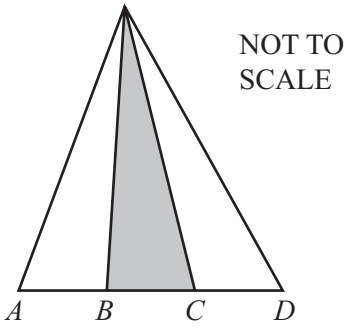
For which of the functions $f(x)$, $g(x)$ and $h(x)$ is this true?

Answer(f) ..... [1]

Question 11 is printed on the next page.

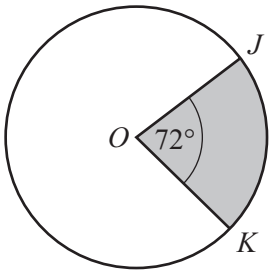
11 The total area of each of the following shapes is X.
The area of the shaded part of each shape is kX.

For each shape, find the value of k and write your answer below each diagram.



$AB = BC = CD$

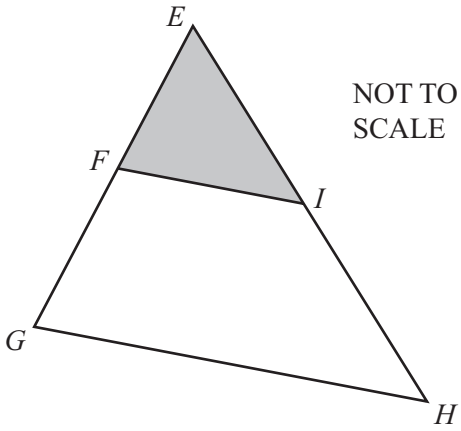
k = ...



NOT TO
SCALE

Angle $JOK = 72°$

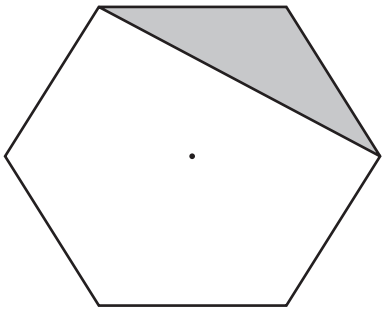
k = ...



NOT TO
SCALE

$EF = FG$ and $EI = IH$

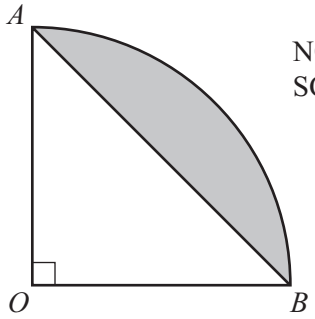
k = ...



NOT TO
SCALE

The shape is a regular hexagon.

k = ...



NOT TO
SCALE

The diagram shows a sector of a circle centre O.
Angle $AOB = 90°$

k = ...

[10]

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