Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	

CENTRE NUMBER		CANDIDATE NUMBER	

7234083009

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/41**

Paper 4 (Extended) **October/November 2017**

2 hours 15 minutes

Candidates answer on the Question Paper.

Additional Materials: Geometrical Instruments
Graphics Calculator

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.
Do not use staples, paper clips, glue or correction fluid.
You may use an HB pencil for any diagrams or graphs.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** the questions.
Unless instructed otherwise, give your answers exactly or correct to three significant figures as appropriate.
Answers in degrees should be given to one decimal place.
For π, use your calculator value.
You must show all the relevant working to gain full marks and you will be given marks for correct methods, including sketches, even if your answer is incorrect.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total number of marks for this paper is 120.

This document consists of **19** printed pages and **1** blank page.

DC (NF/SW) 134061/2

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[Turn over

Formula List

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

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

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

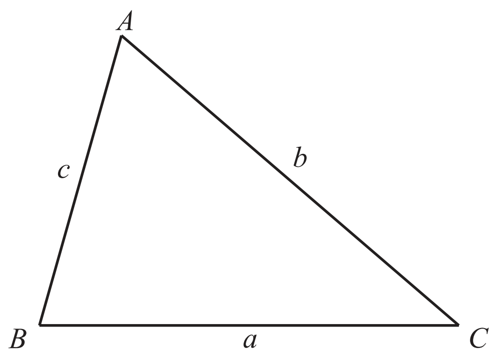
Curved surface area, A, of sphere of radius r. $A = 4\pi r^2$

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

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

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

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



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

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

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

Answer **all** the questions.

1 These are 12 of Stefan's recent homework scores.

10 16 18 11 18 15 8 18 13 9 12 11

(a) Find

(i) the mode,

.... [1]

(ii) the range,

.... [1]

(iii) the median,

.... [1]

(iv) the mean,

.... [1]

(v) the interquartile range.

.... [2]

(b) The teacher wants to compare Stefan's scores with those of another student in the class.

Explain why the mode is not the best value to use to represent Stefan's scores.

....

.... [1]

2 Two banks pay interest in the following ways.

Bank A Simple interest at a rate of 2.5% per year for the first year and then compound interest at a rate of 1.5% per year for each year after that.

Bank B Simple interest at 1.6% per year.

(a) Cherie invested \$3000 in Bank A on 1st January 2016.

Find how much the investment will be worth on 1st January 2019.

\$ .... [3]

(b) Dieter invested \$3000 in Bank B on 1st January 2016.

Find how much the investment will be worth on 1st January 2019.

\$ .... [3]

(c) Show that Cherie's investment will be the first to be worth \$3500.

[4]

3 **(a)** The nth term of a sequence is $n^2 + 3n$.

Find the first four terms of this sequence.

.... , ... , ... , ... [2]

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

5 7 9 11

(i) Write down the next two terms.

.... , ... [1]

(ii) Find the nth term of this sequence.

.... [2]

(c) Using the sequences in **part (a)** and **part (b)**, or otherwise, find the nth term of this sequence.

14, 24, 36, 50, …

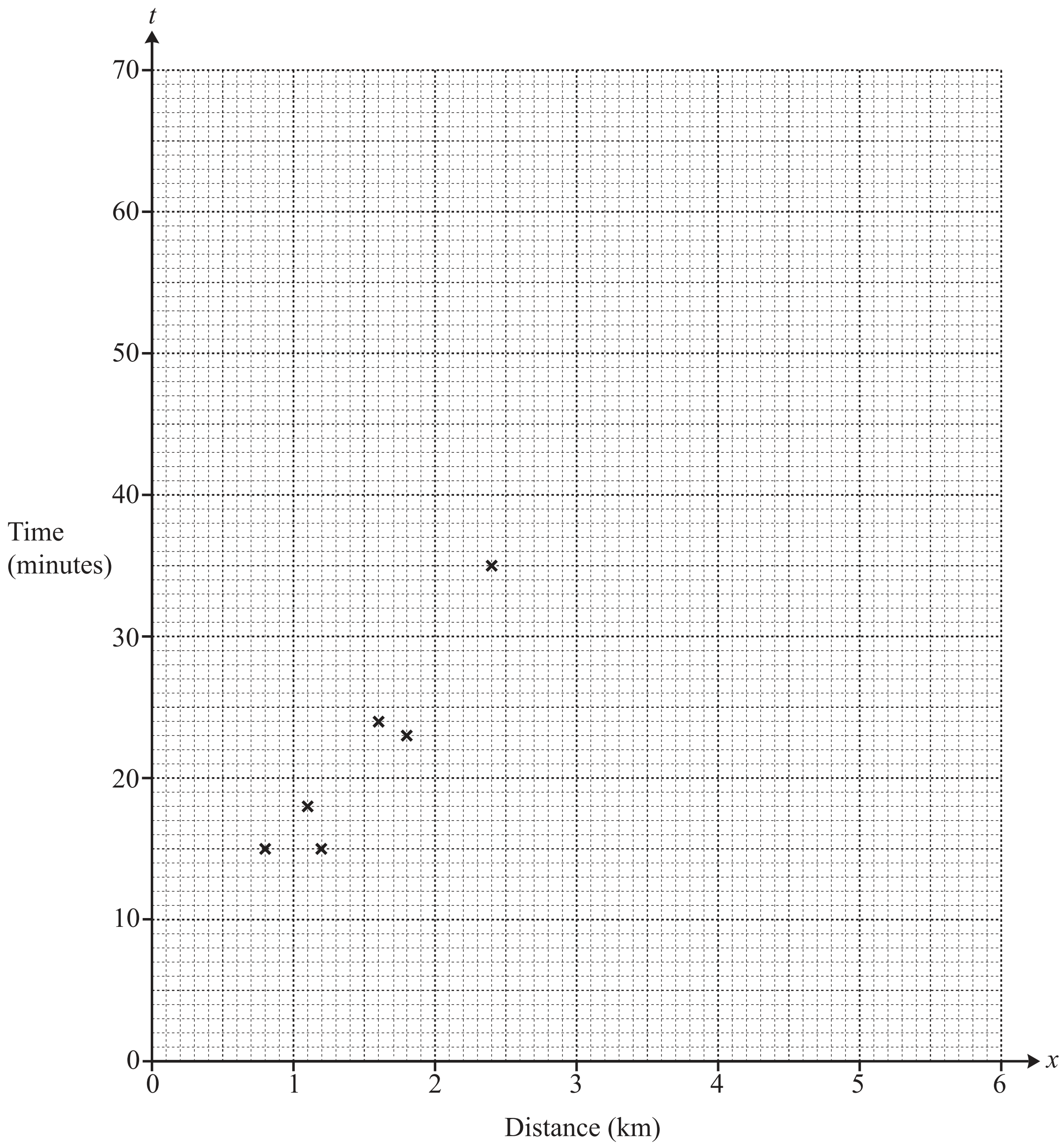
Write your answer as simply as possible.

.... [2]

4 The table shows the distance that each of 12 students lives from school and the time they each take to get to school.

Distance (x km)	0.8	1.1	1.2	1.6	1.8	2.4	2.8	3.1	3.5	4.2	4.7	5.1
Time (t minutes)	15	18	15	24	23	35	37	35	45	48	52	63

(a) Complete the scatter diagram.
The first six points have been plotted for you.



[2]

(b) What type of correlation is shown by the scatter diagram?

.... [1]

(c) **(i)** Find the equation of the regression line in the form $t = mx + c$.

$t =$ .... [2]

(ii) Use your answer to **part (c)(i)** to estimate the time taken to get to school for a student who lives 2.2 km from school.

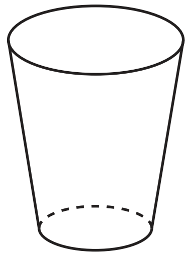
.... min [1]

(iii) Why would it not be sensible to use your answer to **part (c)(i)** to estimate the time taken to get to school for a student who lives 10 km from school?

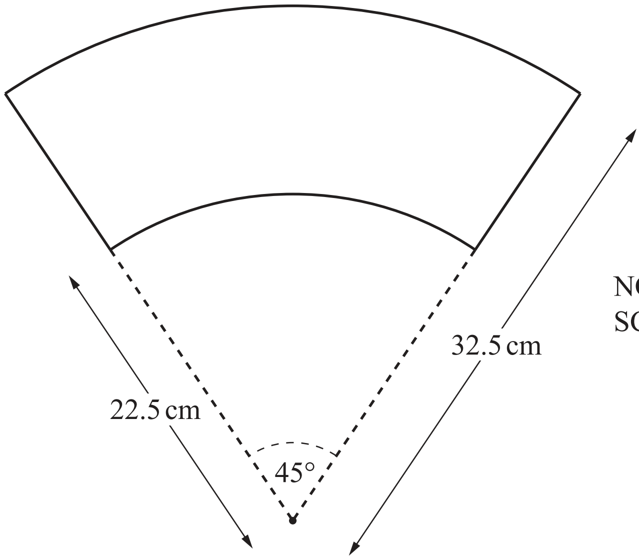
....

.... [1]

5 The diagram shows a paper cup.



The curved surface of the cup is made from a sector of a circle with a smaller sector cut from it, as shown below.



The small sector has radius 22.5 cm and the large sector has radius 32.5 cm.
The sectors have the same centre and both have sector angle 45°.

(a) Show that the radius of the base of the cup is 2.81 cm, correct to 2 decimal places.

[3]

(b) Find the total area of the paper that makes the cup, including the circular base.

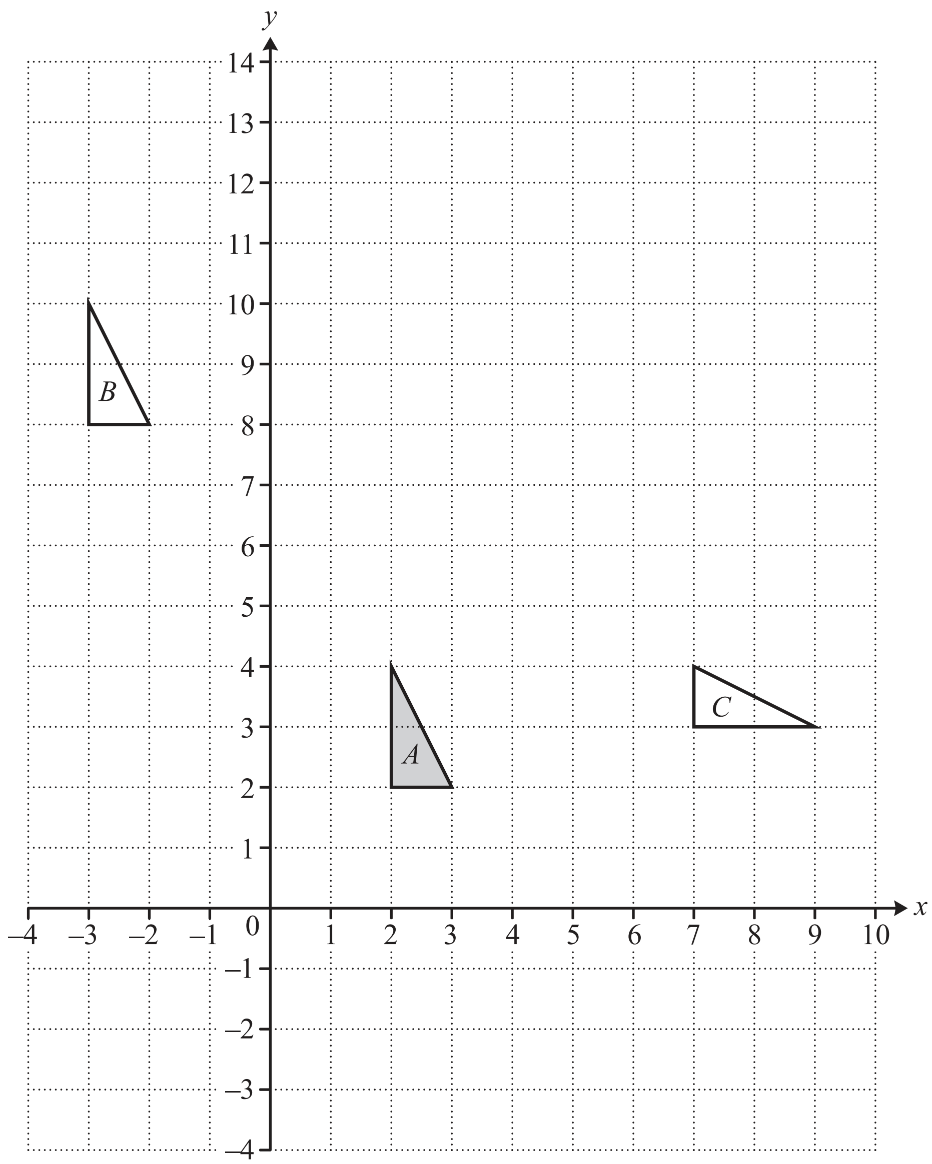
.... cm^2 [5]

(c) A mathematically similar cup holds 8 times as much liquid as this cup.

Find the total area of the paper that makes the larger cup.

.... cm^2 [2]

6



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

....

.... [2]

(b) On the grid, draw the image of triangle A after a stretch with scale factor 3 and invariant line the x-axis. [2]

(c) Triangle A can be mapped onto triangle C by a rotation followed by a reflection.

Complete the following to **fully** describe the two transformations.

Rotation ....

Reflection .... [3]

7 Javier starts a journey at 22 50.

(a) For the first part of the journey he drives for 2 hours 45 minutes at 70 km/h.

Find the distance he travels.

.... km [3]

(b) Javier then stops for 30 minutes.
He then drives the remaining 180 km of his journey at 85 km/h.

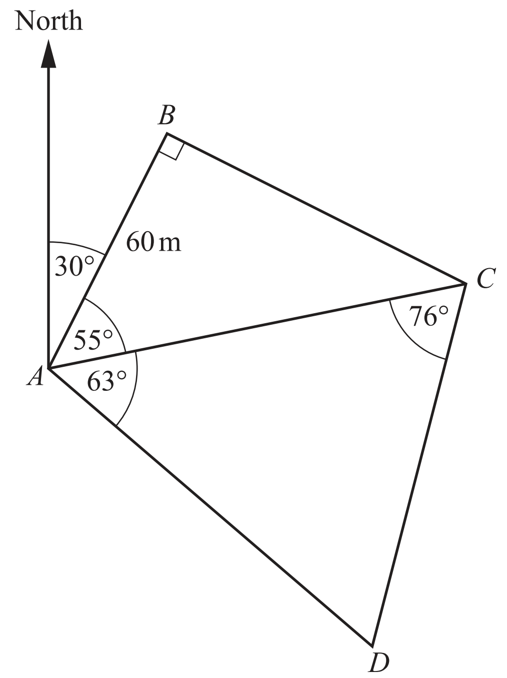
(i) Find his average speed for the whole journey.

.... km/h [4]

(ii) Find the time he arrives at his destination.

.... [2]

8 *ABC* and *ACD* are two triangular fields.



NOT TO SCALE

(a) Find the bearing of *B* from *C*.

.... [3]

(b) Calculate *AC* and show that it rounds to 104.6 m, correct to 1 decimal place.

[3]

(c) Calculate the total area of the two fields.

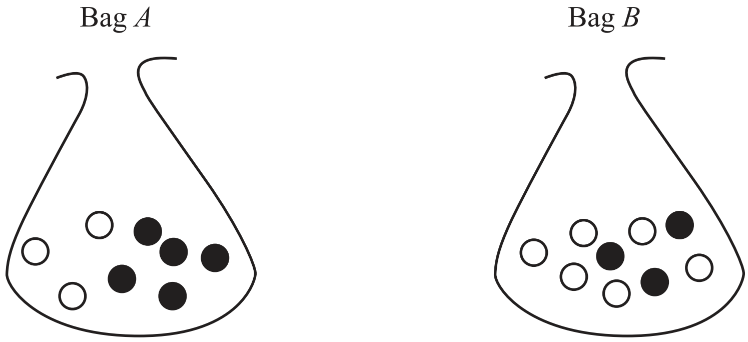
.... m^2 [6]

(d) Maria walks in a straight line from *D* towards *A*.
She stops when she is at her closest point to *C*.

Calculate her distance from *C*.

.... m [2]

9 Two bags each contain white balls and black balls only.

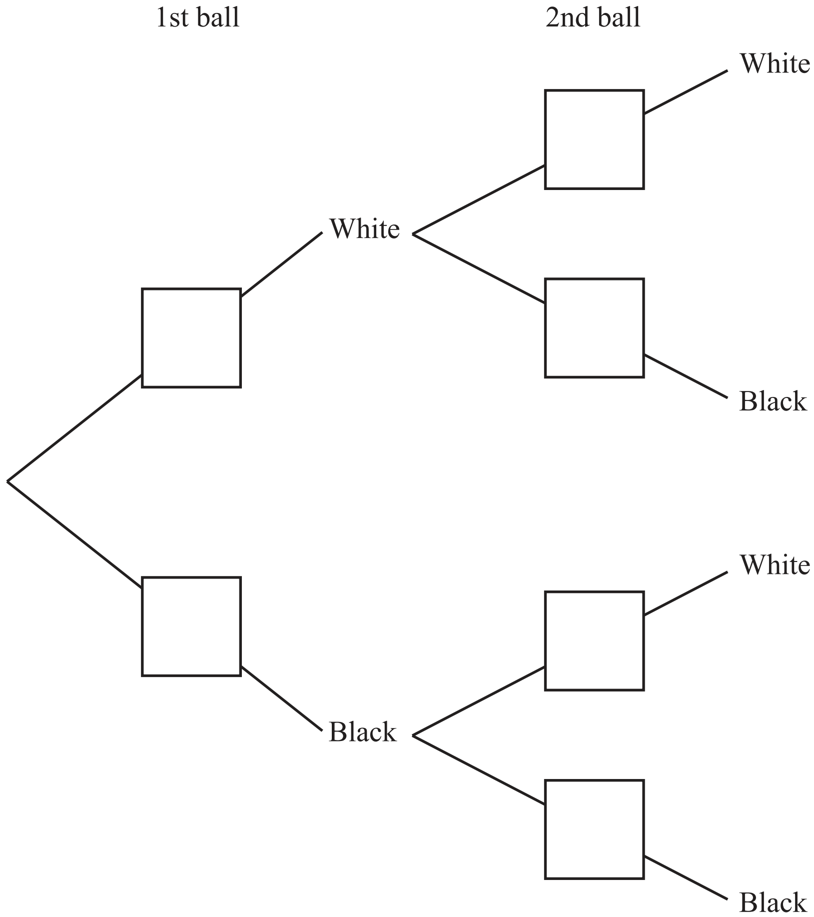


Bag *A* contains 3 white balls and 5 black balls.
Bag *B* contains 6 white balls and 3 black balls.

A ball is picked at random from the 8 balls in Bag *A*.

- If it is white, the ball is not replaced and a second ball is picked at random from **Bag *A***.
- If it is black, a second ball is picked at random from the 9 balls in **Bag *B***.

(a) Complete the tree diagram.



[3]

(b) Find the probability that

(i) both balls are white,

.... [2]

(ii) exactly one of the two balls is black.

.... [3]

10 **(a)** Make y the subject of $3x + y = 8$.

$y =$ .... [1]

(b) The line $3x + y = 8$ intersects the curve $x^2 + y^2 = 25$ at two points.

(i) Use substitution to show that $10x^2 - 48x + 39 = 0$.

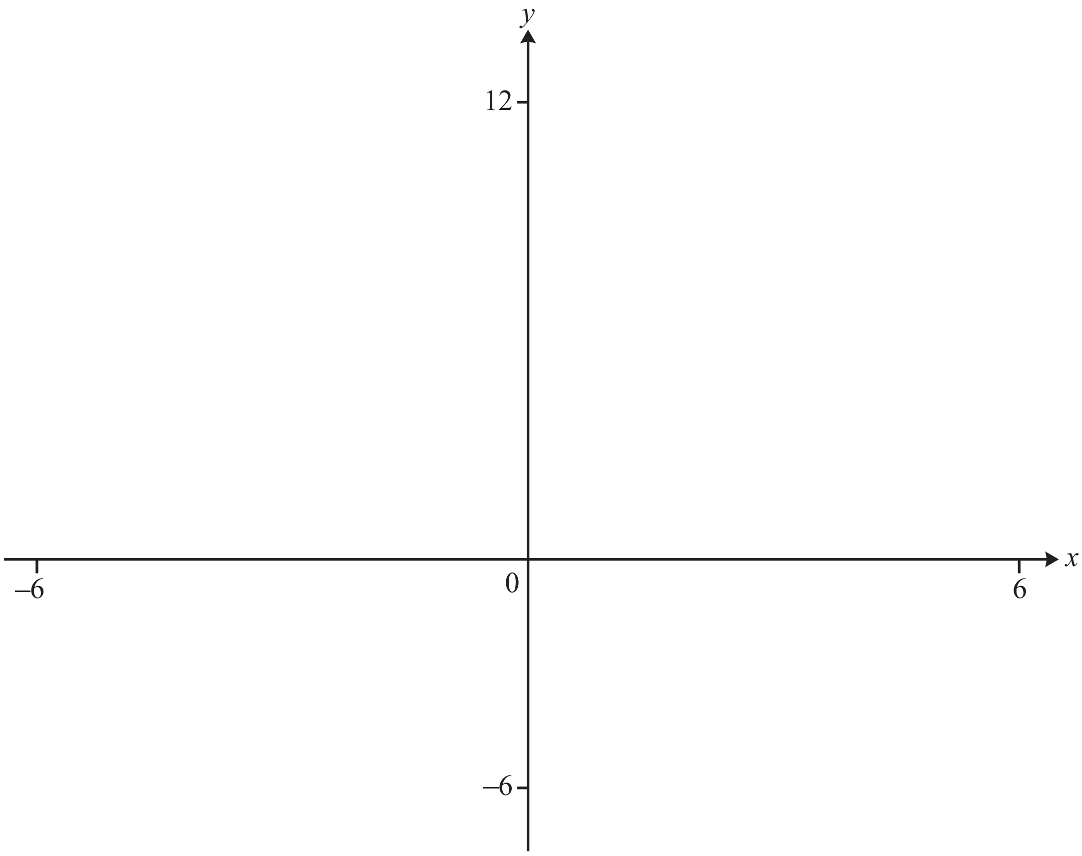
[3]

(ii) Solve the equation $10x^2 - 48x + 39 = 0$ and find the co-ordinates of the two points of intersection. Show all your working.

(....................... , ...)

(....................... , ...) [5]

11



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

(a) On the diagram, sketch the graph of $y = f(x)$ for values of x between -6 and 6. [3]

(b) Find the co-ordinates of the local minimum.

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

(c) Find the equations of the two asymptotes that are parallel to the y-axis.

.... and .... [2]

(d) $g(x) = 3x + 2$

Solve.

(i) $f(x) = g(x)$

.... [3]

(ii) $f(x) > g(x)$

.... [3]

12 $f(x) = 5 - 3x$ $g(x) = 2x + 3$

(a) Solve $f(x) = 11$.

$x =$ .... [2]

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

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

(c) Solve $f(x) \times g(x) = 0$.

.... [2]

(d) Simplify.

(i) $g^{-1}(g(x))$

.... [1]

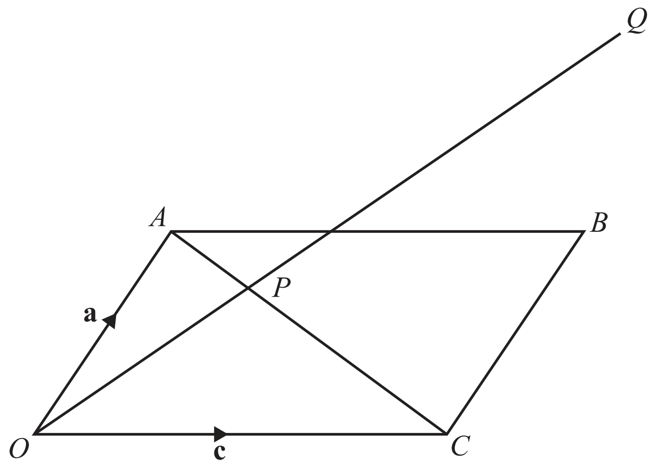
(ii) $f(f(x)) + g(x)$

.... [3]

(iii) $\dfrac{2}{f(x)} + \dfrac{4}{g(x)}$

.... [3]

13



NOT TO SCALE

$OABC$ is a parallelogram and OPQ is a straight line.
P divides AC in the ratio $1:2$.
P divides OQ in the ratio $1:2$.

$\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OC} = \mathbf{c}$.

(a) Find these vectors in terms of **a** and/or **c**.
Give each answer in its simplest form.

(i) $\overrightarrow{AC}$

.... [1]

(ii) $\overrightarrow{OP}$

.... [2]

(iii) $\overrightarrow{CQ}$

.... [2]

(b) Use your answer to **part(a)(iii)** to complete the statement.

The points C, B and Q are .... [1]

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