Write your name here

Surname	Other names

Pearson Edexcel
International GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Mathematics B

Level 2
Paper 2

Sample assessment material for first teaching September 2016
Time: 2 hours 30 minutes

Paper Reference
4MB1/02

You must have:
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- **Calculators may be used.**

Information

- The total mark for this paper is 100.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Check your answers if you have time at the end.
- Without sufficient working, correct answers may be awarded no marks.

Turn over ▶

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S 5 1 8 3 5 A 0 1 2 0

PEARSON

Answer ALL ELEVEN questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Watches are sold in a shop for £80 each.

The watchmaker is paid 65% of this selling price for each of the first 100 watches sold.

He is paid 55% of the selling price for each of the next 50 watches sold and 45% of the selling price for each of any other watches that are sold.

One week 280 watches were sold.

Calculate the total amount, in £, that the watchmaker is paid for these watches.

(Total for Question 1 is 4 marks)

2 (a) Factorise $4x^2 - 25y^2$

(2)

(b) Simplify completely $\dfrac{x^2 - 11x + 24}{x + 5} \div \dfrac{x - 3}{2x^2 + 7x - 15}$

(5)

(Total for Question 2 is 7 marks)

3 On one day, 90 customers bought food at a supermarket.

All 90 customers bought at least one of soup (S), milk (M) and bread (B).

10 customers bought soup only.

45 customers bought milk only.

8 customers bought bread only.

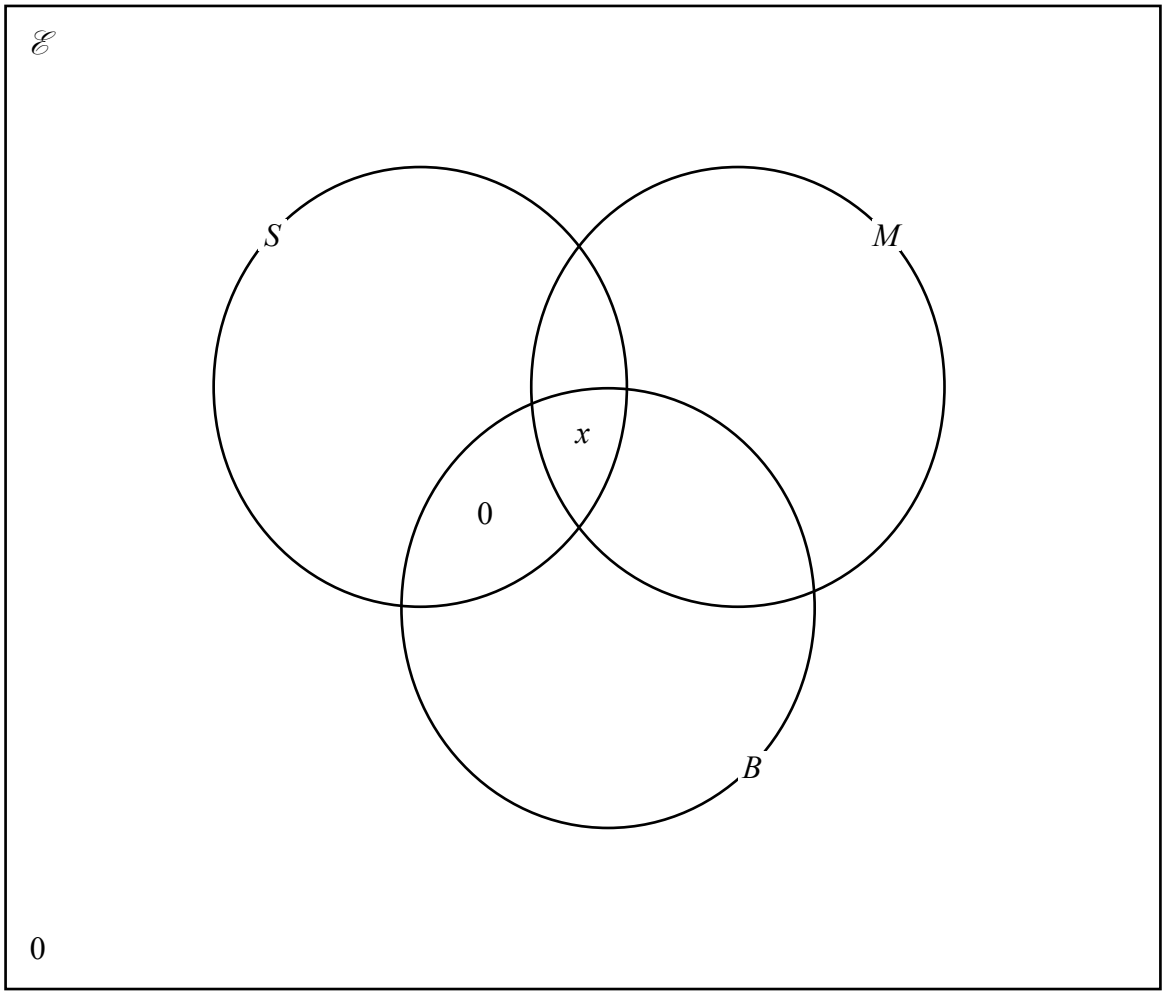
25 customers bought soup and milk.

13 customers bought milk and bread.

No customers bought soup and bread only.

x customers bought soup, milk and bread.

(a) Show all this information in the Venn diagram.



(2)

Question 3 continued

(b) Use the information in the Venn diagram to write down an equation in x.

(1)

(c) Hence find the value of x.

(1)

(d) Find

(i) n(S)

(ii) n($[M \cup B] \cap S'$)

(2)

(Total for Question 3 is 6 marks)

4 The curve C has the equation $y = 6 - x - 2x^2$

(a) Show that the co-ordinates of the stationary point of C are $\left(-\frac{1}{4},\ 6\frac{1}{8}\right)$

(4)

(b) (i) Find the gradient of the curve C at the points where $x = -1$ and $x = 0$

(ii) hence, or otherwise, explain why the stationary point of C is a maximum.

(2)

(Total for Question 4 is 6 marks)

5 Solve the simultaneous equations

$$x^2 + y^2 = 5$$
$$x + 1 = y$$

Show clear algebraic working.

(Total for Question 5 is 6 marks)

6 The distance from Manchester to Northampton is 160 km.

A motorist starts from Manchester at 9 00 a.m. and travels towards Northampton at a constant speed of 64 km/h until she arrives at Bradford, which is 48 km from Manchester.

At Bradford she rests for 24 minutes before continuing her journey at a constant speed to arrive at Northampton at 11 45 a.m.

(a) Using the grid on the next page, draw a graph to represent the motorist's journey.

(3)

(b) Calculate the motorist's speed, in km/h, for her journey from Bradford to Northampton.

(2)

At 9 30 a.m. a second motorist starts from Northampton to journey to Manchester on the same road as the first motorist.

The second motorist travels at a constant speed of 80 km/h.

(c) Draw, on the same grid, a straight line to represent the second motorist's journey.

(2)

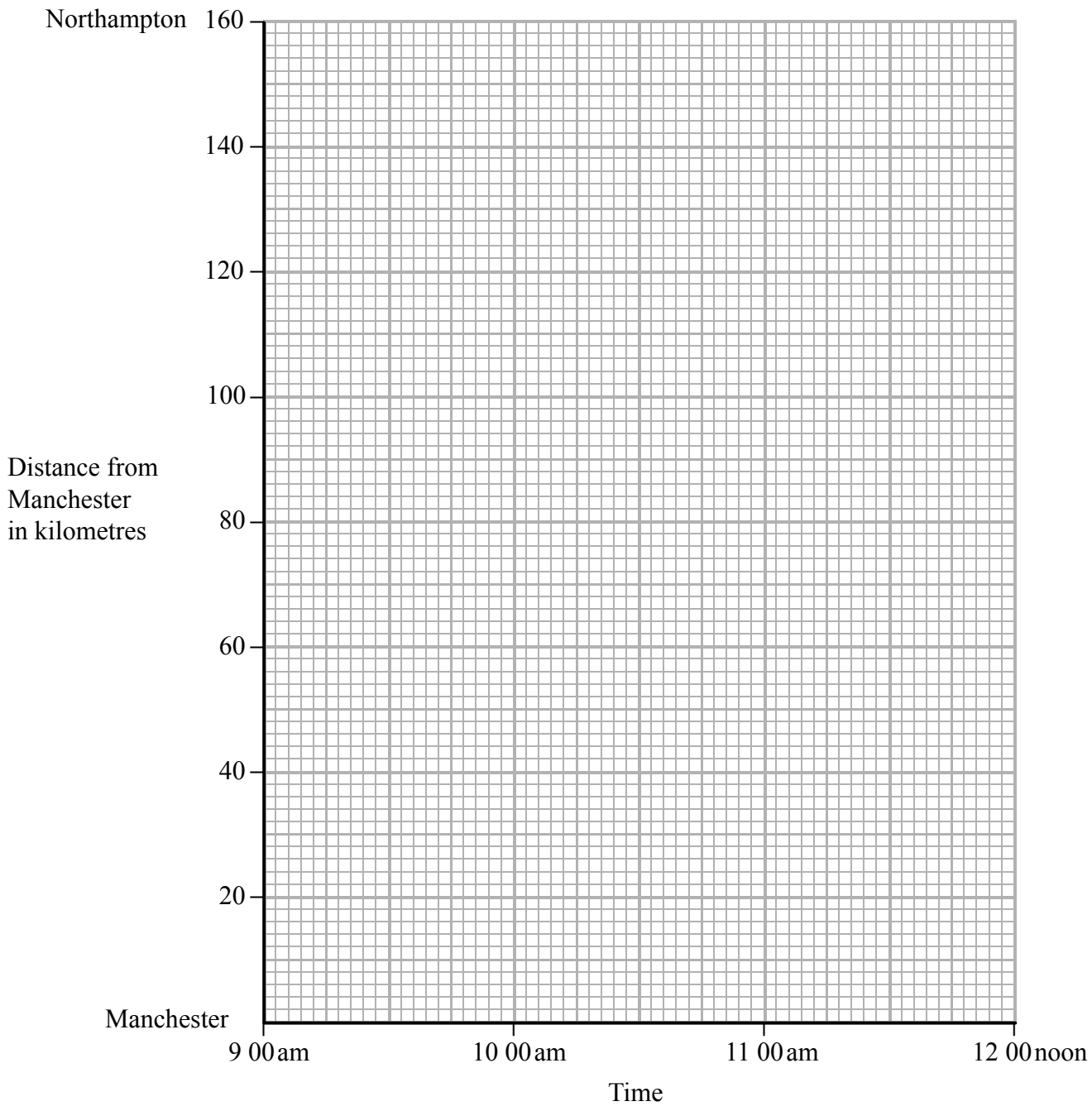
(d) Using your graph, write down

(i) the time at which two motorists meet,

(ii) how far both motorists are from Bradford when they meet.

(2)

Question 6 continued



(Total for Question 6 is 9 marks)

7

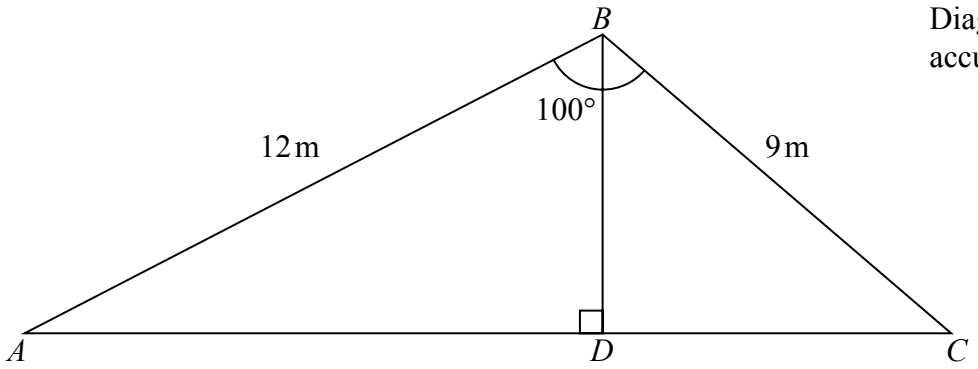


Diagram **NOT** accurately drawn

Figure 1

A, B and C are three points on horizontal ground such that $AB = 12$ m, $BC = 9$ m and $\angle ABC = 100°$ as shown in Figure 1.

Calculate to 3 significant figures,

(a) the length, in m, of AC,

(3)

(b) the size, in degrees, of $\angle CAB$.

(3)

D is the point on AC such that BD is perpendicular to AC.

(c) Calculate the area, in m^2 to 2 significant figures, of triangle ABD.

(3)

$$\left[\begin{array}{c}\text{Cosine rule: } a^2 = b^2 + c^2 - 2bc\cos A \\ \text{Sine rule: } \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} \\ \text{Area of triangle} = \frac{1}{2}ab\sin C\end{array}\right]$$

Question 7 continued

(Total for Question 7 is 9 marks)

8 Part of the curve with equation $y = x^2 - 6x + 5$ is drawn on the grid.

(a) For $y = -2x^2 + \frac{21}{2}x - 10$ complete the table, giving your answers to 2 decimal places where necessary.

x	1	1.5	2	2.5	3	3.5	4	5
y	−1.5		3		3.5		0	−7.5

(3)

(b) On the grid, plot the points from your completed table and join them to form a smooth curve.

(3)

(c) Use the two curves on the grid to find estimates for the solutions of the equation

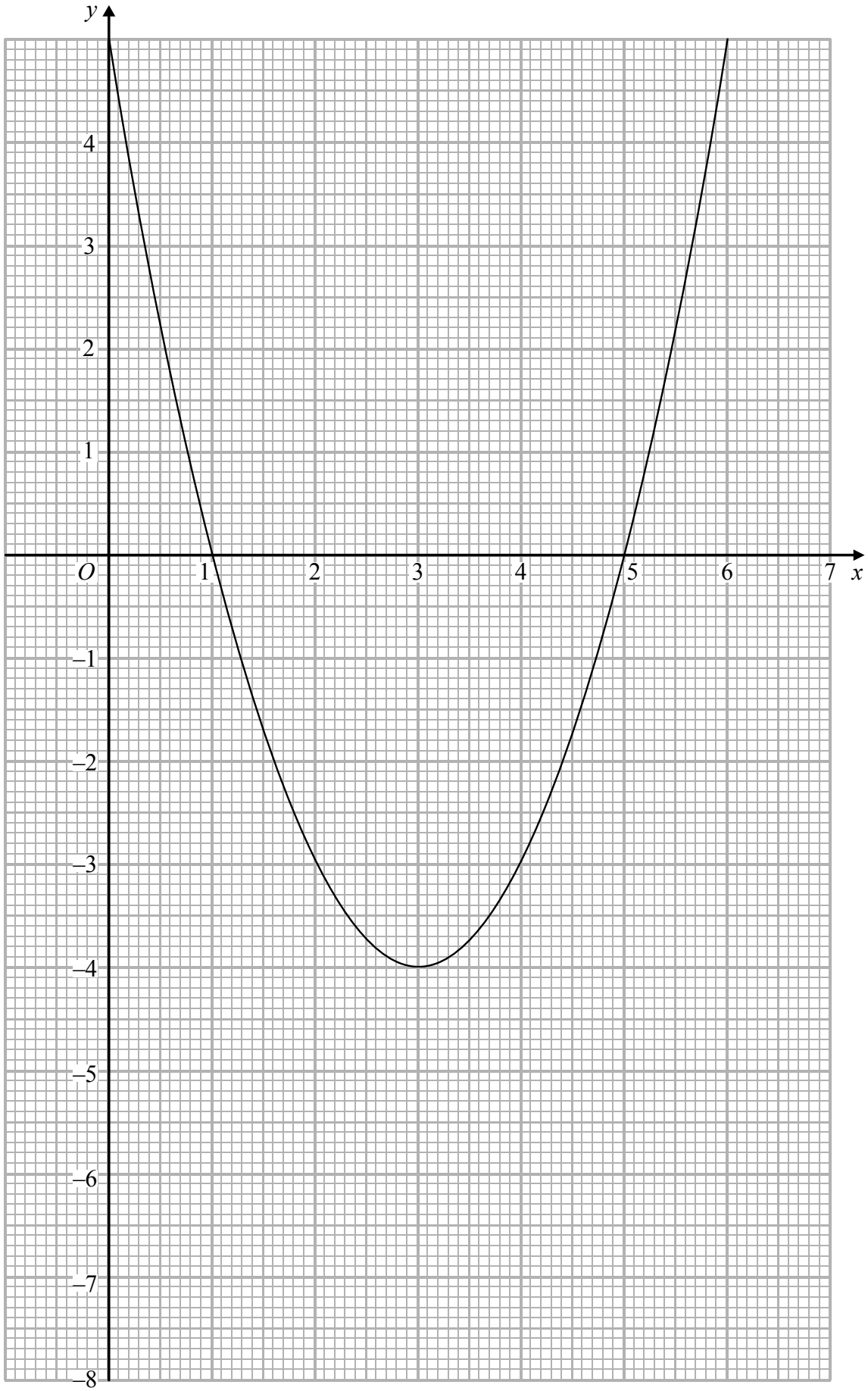
$$3x^2 - \frac{33}{2}x + 15 = 0$$

(2)

The curve with equation $y = x^2 - 6x + 5$ intersects the curve with equation $y = -2x^2 + \frac{21}{2}x - 10$ at points A and B.

(d) Work out the gradient of the straight line through A and B.

(3)



(Total for Question 8 is 11 marks)

9 Left-handed and right-handed people do a test. It is found that 80% of left-handed people pass the test and 90% of right-handed people pass the test.

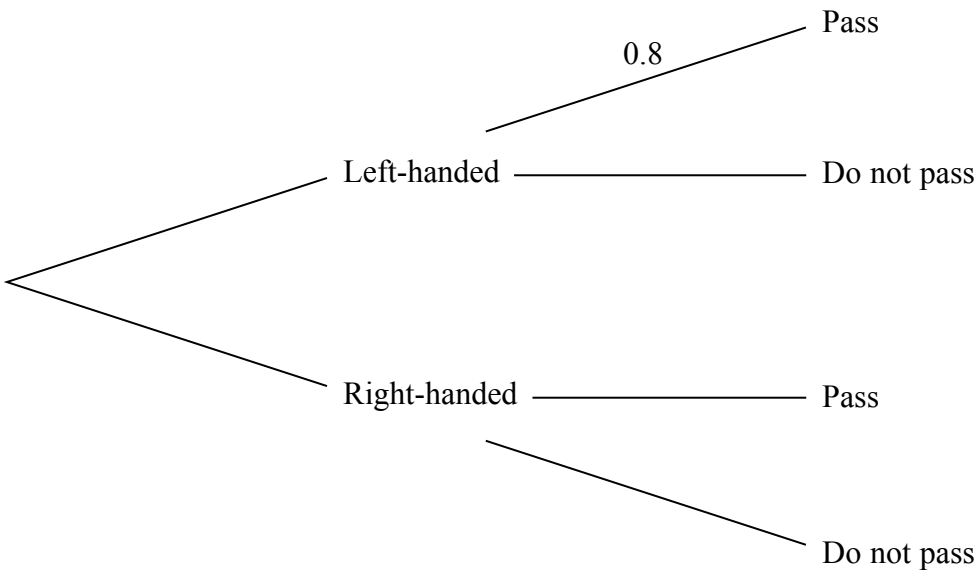
On the island of Sinestra, a fraction p of the population are left-handed and the remainder are right-handed.

A person on Sinestra is to be chosen at random to take the test.

(a) Write down the probability, in terms of p, that the person chosen is right-handed.

(1)

(b) Complete the probability tree diagram to show all the information.



(3)

On Sinestra the probability of passing the test is 5 times the probability of not passing the test.

(c) From your completed probability tree diagram, or otherwise, find the value of p.

(5)

A person on Sinestra is selected at random. Given that this person passed the test, use your answer to part (c) to

(d) determine the probability that this person is left-handed.

(3)

Question 9 continued

(Total for Question 9 is 12 marks)

10 The vertices of triangle A are the points with coordinates (2, 6), (4, 2) and (6, 2).

(a) On the grid opposite, draw and label triangle A.

(1)

Triangle B is the image of triangle A under a reflection in the line with equation $y = -1$

(b) On the grid, draw and label the line with equation $y = -1$

(1)

(c) On the grid, draw and label triangle B.

(1)

Triangle B is transformed to triangle C by the enlargement with centre (0, –2) and scale factor $-\frac{1}{2}$

(d) On the grid, draw and label triangle C.

(3)

Triangle C is transformed to triangle D under the transformation with matrix **M** where

$$\mathbf{M} = \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}$$

(e) On the grid, draw and label triangle D.

(3)

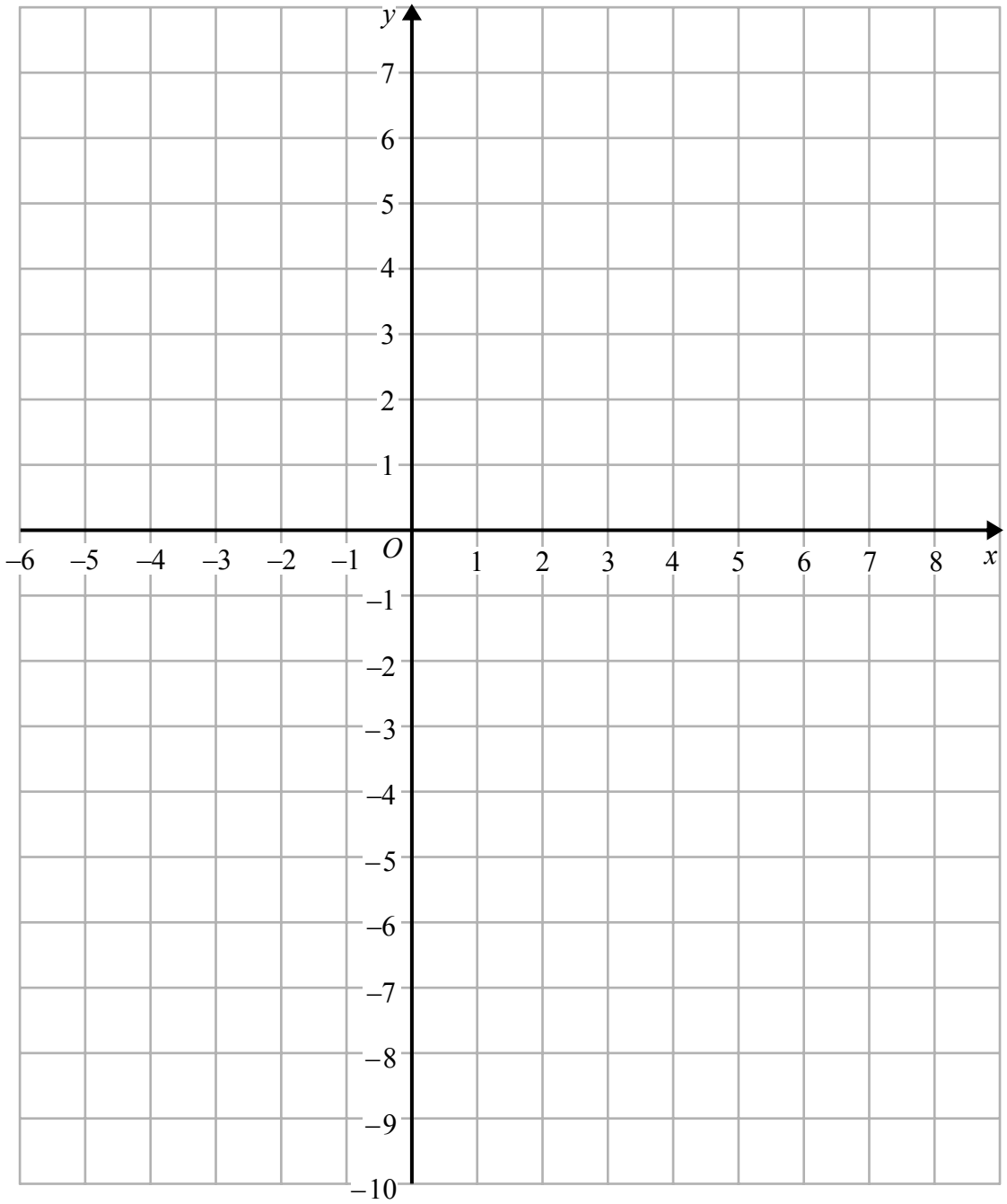
(f) Describe fully the transformation with matrix **M**.

(2)

(g) Describe fully the **single** transformation that maps triangle D onto triangle A.

(3)

Question 10 continued



(Total for Question 10 is 14 marks)

11

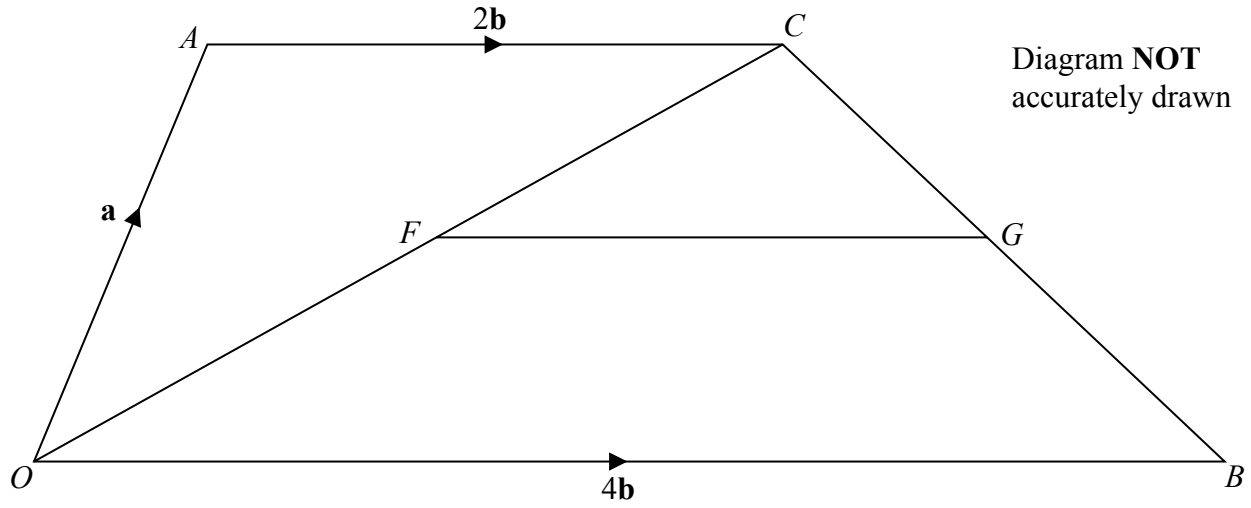


Diagram **NOT** accurately drawn

Figure 2

Figure 2 shows a quadrilateral $OACB$ where $\overrightarrow{OA} = \mathbf{a}$, $\overrightarrow{OB} = 4\mathbf{b}$ and $\overrightarrow{AC} = 2\mathbf{b}$
The point F on OC is such that $OF : OC = 2 : 5$
The point G on CB is such that $CG : CB = 3 : 5$

(a) Find, in terms of **a** and **b**,

(i) $\overrightarrow{OC}$,

(ii) $\overrightarrow{CG}$.

(4)

(b) (i) Show that $\overrightarrow{FG} = \lambda\mathbf{b}$, where λ is a constant.

(ii) Hence write down the value of λ.

(3)

(c) (i) Explain why ΔOCB is similar to ΔFCG.

(ii) Find the ratio (area of ΔOCB) : (area of ΔFCG) in the form $m : n$ where m and n are integers.

(4)

The area of ΔFCG is 18 cm^2

Calculate, in cm^2

(d) (i) the area of ΔOCB,

(ii) the area of $OACB$.

(5)

Question 11 continued

Question 11 continued

(Total for Question 11 is 16 marks)

TOTAL FOR PAPER IS 100 MARKS

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