

Write your name here

Surname	Other names
---------	-------------

Pearson Edexcel
International GCSE

Centre Number

--	--	--	--	--

Candidate Number

--	--	--	--

Mathematics B

Paper 2



Wednesday 15 January 2014 – Morning
Time: 2 hours 30 minutes

Paper Reference

4MB0/02

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 ►

P42937A

©2014 Pearson Education Ltd.

6/4/1/1/1/1/



P 4 2 9 3 7 A 0 1 2 8



Question 1 continued

Handwriting practice area with 25 horizontal dotted lines.

(Total for Question 1 is 5 marks)



Question 4 continued

Ruled area for writing the answer to Question 4.

(Total for Question 4 is 5 marks)



5

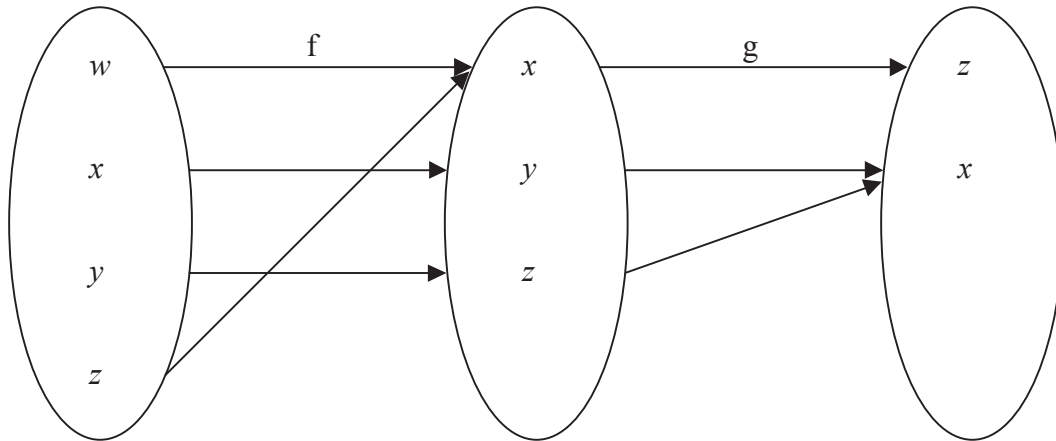


Figure 1

Information about the functions f and g is shown in Figure 1

(a) Find

- (i) $f(x)$,
- (ii) $gf(w)$,
- (iii) $fg(x)$.

(3)

h is the function such that

$$h: x \mapsto \frac{1}{x+2}, \quad x \neq -2$$

(b) Find the inverse function h^{-1} . Give your answer in the form $h^{-1}: x \mapsto \dots$

(2)

(c) Hence, or otherwise, solve $h^{-1}(x) = -x$.

(3)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....



Question 5 continued

Ruled area for writing the answer to Question 5.

(Total for Question 5 is 8 marks)



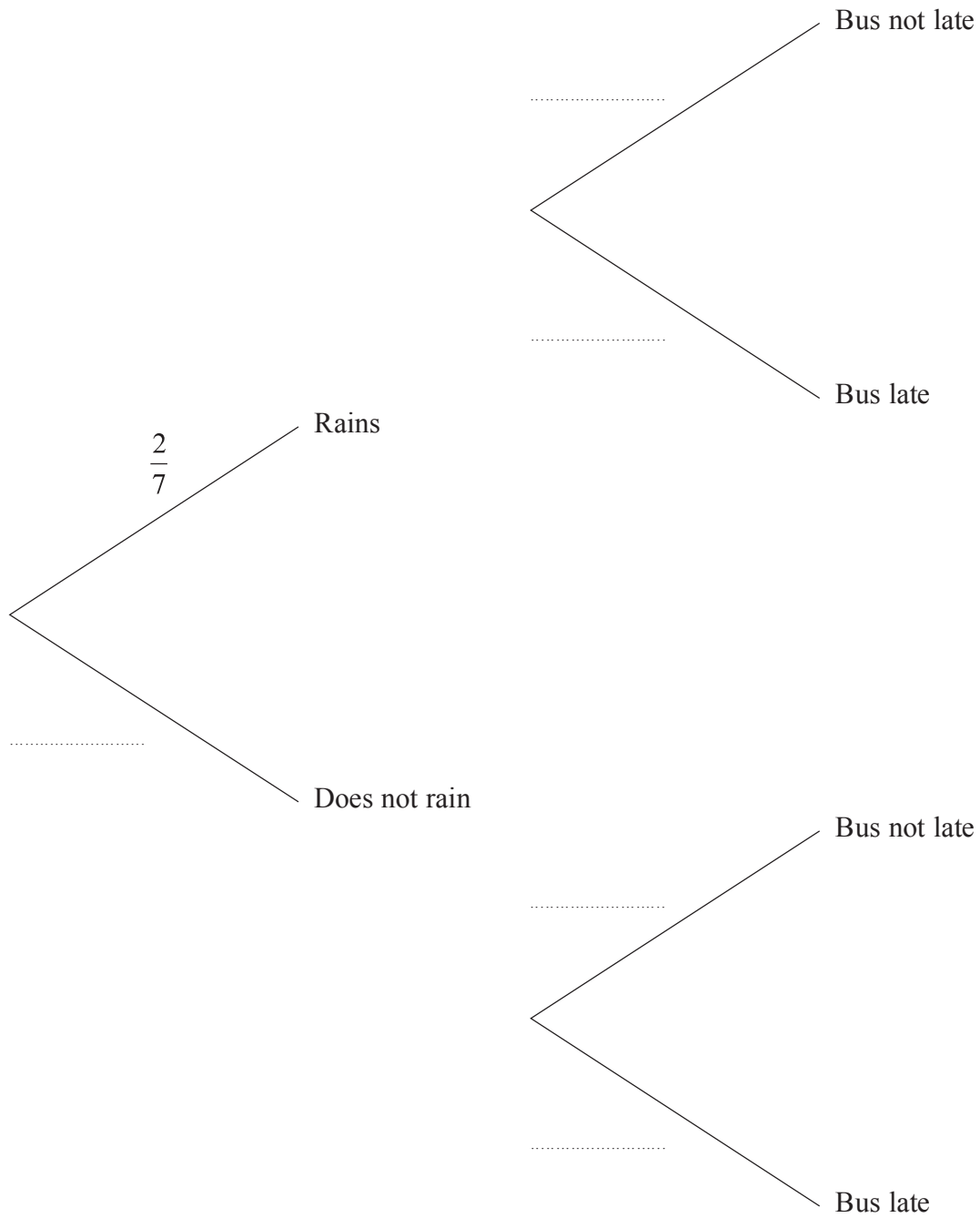
6 On school days, Fatima goes to school by bus.

The probability that it will rain on a school day is $\frac{2}{7}$

When it rains, the probability that the bus will be late is $\frac{1}{5}$

When it does **not** rain, the probability that the bus will **not** be late is $\frac{5}{6}$

(a) Complete the probability tree diagram.



(3)



Question 7 continued

Handwriting practice area with 25 horizontal dotted lines.

(Total for Question 7 is 9 marks)



8

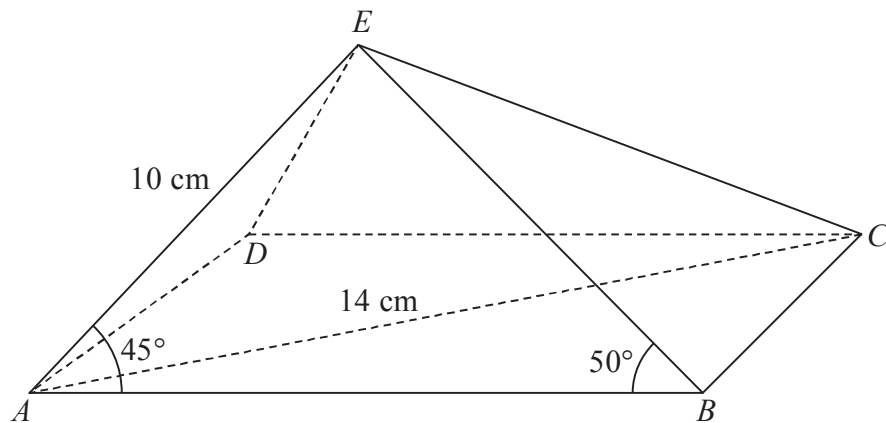
Diagram **NOT** accurately drawn

Figure 2

In Figure 2, $ABCDE$ is a rectangular based pyramid with base $ABCD$.

In $\triangle ADE$, $AE = DE = 10$ cm.

In $\triangle BCE$, $BE = CE$.

Given that $\angle EAB = 45^\circ$ and $\angle ABE = 50^\circ$

(a) calculate the length, in cm to 3 significant figures, of BE . (3)

(b) Show that, to 3 significant figures, $AB = 13.0$ cm. (2)

Given also that $AC = 14$ cm,

(c) calculate the length, in cm to 3 significant figures, of BC . (2)

(d) Calculate the size, in degrees to 3 significant figures, of $\angle BEC$. (3)

The triangular faces of the pyramid are to be painted.

(e) Calculate the total surface area, in cm^2 to 3 significant figures, that is to be painted. (5)

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



Question 8 continued

A large rectangular area with rounded corners, containing 25 horizontal dotted lines for writing.



Question 8 continued

Lined writing area for the answer to Question 8.



Question 8 continued

Handwriting practice area with 25 horizontal dotted lines.

(Total for Question 8 is 15 marks)



9

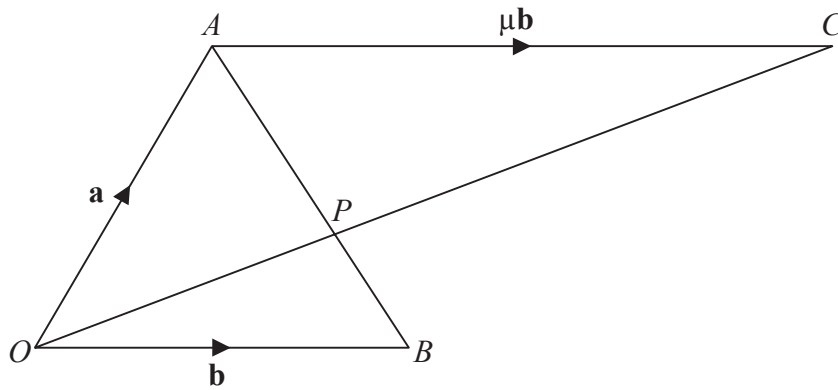
Diagram NOT
accurately drawn

Figure 3

Figure 3 shows $\triangle OAB$ in which $\vec{OA} = \mathbf{a}$ and $\vec{OB} = \mathbf{b}$.

P is the point on AB such that $AP : PB = 3 : 1$

(a) Find, in terms of \mathbf{a} and \mathbf{b} , simplifying your answers,

(i) \vec{AB} ,

(ii) \vec{AP} ,

(iii) \vec{OP} .

(4)

The point C is such that OPC is a straight line and $\vec{AC} = \mu\mathbf{b}$, where μ is a scalar.

(b) Express, in terms of μ , \mathbf{a} and \mathbf{b} , simplifying your answers where possible,

(i) \vec{OC} ,

(ii) \vec{PC} .

(3)

Given that $\vec{OP} = \lambda \vec{OC}$, where λ is a scalar,

(c) (i) find the value of λ ,

(ii) hence use your value of λ to find μ .

(6)

(d) Hence write down the ratio $OP : PC$ in the form $1 : m$ where m is an integer.

(1)

.....

.....

.....

.....

.....



Question 9 continued

Handwriting practice area with 25 horizontal dotted lines.



Question 9 continued

A large rectangular area with a rounded border, containing 25 horizontal dotted lines for writing.



Question 9 continued

Handwriting practice area with 25 horizontal dotted lines.

(Total for Question 9 is 14 marks)



10

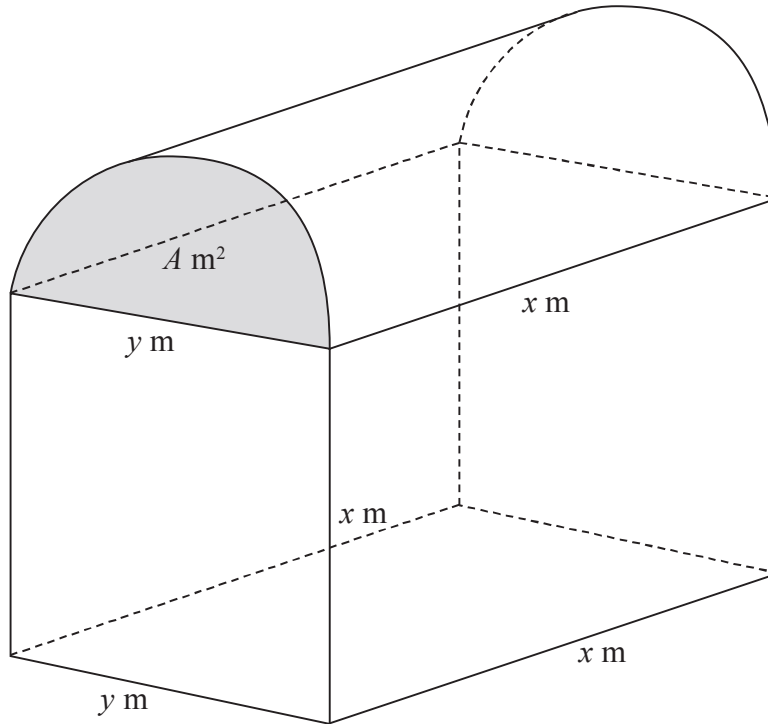
Diagram **NOT**
accurately drawn

Figure 4

Figure 4 shows a barn whose roof, in the shape of a half cylinder, is on top of a cuboid. The half cylinder is x metres long and the semi-circular ends of the half cylinder each have an area of $A \text{ m}^2$ and diameter y metres. The cuboid is y metres wide, x metres long and x metres high, as shown in Figure 4. The total external surface area of the barn, excluding the floor of the barn, is $S \text{ m}^2$.

(a) Show that

$$S = 2x^2 + xy \left(2 + \frac{\pi}{2} \right) + 2A \quad (3)$$

Given that the volume of the cuboid is $10x \text{ m}^3$,(b) show that $y = \frac{10}{x}$ (2)

(c) Hence show that

$$S = 2x^2 + 10 \left(2 + \frac{\pi}{2} \right) + \frac{25\pi}{x^2} \quad (3)$$

$$\left[\begin{array}{l} \text{Area of circle} = \pi r^2 \\ \text{Curved surface area of a right circular cylinder} = 2\pi r h \end{array} \right]$$

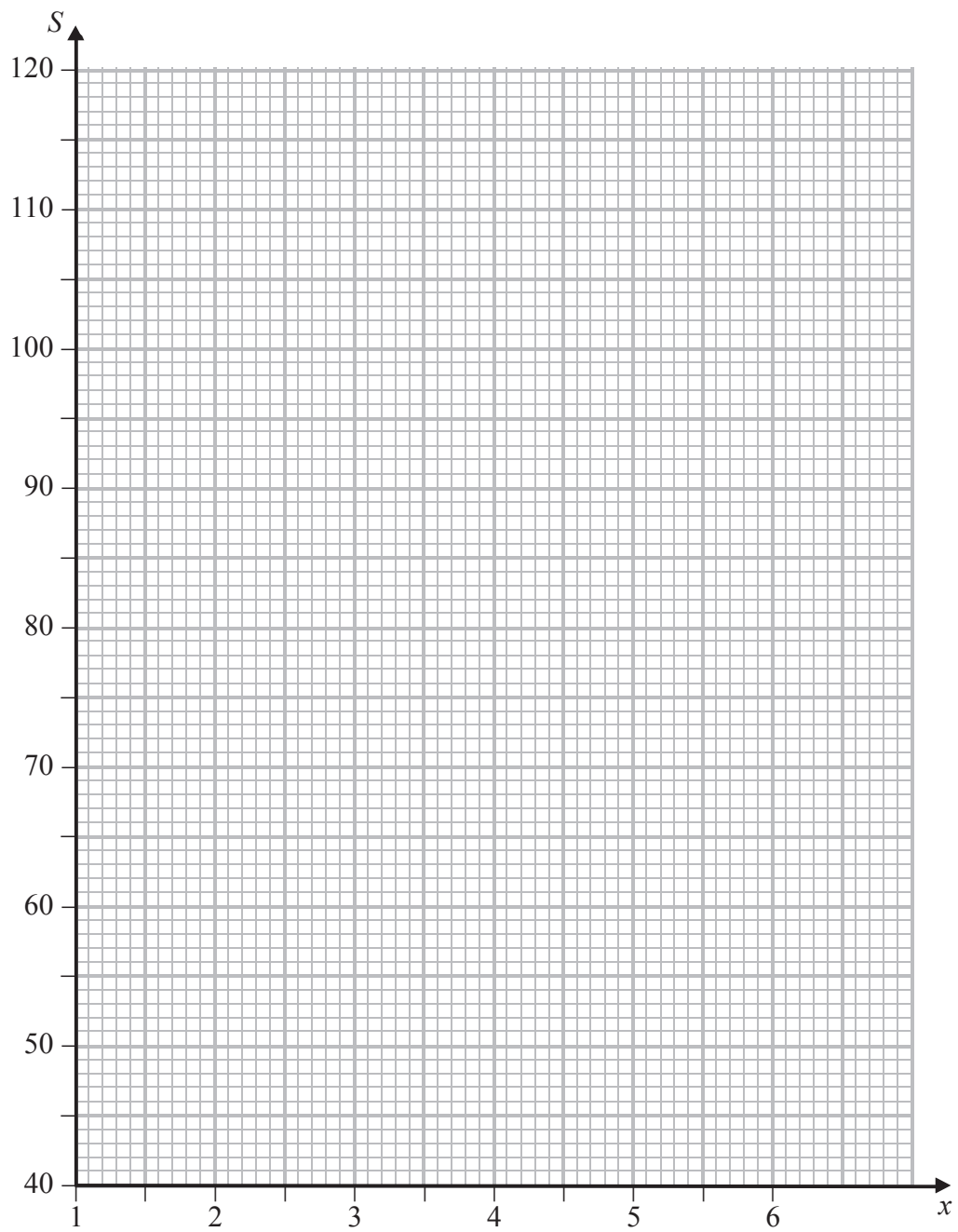


Question 10 continued

Ruled area for writing the answer to Question 10.



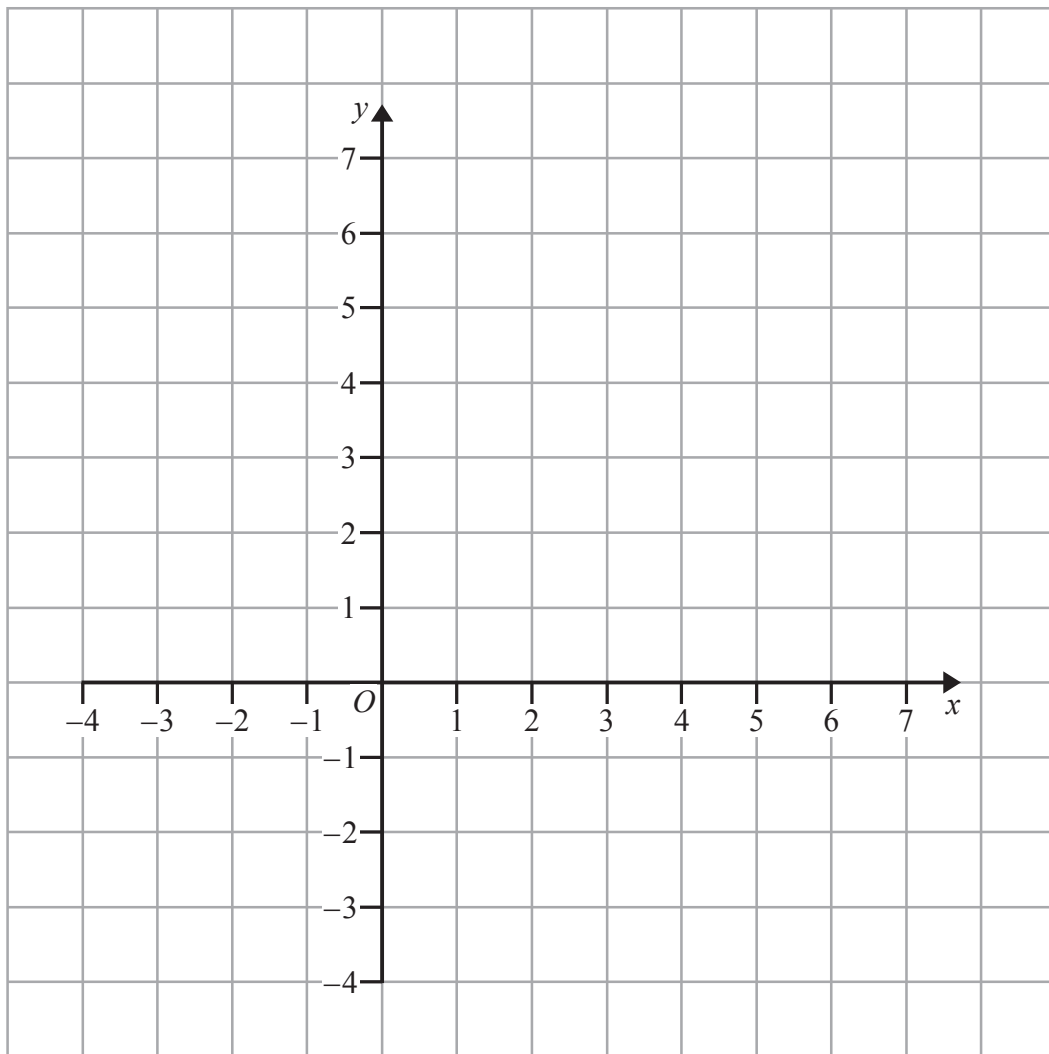
Question 10 continued



(Total for Question 10 is 16 marks)



Question 11 continued



.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....



Question 11 continued

Handwriting practice area with 25 horizontal dotted lines.

(Total for Question 11 is 10 marks)

TOTAL FOR PAPER IS 100 MARKS

