

Write your name here

Surname

Other names

Centre Number

Candidate Number

**Pearson Edexcel
International GCSE**

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Mathematics B

Paper 2R



Tuesday 19 January 2016 – Morning

Time: 2 hours 30 minutes

Paper Reference

4MB0/02R

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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3 Given that $a > 0$ and $b > 0$ and that

$$\begin{pmatrix} 2a & a \\ b & b \end{pmatrix} \begin{pmatrix} b & 2a \\ b & a \end{pmatrix} = \begin{pmatrix} c & 80 \\ 18 & c \end{pmatrix}$$

find the value of a , the value of b and the value of c .

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Question 3 continued

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(Total for Question 3 is 6 marks)



4 (a) Simplify fully $\frac{2x^2 - x - 10}{3} \times \frac{x}{x + 2}$ (3)

(b) Given that $y = \frac{2x^2 - x - 10}{3} \times \frac{x}{x + 2}$

solve $\frac{dy}{dx} = 0$ (3)

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Question 4 continued

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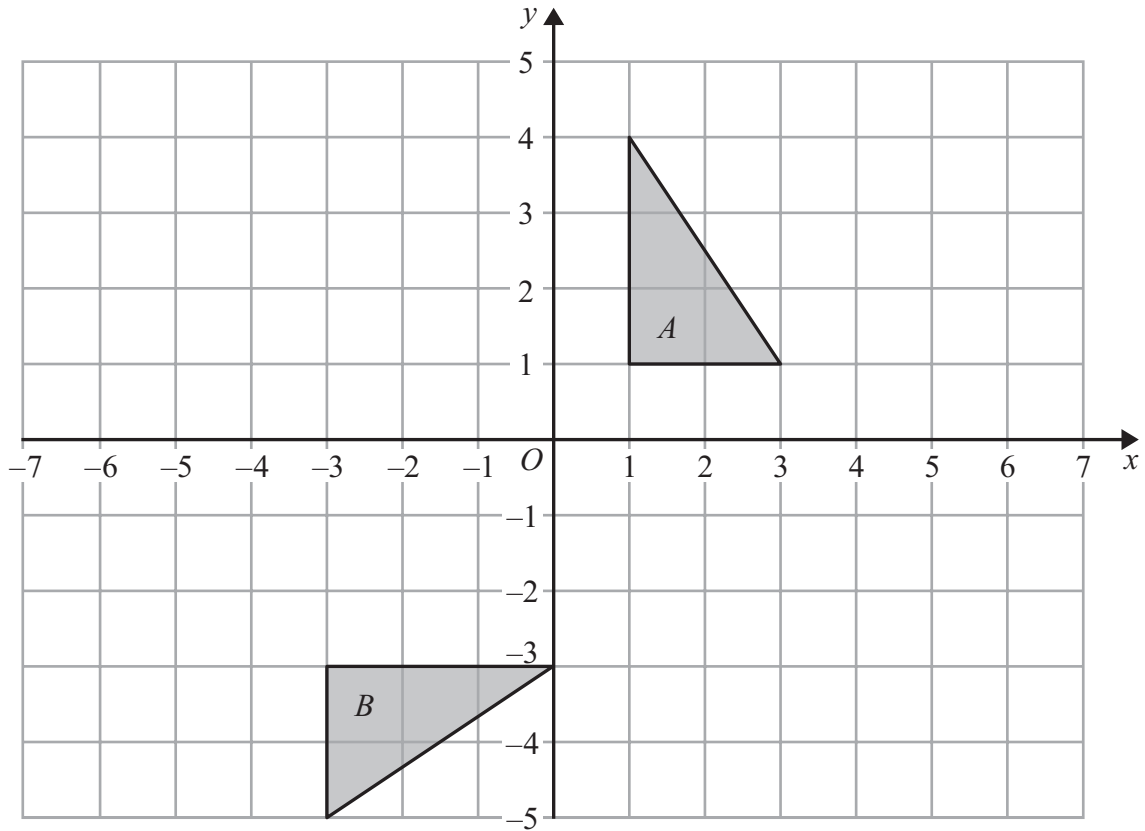
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(Total for Question 4 is 6 marks)



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On the grid, triangle *B* is the image of triangle *A* under a single transformation.

(a) Describe fully this single transformation.

(3)

Triangle *B* is transformed to triangle *C* under the transformation with matrix *N* where

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

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

(3)

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Question 5 continued

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(Total for Question 5 is 6 marks)



Question 6 continued

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(Total for Question 6 is 8 marks)



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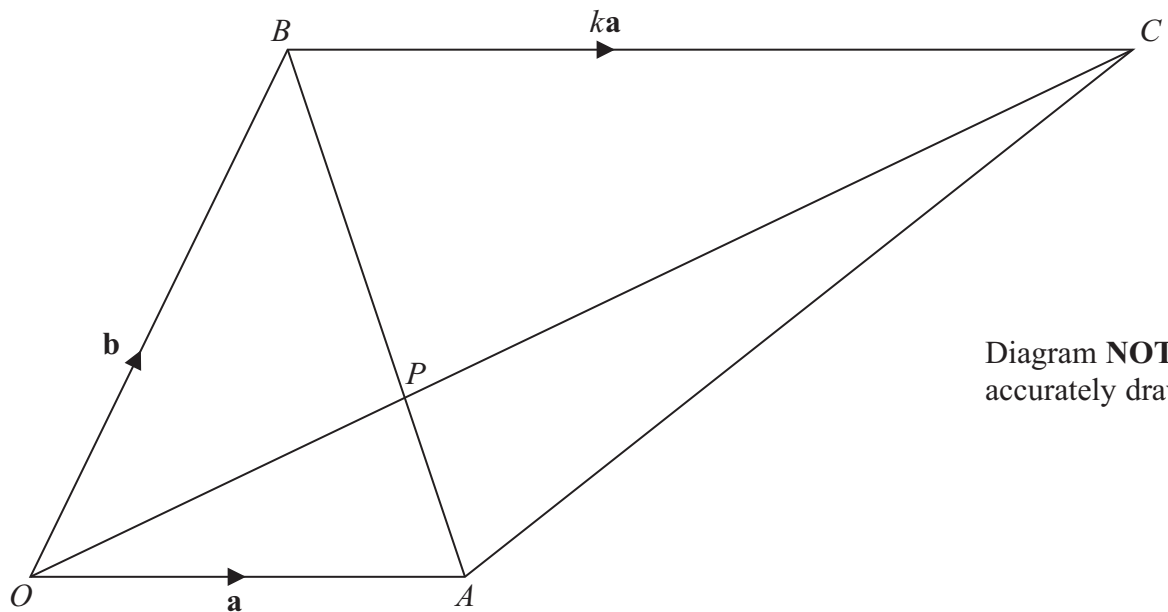


Figure 1

Figure 1 shows trapezium $OBCA$ in which $\vec{OA} = \mathbf{a}$, $\vec{OB} = \mathbf{b}$ and $\vec{BC} = k\mathbf{a}$ where k is a constant.

OC and AB intersect at P .

(a) Write down in terms of \mathbf{a} and \mathbf{b} and where necessary k ,

- (i) \vec{AB} (ii) \vec{AC} (iii) \vec{OC} (3)

Given that $OP : OC = 1 : m$,

(b) write down an expression for \vec{OP} in terms of \mathbf{a} , \mathbf{b} , k and m . (1)

Given that $AP : AB = 1 : n$,

(c) write down and simplify an expression for \vec{OP} in terms of \mathbf{a} , \mathbf{b} , and n . (2)

(d) Show that $m = n$. (2)

(e) Hence, find k in terms of n . (2)

Given that $OBCA$ is a parallelogram,

(f) write down the value of n . (1)



Question 7 continued

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Question 7 continued

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Question 7 continued

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(Total for Question 7 is 11 marks)



Question 8 continued

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Question 8 continued

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Question 8 continued

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(Total for Question 8 is 11 marks)



Question 9 continued

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Question 9 continued

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(Total for Question 9 is 13 marks)



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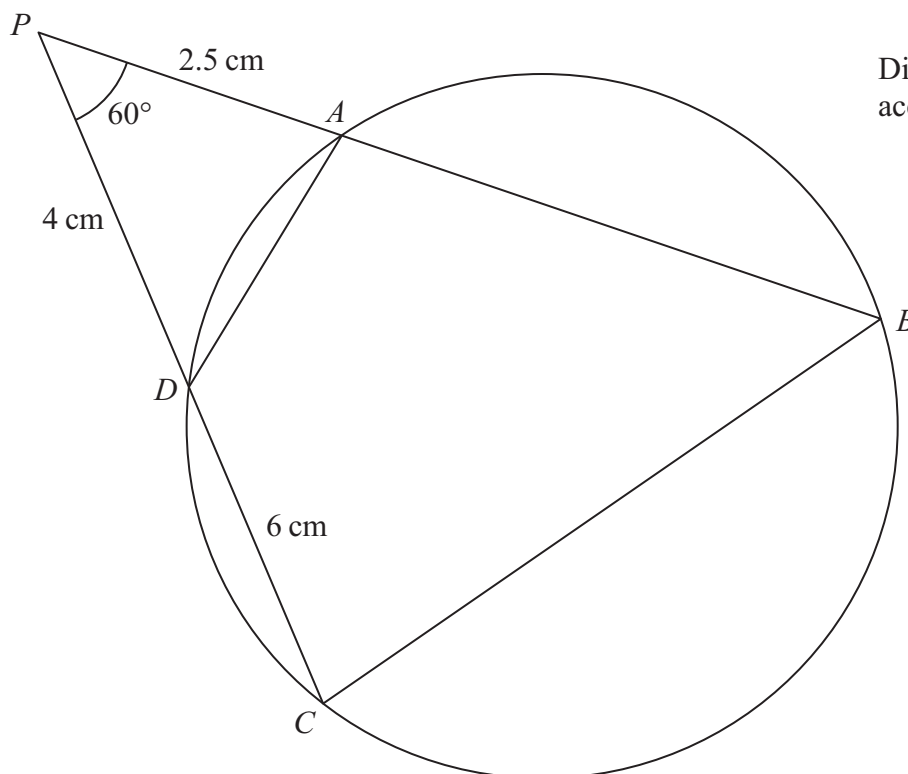
Diagram NOT
accurately drawn

Figure 2

In Figure 2, $ABCD$ is a circle. The point P , outside the circle, is such that PAB and PDC are straight lines so that $PA = 2.5$ cm, $PD = 4$ cm, $DC = 6$ cm and $\angle BPC = 60^\circ$

- (a) Show that $AB = 13.5$ cm. (3)
- (b) Find the length, in cm, of BC . (3)
- (c) Find the size, in degrees to 3 significant figures, of $\angle ABC$. (3)
- (d) Giving reasons, find the size, in degrees to 3 significant figures, of $\angle PAD$. (3)
- (e) Find the area, in cm^2 to 3 significant figures, of $ABCD$. (4)

$$[\text{Cosine rule: } a^2 = b^2 + c^2 - 2bc \cos A$$

$$\text{Sine rule: } \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

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

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Question 10 continued

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Question 10 continued

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Question 10 continued

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(Total for Question 10 is 16 marks)



Question 11 continued

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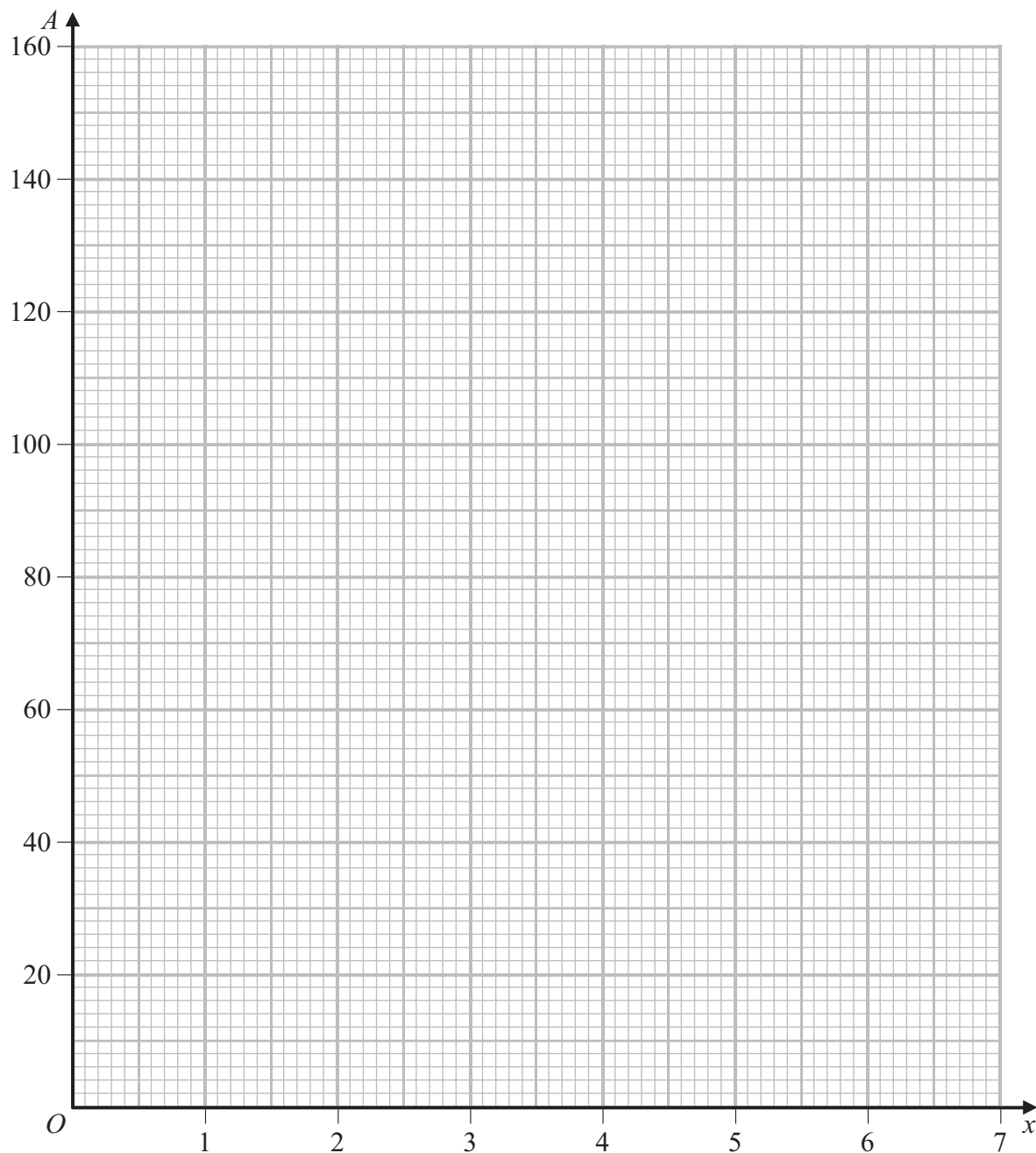
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Question 11 continues on the next page.



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Question 11 continued



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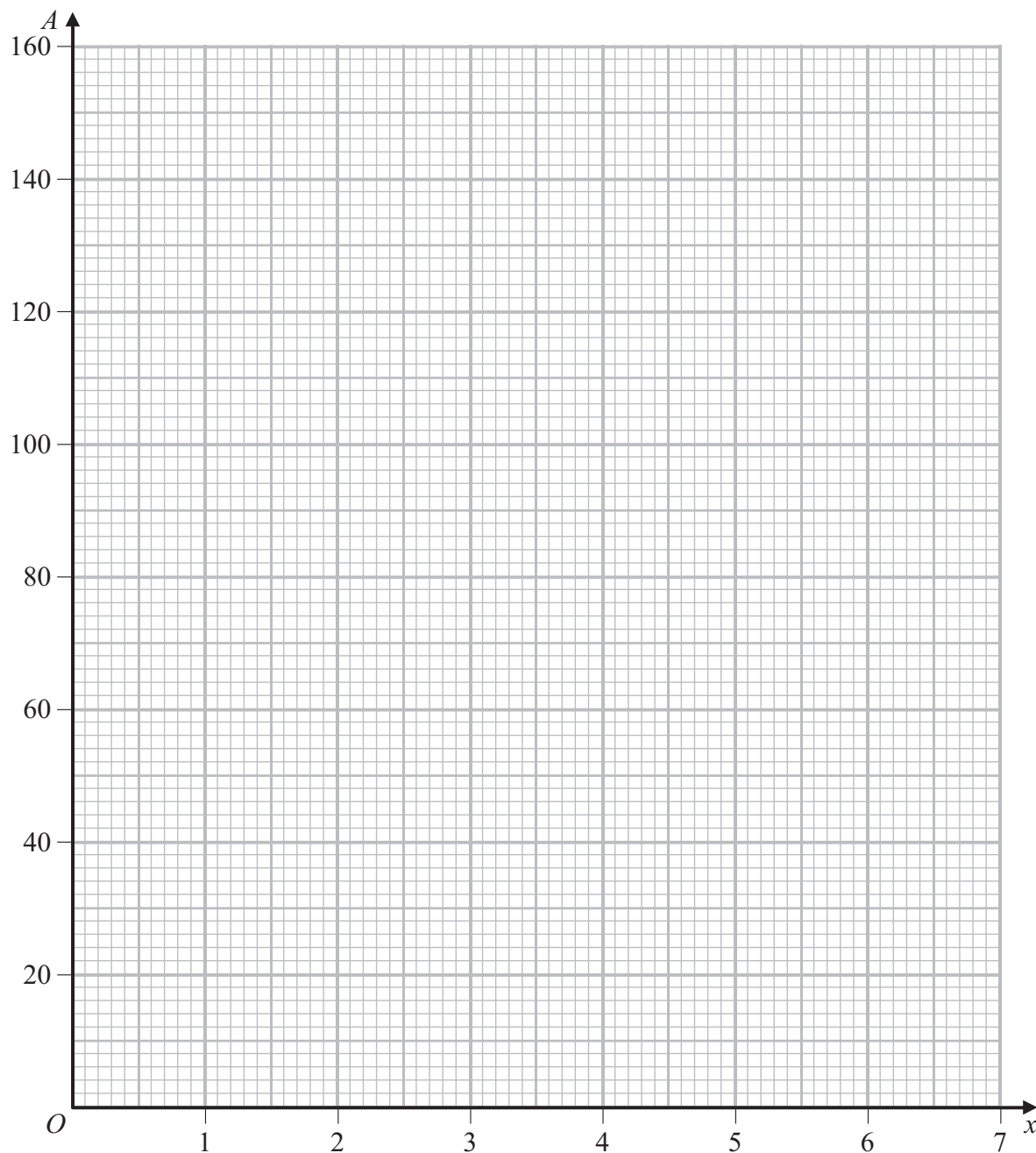
Turn over for a spare grid if you need to redraw your graph.



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Question 11 continued

Only use this grid if you need to redraw your graph.



(Total for Question 11 is 15 marks)

TOTAL FOR PAPER IS 100 MARKS

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