Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						7	3	6	1	/	0	2	Signature	

Paper Reference(s)

7361/02

Examiner's use only

Team Leader's use only

London Examinations GCE

Mathematics Syllabus B

Ordinary Level

Paper 2

Wednesday 7 May 2008 – Morning

Time: 2 hours 30 minutes

MC003187084

Materials required for examination
Nil

Items included with question papers
Nil

Candidates are expected to have an electronic calculator when answering this paper.

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
Check that you have the correct question paper.
Answer ALL the questions. Write your answers in the spaces provided in this question paper.
If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
Full marks may be obtained for answers to ALL questions.
There are 11 questions in this question paper. The total mark for this paper is 100.
There are 24 pages in this question paper. Any blank pages are indicated.

Advice to Candidates

Write your answers neatly and legibly.

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1. Solve the simultaneous equations

$$2x + 3y = 3,$$
$$6x - 12y = -5.$$

(4)

Q1

(Total 4 marks)

Leave blank

2. Simone travelled 205 km by train from Lisbon to Coimbra. She left Lisbon at 09 30 and arrived in Coimbra at 12 00.

(a) Calculate the average speed, in km/h, for this journey.

(2)

Simone then caught a train to Oporto. The train left Coimbra at 13 20 and travelled at an average speed of 75 km/h. The distance between Coimbra and Oporto is 125 km.

(b) Calculate the time at which Simone arrived in Oporto.

(2)

The following day Simone flew by plane from Oporto to Lisbon at an average speed of 465 km/h. The total flying time was 40 minutes.

(c) Calculate the distance, in km, that Simone travelled by plane.

(2)

Q2

(Total 6 marks)

Leave blank

3. (a) Given that $(x + 2)$ is a factor of $5x^3 + 6x^2 + kx - 2$, find the value of k.

(2)

(b) Using your value of k, factorise completely $5x^3 + 6x^2 + kx - 2$.

(4)

Q3

(Total 6 marks)

Leave blank

4. (a) Expand $(2x - 5)(3x^2 + 7)$.

(1)

(b) Given that $y = (2x - 5)(3x^2 + 7)$, find $\frac{dy}{dx}$.

(2)

(c) Find the values of x for which $\frac{dy}{dx} = 26$.

(4)

Q4

(Total 7 marks)

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5.

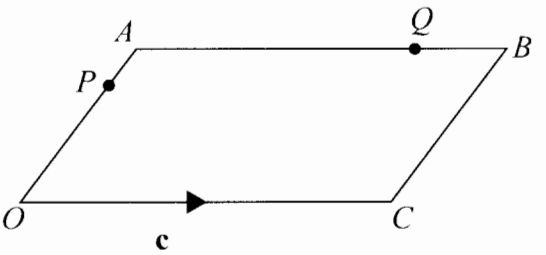

Figure 1

In Figure 1, $OABC$ is a parallelogram with $\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OC} = \mathbf{c}$. The point P divides OA in the ratio 3 : 1 and the point Q divides AB in the ratio 4 : 1.

(a) Express, in terms of **a** and **c**,

(i) $\overrightarrow{CP}$,

(ii) $\overrightarrow{OQ}$.

(2)

CP is extended to the point X where $CP : CX = 1 : 2$ and OQ is extended to Y where $OQ : OY = 2 : 3$.

(b) Express in terms of **a** and **c**, the vector $\overrightarrow{OX}$. Simplify your answer.

(2)

(c) Show that XY is parallel to OC.

(2)

Leave blank

Question 5 continued

Q5

(Total 6 marks)

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6.

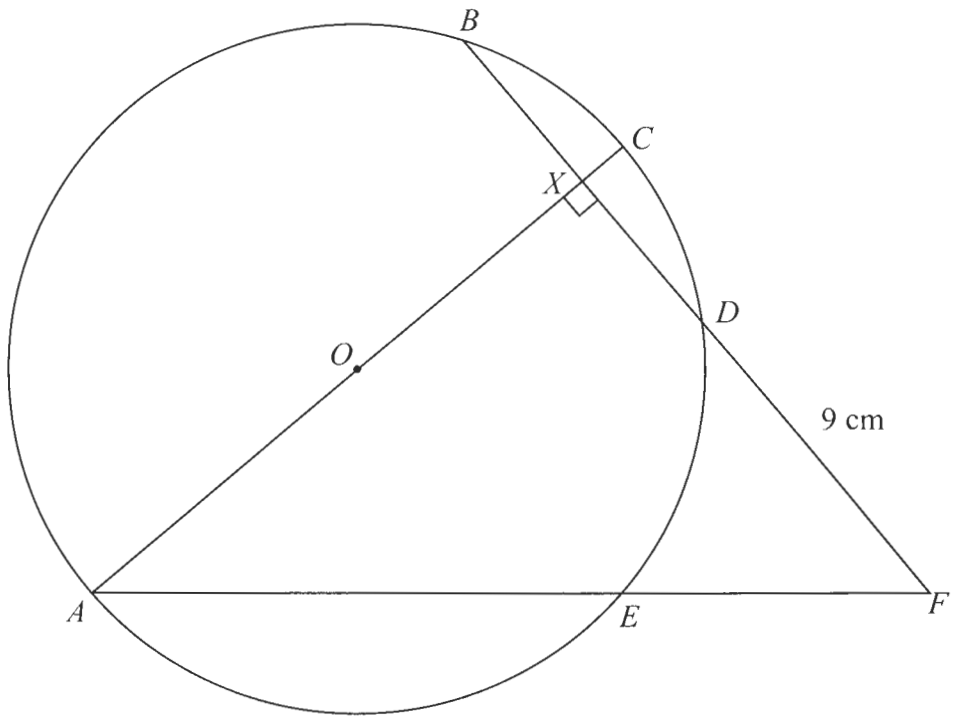

Figure 2

In Figure 2, $ABCDE$ is a circle with centre O. The chord BD and the diameter AC intersect at right angles at the point X. The length of $AX = 20$ cm and the length of $XC = 1.8$ cm.

(a) Calculate the length, in cm, of XD.

(2)

The chords BD and AE are extended to meet at F, and $FD = 9$ cm.

(b) Show that $AF = 25$ cm.

(2)

(c) Calculate the length, in cm, of AE.

(2)

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

(3)

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Question 6 continued

Q6

(Total 9 marks)

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7.

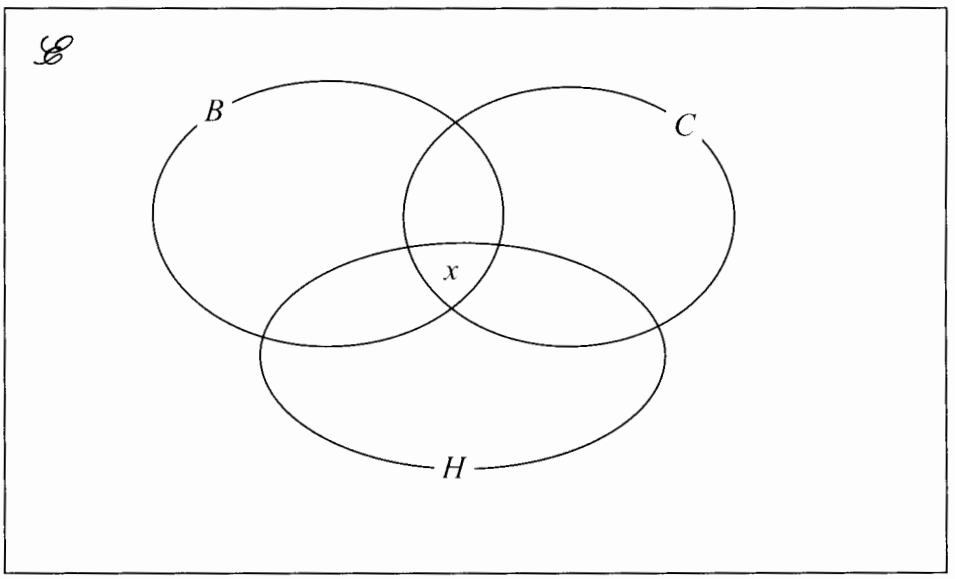


Figure 3

56 people went on holiday to Madeira. All 56 people had the opportunity to go on a boat trip, a coach trip and a helicopter trip.

32 went on the coach trip.
30 went on the boat trip.
10 went on the helicopter trip.
12 went on the boat trip and the coach trip but not the helicopter trip.
4 went on the boat trip and the helicopter trip but not the coach trip.
2 went on the coach trip and the helicopter trip but not the boat trip.

8 did not go on any of the trips.

Let x be the number of people who went on all three trips. Let B, C and H be the sets of those people who went on the boat trip (B), the coach trip (C) and the helicopter trip (H).

(a) Complete Figure 3 by writing, in terms of x where necessary, the number of people in each region of the Venn diagram.

(4)

(b) Hence find the value x.

(2)

(c) Write down the value of

(i) $n(B \cup C)$,

(ii) $n((B \cup C) \cap H)$,

(iii) $n((B \cup C \cup H)')$.

(3)

Leave blank

Question 7 continued

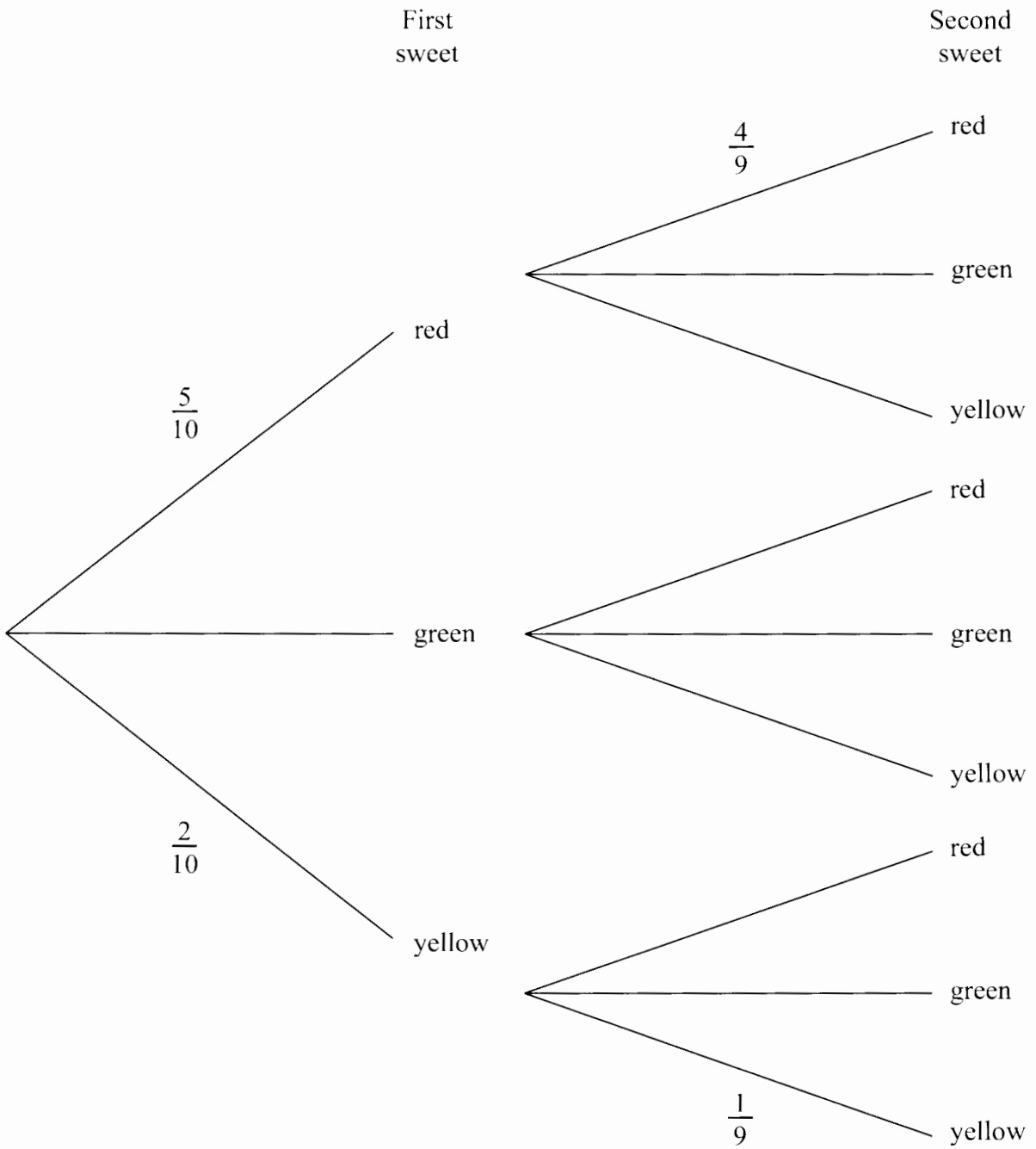
Q7

(Total 9 marks)

Leave blank

8. A bag contains 5 red sweets, 3 green sweets and 2 yellow sweets. A sweet is to be taken at random from the bag and eaten. A second sweet is then to be taken at random from the bag.

(a) Complete the tree diagram.



(3)

(b) Calculate the probability that

(i) both sweets will be green,

(ii) the two sweets will be of different colours,

(iii) at most one of the two sweets will be yellow.

(7)

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Question 8 continued

Q8

(Total 10 marks)

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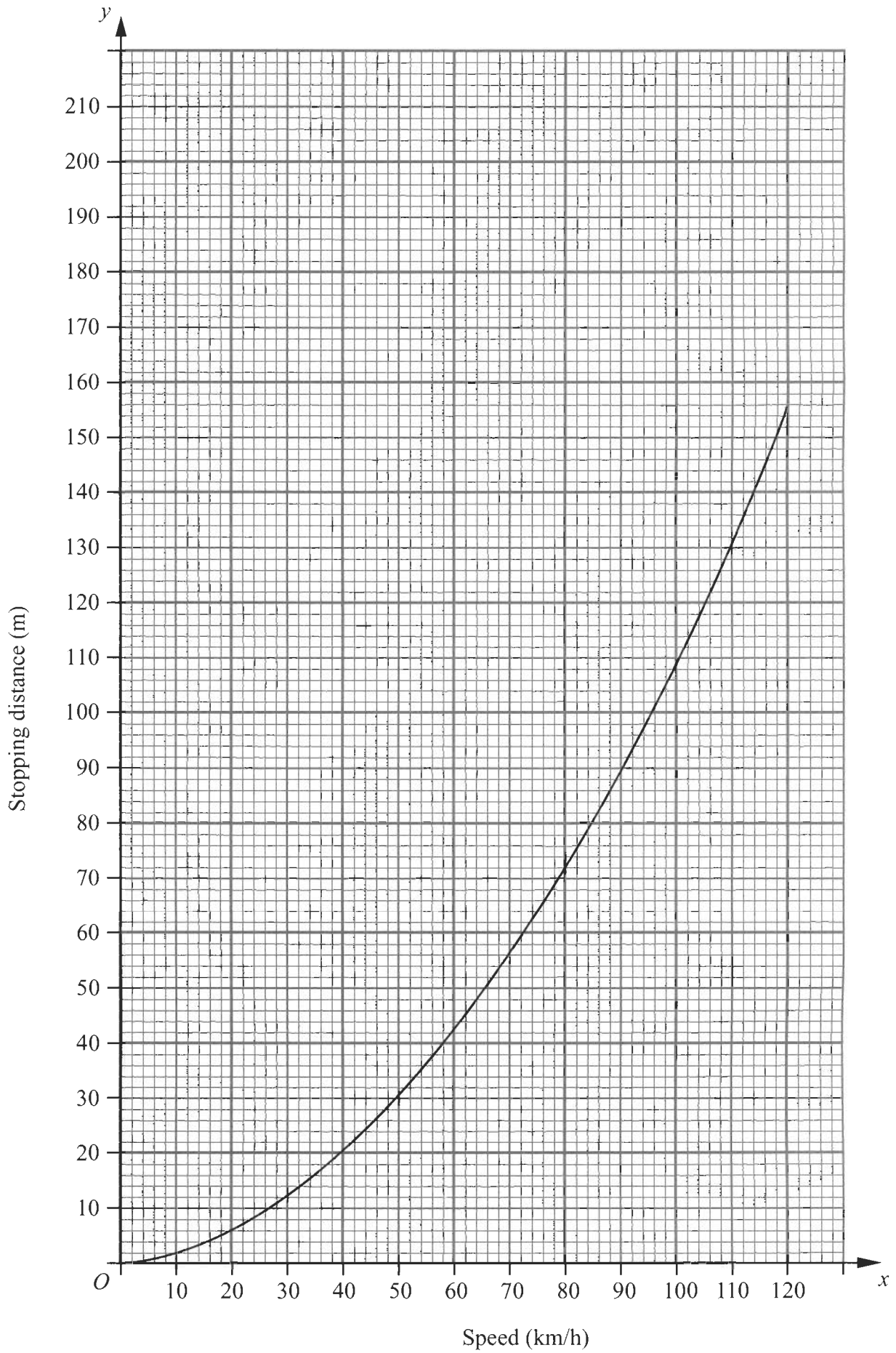
9.



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The graph shows the relationship between the speed of a car, in km/h, and the stopping distance, in m, of the car on a dry road.

(a) Use the graph to estimate the stopping distance on the dry road when the car is travelling at 75 km/h.

(1)

The car is now travelling at the speed for which the stopping distance on the dry road is 120 m.

(b) Use the graph to estimate the stopping distance when the car is travelling at half this speed.

(2)

When the road is wet, the stopping distance, y metres, when the car is travelling at x km/h is given by

$$y = \frac{x^2}{75} + \frac{x}{15}.$$

(c) Complete the following table, giving the values of y to one decimal place.

x	0	10	20	30	40	50	60	70	80	90	100	110	120
y	0	2		14	24		52	70		114	140	168.7	200

(3)

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

(3)

The car is travelling at the speed for which the stopping distance on the wet road is 134 m.

(e) From your graph, find an estimate of the speed, in km/h, of the car.

(2)

When the car is travelling at v km/h, the **difference** between the stopping distance on the wet road and the stopping distance on the dry road is 27 m.

(f) From your graph, find an estimate of v.

(2)

Leave blank

Question 9 continued

Leave blank

Question 9 continued

Q9

(Total 13 marks)

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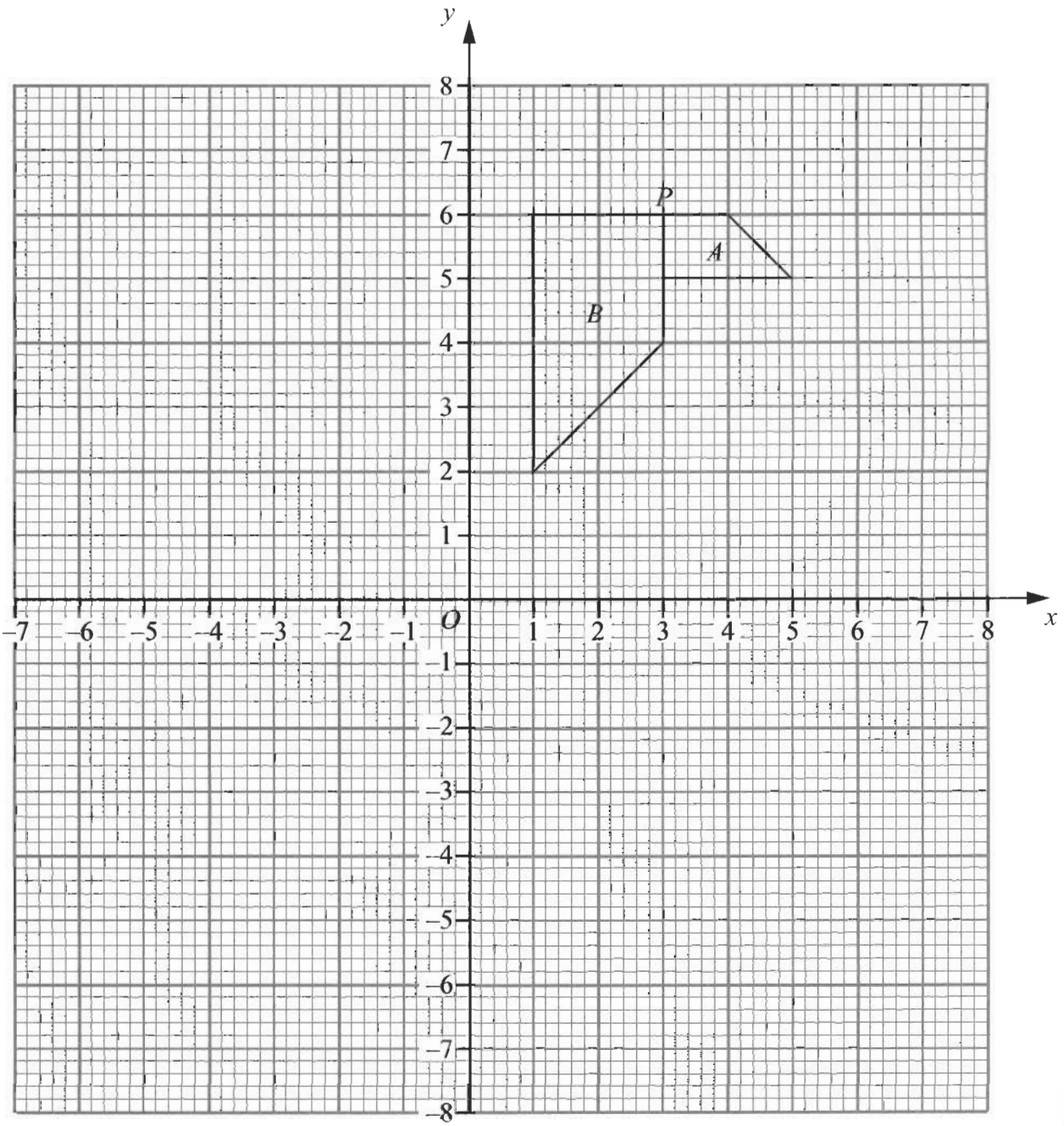
10.



The trapezium B is the image of trapezium A under the combined transformation of a rotation about the point P followed by an enlargement.

(a) Write down the angle and direction of the rotation.

(1)

(b) Describe fully the enlargement.

(2)

The trapezium C is the image of trapezium B under an enlargement with scale factor $-\frac{1}{2}$ and with centre (–3, 4).

Leave blank

(c) On the graph, draw and label trapezium C.

(3)

The matrix $\mathbf{R} = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$.

Trapezium D is the image of trapezium C under the transformation with matrix $\mathbf{R}$.

(d) On the graph, draw and label trapezium D.

(2)

(e) Describe fully the transformation with matrix $\mathbf{R}$.

(2)

Trapezium A is the image of trapezium D under the transformation with matrix $\mathbf{T}$.

(f) Describe fully the transformation with matrix $\mathbf{T}$.

(2)

(g) Find the matrix $\mathbf{T}$.

(2)

Q10

(Total 14 marks)

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11.

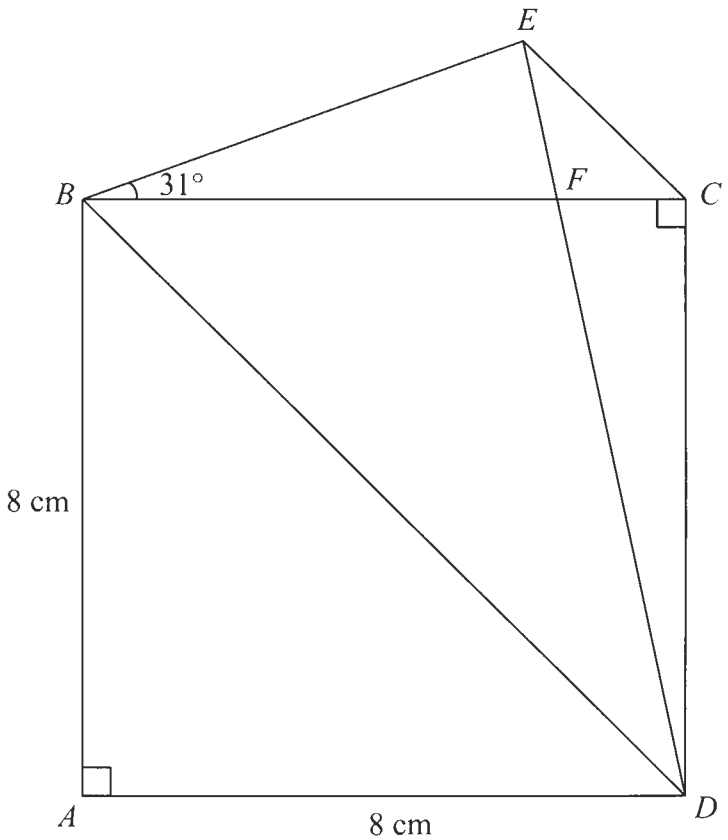

Figure 4

In Figure 4, $ABCD$ is a square of side 8 cm. The point E is such that $DE = DB$ and $\angle EBC = 31°$. The intersection of DE and BC is the point F.

Calculate, giving your answers to 3 significant figures,

(a) the length, in cm, of DB,

(2)

(b) the length, in cm, of BE,

(4)

(c) the size, in degrees, of $\angle CDF$,

(2)

(d) the length, in cm, of CF,

(2)

(e) the area, in cm^2, of triangle BEF,

(3)

(f) the area, in cm^2, of triangle EFC.

(3)

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

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Question 11 continued

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Question 11 continued

Q11

(Total 16 marks)

TOTAL FOR PAPER: 100 MARKS

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