Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
TOTAL	

Free-Standing Mathematics Qualification
Higher Level

Shape and Space 4985

Specimen Question Paper

For this paper you must have:

- a clean copy of the Data Sheet (enclosed)
- a protractor
- a pair of compasses
- a ruler
- a calculator.

Time allowed

- 1 hour 15 minutes

Instructions

- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page.
- Do all rough work in this book. Cross through any work that you do not want to be marked.
- You may **not** refer to the copy of the Data Sheet that was available prior to this examination. A clean copy is enclosed for your use.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 50.
- You are expected to use a calculator where appropriate.

Advice

- In all calculations, show clearly how you work out your answer.

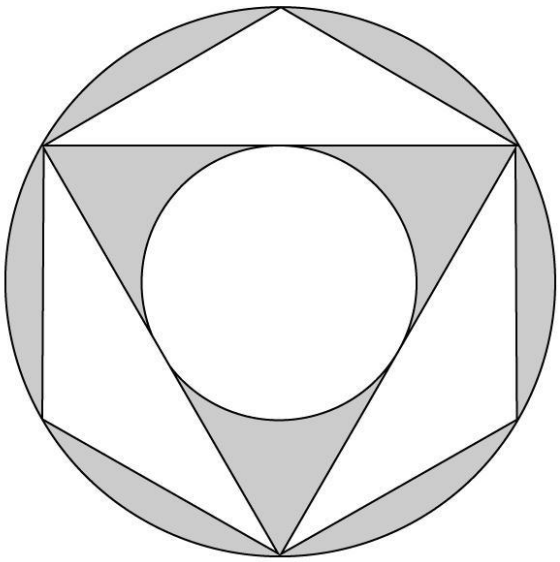
Section A

Answer **all** questions in the spaces provided.

Use **Crop Circles** *from page 2 of the Data Sheet*.

1 The diagram below shows the pattern of one of the crop circles.

The white shapes represent the crops that were flattened.



1 (a) In the cornfield the smaller inner circle has a diameter of 25 metres.

Calculate the area of this circle.

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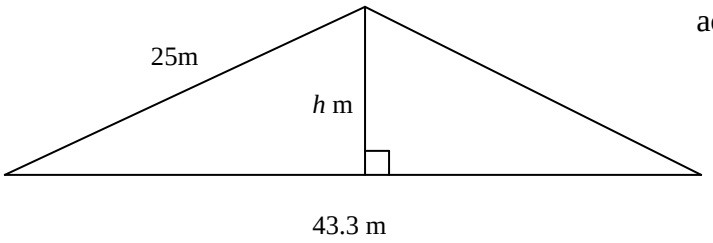
.....

(3 marks)

1 (b) The diagram shows the dimensions of one of the white isosceles triangles.



1 (b) (i) Calculate the height, *h* metres, of this triangle.

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(3 marks)

1 (b) (ii) Calculate the area of this triangle.

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.....

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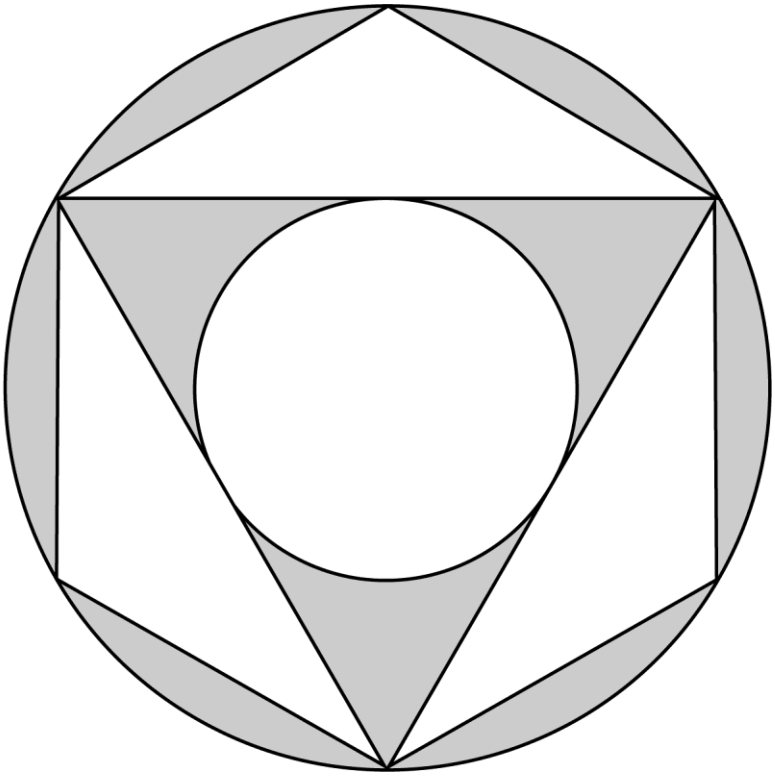
(2 marks)

1 (c) The crop circle is shown again below.

The white shapes represent the crops which were flattened.

Scale 1 : 500



Use your answers to parts **(a)** and **(b)** to find the total area of the crops which were flattened to form this crop circle.

Give your answer to 3 significant figures.

.....

.....

.....

(3 marks)

11

2 In triangle *PQR*, the length of *PR* is 42 m and the length of *PQ* is 54 m.

Both of these lengths are given to the nearest metre.

Find the upper bound in the difference between these two lengths.

.....

.....

.....

(3 marks)

3 Another triangle *PQR* has sides *PQ* of length 55 m, *PR* of length 50 m and *QR* of length 40 m.

3 (a) Draw a scale drawing of this triangle.

Use the scale of 1 cm : 5 m.

(3 marks)

Using **pencil**, **ruler** and a pair of **compasses** only, follow the instructions **(b)** and **(c)** below.

Leave **all** construction lines in your drawing

3 (b) Construct the perpendicular bisectors of *PQ* and *QR*.

(3 marks)

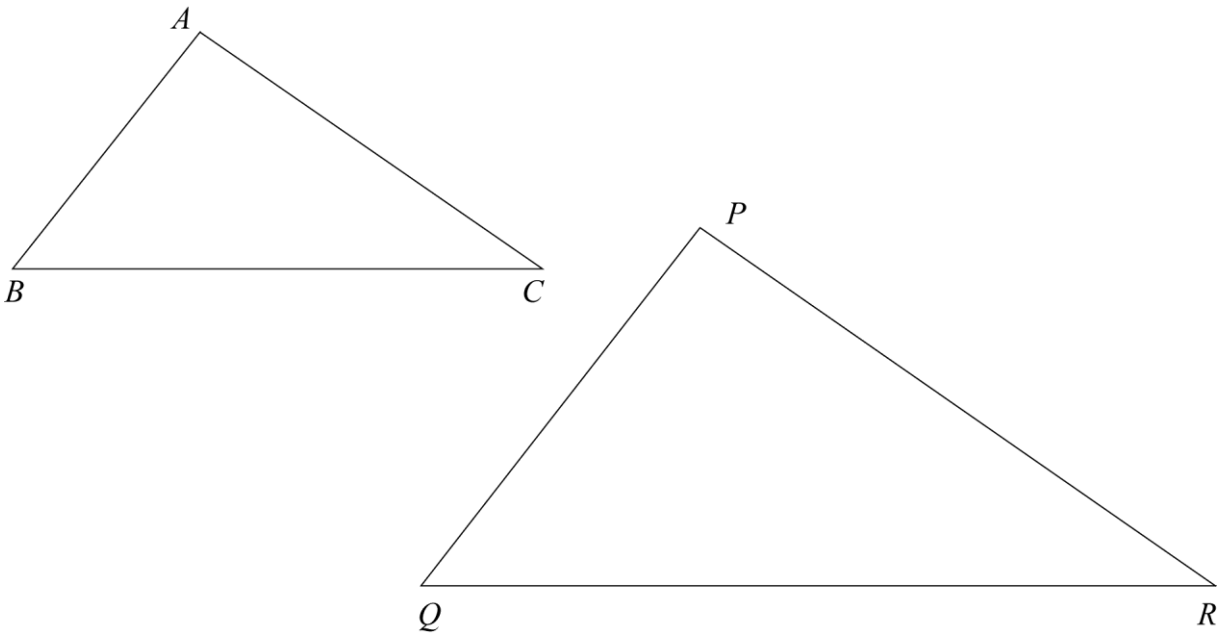
The point of intersection of the perpendicular bisectors in (b) is the centre of the circle passing through the points *P*, *Q* and *R*.

3 (c) Draw the circle passing through *P*, *Q* and *R*.

(1 mark)

7

4 Triangles *ABC* and *PQR* are similar in shape with angles *A* and *P* being equal and angles *B* and *Q* being equal.



The length of *AB* is 6 cm.
The length of *PQ* is 8 cm.
The length of *AC* is 9 cm.
The length of *RQ* is 12 cm.

4 (a) Calculate the length of *BC*.

.....

.....

(2 marks)

4 (b) Calculate the length of *PR*.

.....

.....

(2 marks)

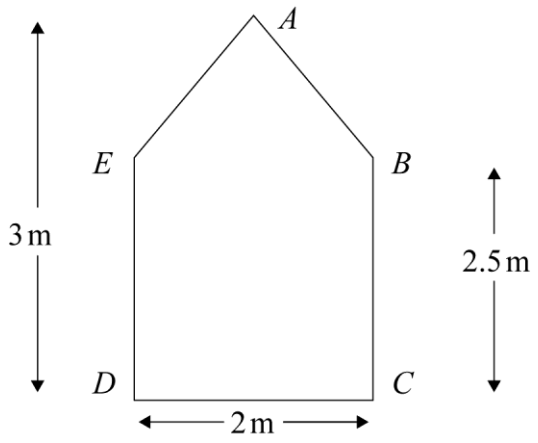
4

Section B

Answer **all** questions in the spaces provided.

Use **Garden Shed** *from page 3 of the Data Sheet*.

5 The diagram below shows the end view of one of the sheds.



Not drawn accurately

BCDE is rectangular in shape with $BC = ED = 2.5$ metres.
The base CD is of length 2 metres.
The top point of the roof, A, is 3 metres vertically above CD.
The dimensions all relate to the interior of the shed.

5 (a) Calculate the area of the end view.

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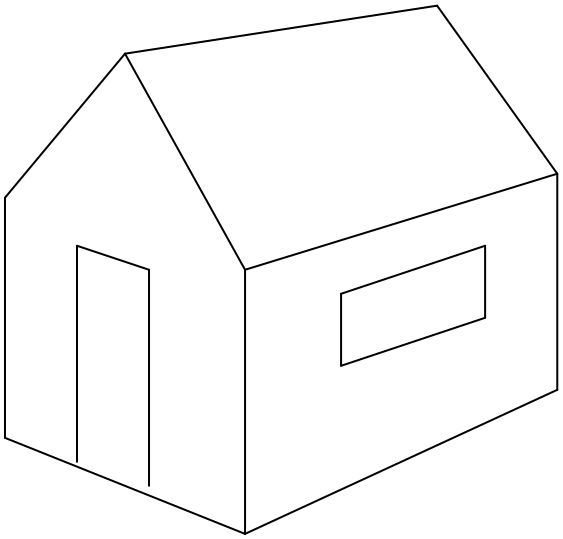
(4 marks)

5 (b) The interior of the shed is a prism of length 4 metres as shown.



Not drawn accurately

Calculate the volume of the interior of the shed.

State your units.

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.....

.....

(3 marks)

5 (c) The height of the door in the shed is 1.8 metres. Convert this height to feet and inches.

Use the conversions 1 inch = 2.54 centimetres and 1 foot = 12 inches.

Give your answer to the nearest inch.

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(3 marks)

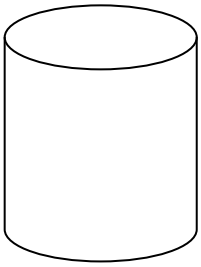
10

Section C

Answer **all** questions in the spaces provided.

Use **Water Butt** *from page 4 of the Data Sheet*.

6 The water butt is cylindrical; its height is 1.5 m and its radius is 40 cm.



Not drawn accurately

6 (a) Convert the radius of the water butt into metres.

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(1 mark)

6 (b) Find the volume of the water butt.

Give your answer in m^3.

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(2 marks)

6 (c) The water butt is used to fill a garden pond.

The pond is in the shape of a hemisphere with a radius of 0.6 m.

Find the volume of the hemispherical pond.

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(2 marks)

6 (d) Initially the water butt was full

Calculate the percentage of the water from the water butt which was used to fill the pond.

.....

.....

(2 marks)

7 A large water butt is also on sale. The two water butts are similar in shape.

Every dimension in the larger water butt is twice the size of the dimension in the smaller water butt.

Find the ratio of the volume of the larger water butt to the volume of the smaller water butt.

.....

.....

(2 marks)

7

2

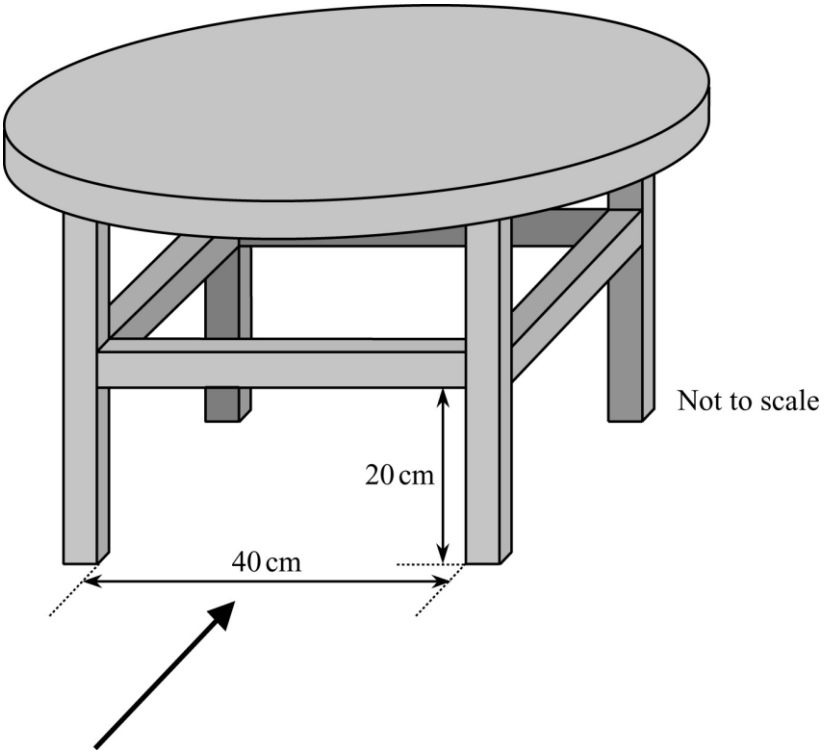
8 The diagram below shows a coffee table with 4 planes of symmetry.

The circular top has a diameter of 80 cm and is 4 cm thick.

The wood used for the frame has a square cross-section 4 cm by 4 cm.

The vertical legs are 50 cm long.

The horizontal pieces of wood joining the legs are 40 cm long and are attached to the legs at a distance of 20 cm above the bottom of the legs (shown in the sketch below).



On the next page, draw a front elevation of this coffee table viewed from the direction shown by the arrow.

Make your drawing to a scale of 1:5 and show all hidden detail.

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(6 marks)

END OF QUESTIONS

6