Surname	
Other Names	
Candidate Signature	

Centre Number						Candidate Number				

Examiner Comments	

Total Marks

PAPER 2H

GCSE MATHEMATICS

CM

Practice Set B | Calculator | Time allowed: 1 hour 30 minutes

Instructions to candidates:

• In the boxes above, write your centre number, candidate number, your surname, other names and signature.

• Answer ALL of the questions.

• You must write your answer for each question in the spaces provided.

• You may use a calculator.

Information to candidates:

• Full marks may only be obtained for answers to ALL of the questions.

• The marks for individual questions and parts of the questions are shown in round brackets.

• There are 18 questions in this question paper. The total mark for this paper is 80.

Advice to candidates:

• You should ensure your answers to parts of the question are clearly labelled.

• You should show sufficient working to make your workings clear to the Examiner.

• Answers without working may not gain full credit.

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1 0 3 3 1 1 2 2 8 0 0 0 4

Do not write outside the box

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

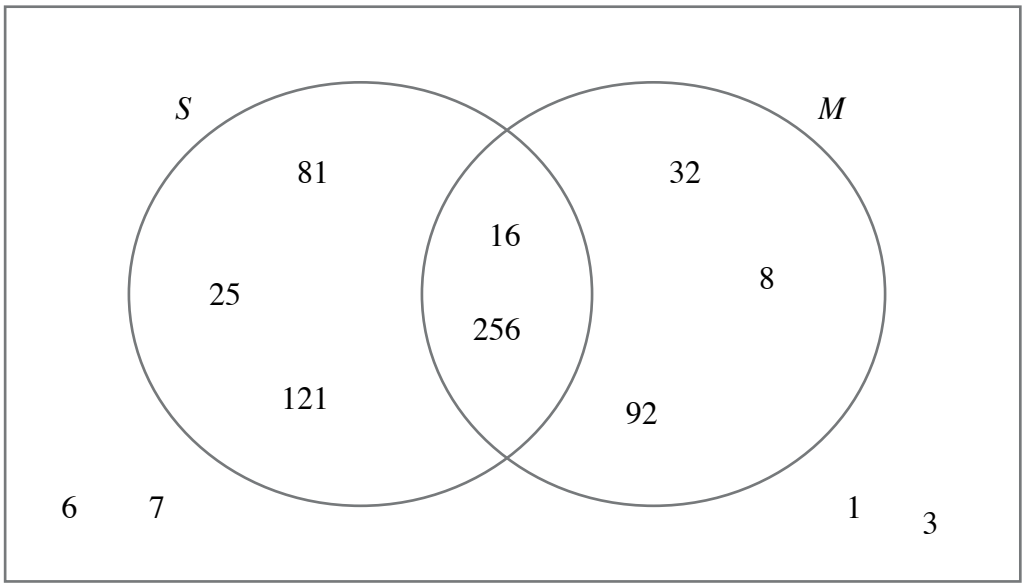
1 George generates some numbers at random.

He separates them into two categories:

- square numbers (*S*)
- multiples of 4 (*M*)

He draws a Venn diagram for his set of numbers.

His Venn diagram is shown below.



One of George's numbers is in the wrong place.

(a) Circle this number on the Venn diagram. **(1)**

George picks a number from his set at random.

(b) What is the probability that the number is in the set $S \cap M$?

.....

(2)

(Total for Question 1 is 3 marks)

Do not write outside the box

2 The nth term of a sequence is $5n - 3$.

(a) Write down the 8th term in this sequence.

.....

(1)

(b) Is 148 a term in this sequence?

Justify your answer.

(2)

(Total for Question 2 is 3 marks)

3 Two variables x and y are such that x and $(y + 2)$ are in the ratio 1:3.

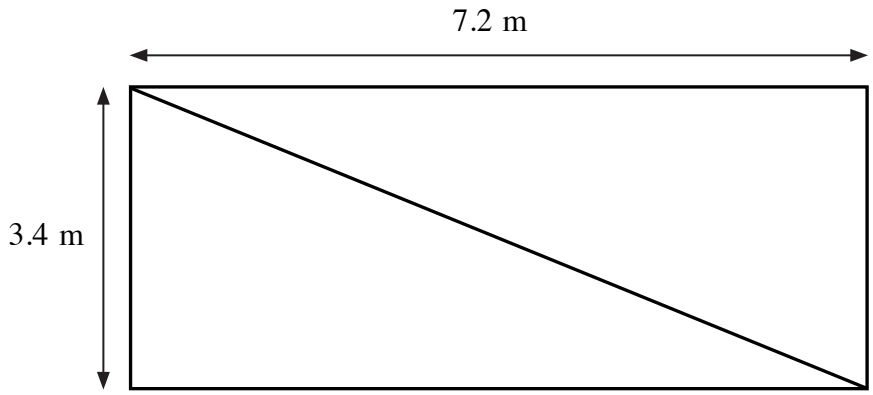
Show that $y = 3x - 2$.

(Total for Question 3 is 3 marks)

Do not write outside the box

4 Laci is an engineer.

She wants to construct the rectangular framework below.



NOT TO SCALE

There are two choices of material.

Material **A**	Material **B**
• £10.32 for the first ten metres • £8.26 for every additional ten metres	• £27.18 for twenty metres • For every twenty metres bought, get twenty metres free

She wants to construct the framework for the least possible cost.

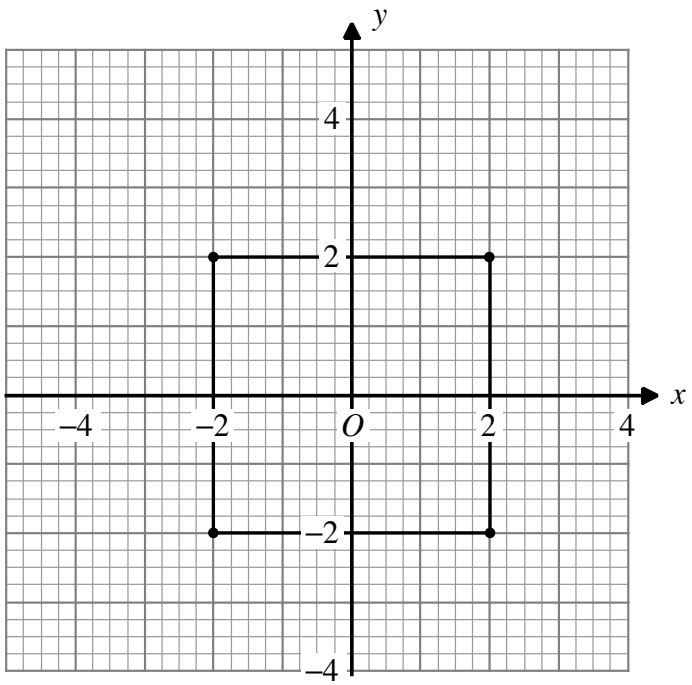
Which material should Laci use for the framework?

You must show all of your working.

(Total for Question 4 is 5 marks)

Do not write outside the box

5 The square S is shown on the coordinate axes below.



The vertices of S are at (2, 2), (2, –2), (–2, –2) and (–2, 2).

Two transformations are applied to S to give the square S^*.

The vertices of S^* are (3,5), (3, –3), (–5, –3) and (–5, 5).

Describe fully a sequence of two transformations that can be applied to S to obtain S^*.

(i) First transformation

.....

.....

.....

(ii) Second transformation

.....

.....

.....

(Total for Question 5 = 5 marks)

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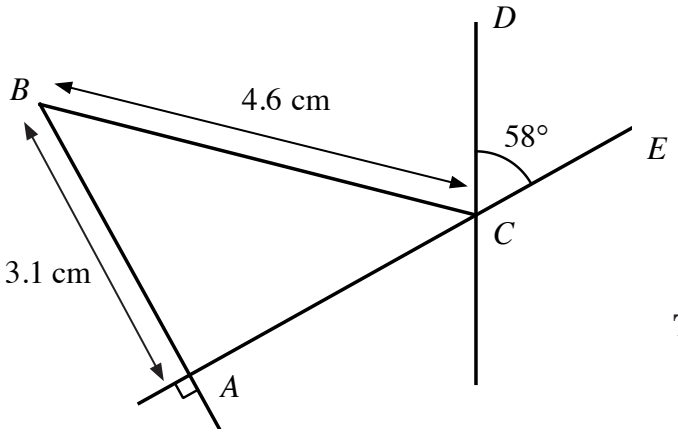
6



NOT TO SCALE

ABC is a triangle with *AB* = 3.1 cm and *BC* = 4.6 cm.

ACE is a straight line. The angle *DCE* = 58°.

Find the size of the angle *BCD*.

o

.....

(Total for Question 6 is 4 marks)

Do not write outside the box

7 Lucy is studying a degree at university.

In her first year, Lucy studies three modules.

- Module 1 counts for 20% of the first year
- Module 2 counts for 30% of the first year
- Module 3 counts for 50% of the first year

The first year counts towards 10% of Lucy's total degree.

Lucy has scored 80 out of the 120 available marks in Module 1.

Lucy has scored 60% in Module 2.

She does **not** want to lose more than 4% of her total degree in her first year.

What is the minimum percentage Lucy needs to score in Module 3 to achieve her goal?

Give your answer to two decimal places and show **all** of your working.

.....%

(Total for Question 7 is 5 marks)

Do not write outside the box

8 Show in clear stages that $(2h + 3)^2 - (h + 1)^2$ can be written in the form $ah^2 + bh + c$, where a, b and c are integers to be found.

(Total for Question 8 is 4 marks)

9 The curve C has the equation $y = 2^{-x}$.

(a) Sahil says that the variables y and 2^{-x} are directly proportional.

Which of the following is true about Sahil's claim?

Circle your answer.

Sahil is correct	Sahil is incorrect	More information is needed to decide

(1)

(b) Write down the coordinates of the point where the curve C crosses the y axis.

.....

(1)

(Total for Question 9 is 2 marks)

Do not write outside the box

10 **A** and **B** are two polygons.

Polygon **A** is a regular polygon. It has 15 sides. An exterior angle in **A** is y^o.

Polygon **B** has x sides. An interior angle in **B** is $2y^o$.

Show that polygon **B** is not regular.

.....

(Total for Question 10 is 4 marks)

Do not write outside the box

11 Heidi collects data about the temperature distribution in degrees Fahrenheit (°F) for a sample of 40 days in Chicago in 1995.

Her data is shown in the table below.

Temperature (T °F)	Frequency
$60 < T \leq 70$	3
$70 < T \leq 80$	15
$80 < T \leq 90$	17
$90 < T \leq 100$	5

Initially Heidi had 41 data points.

Her 41st data point was a temperature reading of 125 °F.

Heidi did not include this in her data table.

(a) Suggest why.

.....

.....

(1)

(b) On the graph paper on Page 11, draw a cumulative frequency diagram for these data. **(2)**

(c) Using Heidi's data, estimate the median temperature in Chicago in 1995

.....

(1)

(d) (i) Using Heidi's data, estimate the limits between which the middle 50% of the data lies.

middle 50% of the data lies between ..... and .....

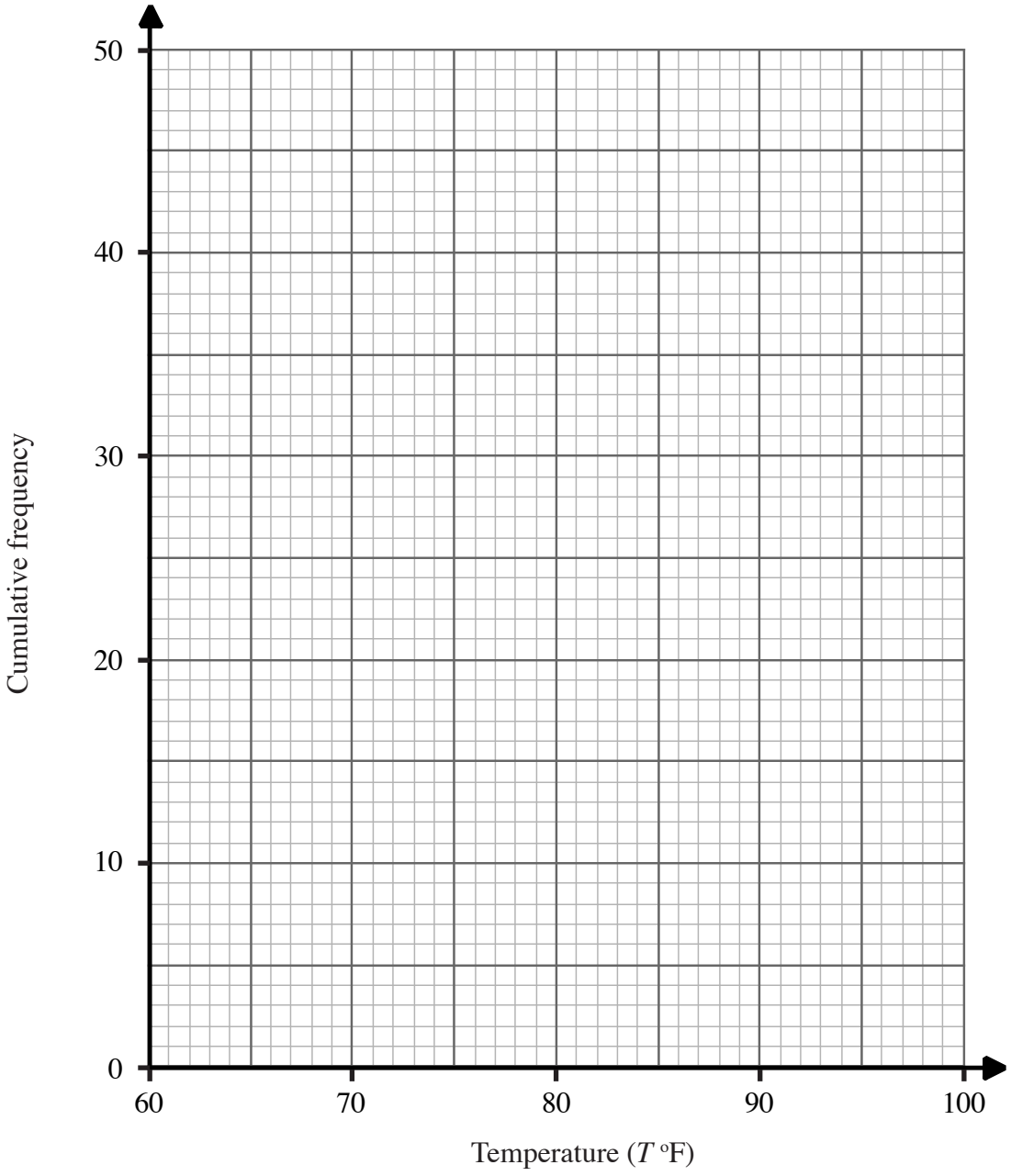
(3)

(d) (ii) State the term used to describe the range of the middle 50% of the data.

.....

(1)

Do not write outside the box



(e) Explain why Heidi's data may not be fully representative of the temperature distribution in Chicago in 1995.

.....

.....

(1)

(Total for Question 11 is 9 marks)

Do not write outside the box

12 The curve C has the equation $y = x^2 - 7x + 10$.

Find the coordinates of the minimum point on the curve C.

.....

(Total for Question 12 is 3 marks)

13 The first three terms in a geometric sequence are

$$4 - 2\sqrt{3} \qquad x \qquad 16 - 8\sqrt{3}$$

Given that $x > 1$, find the exact value of x.

.....

(Total for Question 13 is 4 marks)

Do not write outside the box

14 (a) Show that the equation $x^2 + 4x - x^3 = 0$ has a solution between $x = 2$ and $x = 3$.

(2)

(b) Show that the equation $x^2 + 4x - x^3 = 0$ can be written in the form $x = 1 + \frac{4}{x}$.

(1)

(c) Use the iterative formula $x_{n+1} = 1 + \frac{4}{x_n}$, starting with $x_0 = 2.5$, to find an approximation for the value of x_3. Give your answer to six significant figures.

Show all of your working.

.....

(3)

The solution to $x^2 + 4x - x^3 = 0$ between $x = 2$ and $x = 3$ is 2.56 to two decimal places.

(d) Find the first value of k such that x_k approximates this solution correct to two decimal places.

.....

(1)

(Total for Question 14 is 7 marks)

Do not write outside the box

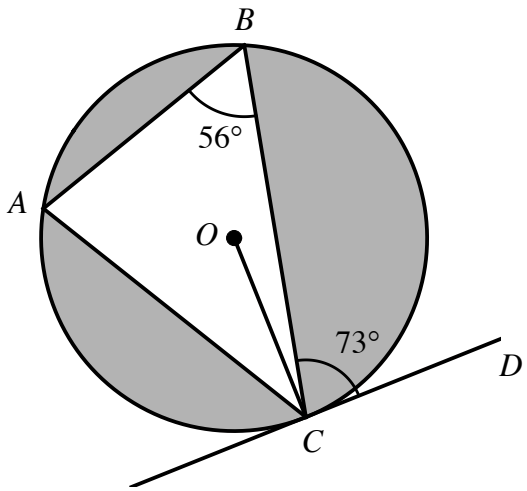
15 Use your knowledge of recurring decimals to prove that 0.999... = 1.

.....

(Total for Question 15 is 3 marks)

Do not write outside the box

16



NOT TO SCALE

The triangle *ABC* are points on a circle which has centre *O* and radius 6 cm.

The angle *ABC* = 56° and the angle *BCD* = 73°.

The length of the chord *AB* is 8 cm.

Find the area of the shaded region.

Show all of your working clearly.

.....cm^2

(Total for Question 16 is 6 marks)

Do not write outside the box

17 The functions f and g are such that

$f(x) = 3x - 2 \qquad g(2x + 1) = ax + b$

(a) Show that $g(x) = \frac{1}{2}ax + b - \frac{1}{2}a$.

(1)

(b) Given that $g(1) = 4$, write down the value of b.

.....

(1)

(c) Given further that $f^{-1}(2) = g(0)$, find the value of a.

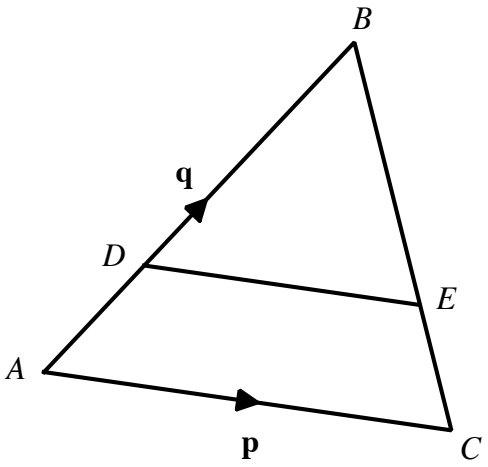
.....

(4)

(Total for Question 17 = 6 marks)

Do not write outside the box

18



The triangles *ABC* and *BDE* are similar.

$\overrightarrow{AB} = \mathbf{q}$ and $\overrightarrow{AC} = \mathbf{p}$.

The ratio $AB:AD = 1:k$.

(a) Write down, in terms of k, the ratio $CB:CE$.

.....

(1)

(b) Prove that DE is parallel to AC.

(3)

(Total for Question 18 = 4 marks)

TOTAL FOR PAPER = 80 MARKS

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