Please write clearly, in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

GCSE MATHEMATICS

H

Higher Tier Paper 1 Non-Calculator

Exam Date Morning Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:
- mathematical instruments

You must **not** use a calculator.

Instructions
- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer book.

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

For Examiner's Use	
Pages	Mark
2 - 3	
4 - 5	
6 - 7	
8 - 9	
10 - 11	
12 - 13	
14 - 15	
16 - 17	
18 - 19	
20 - 21	
22 - 23	
TOTAL	

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

1 (a) Circle the highest common factor (HCF) of $4x^2y$ and $8xy^3$

[1 mark]

$2xy$ $4xy$ $8x^2y^3$ $8x^3y^4$ $32x^2y^3$

1 (b) Circle the lowest common multiple (LCM) of $4x^2y$ and $8xy^3$

[1 mark]

$2xy$ $4xy$ $8x^2y^3$ $8x^3y^4$ $32x^2y^3$

2 For which acute angle do $\sin x$ and $\cos x$ have the same value?

Circle your answer.

[1 mark]

0° 30° 45° 60°

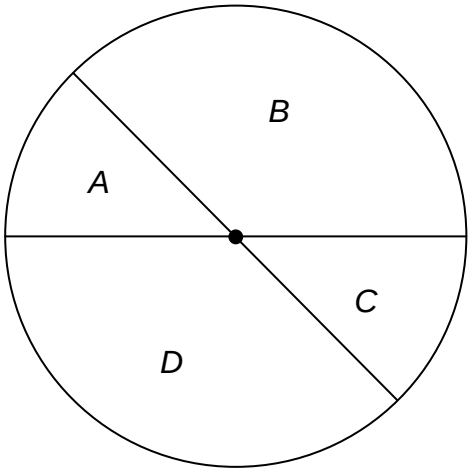
3 Circle the gradient of the straight line $4y + 3x - 1 = 0$

[1 mark]

3 $\frac{3}{4}$ $\frac{4}{3}$ $-\frac{3}{4}$

4 A circle has radius 6 cm

Two diameters split the circle into four sectors, as shown.



Not drawn accurately

Area of sector *A* : Area of sector *B* = 1 : 3

Work out the area of sector *A*.

Give your answer in terms of π.

[3 marks]

Answer _____ cm^2

7

5 The table shows information about the times for 100 people to complete a task.

Time, *t*, (minutes)	**Frequency**
$0 < t \leqslant 5$	17
$5 < t \leqslant 10$	28
$10 < t \leqslant 15$	33
$15 < t \leqslant 20$	22

The shortest time was 3 minutes 40 seconds.

5 (a) Work out the **greatest** possible range of times.

[2 marks]

Answer _____ minutes _____ seconds

5 (b) Jack says,

"The median time is exactly 10 minutes."

Give a reason why he **must** be incorrect.

[1 mark]

6 Using ruler and compasses,

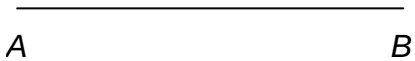
construct a triangle *ABC* so that

BC is perpendicular to *AB*

AC = 9 cm

AB has been drawn for you.

[3 marks]



6

7 A bag contains 20 counters.

10 of the counters are red, 8 are blue and 2 are yellow.

Three counters are taken out at random.

7 (a) If all 3 of these counters are the **same** colour, what is the probability that the next counter taken out at random is yellow?

[1 mark]

Answer _____

7 (b) If all 3 of these counters are **different** colours, what is the probability that the next counter taken out at random is yellow?

[1 mark]

Answer _____

8 List the integers that satisfy both these inequalities.

$2x + 7 < 0$

and $x > -10$

[2 marks]

Answer _____

9 y is directly proportional to x.

Complete the table.

[2 marks]

x	–8	0	7
y			63

Turn over for the next question

6

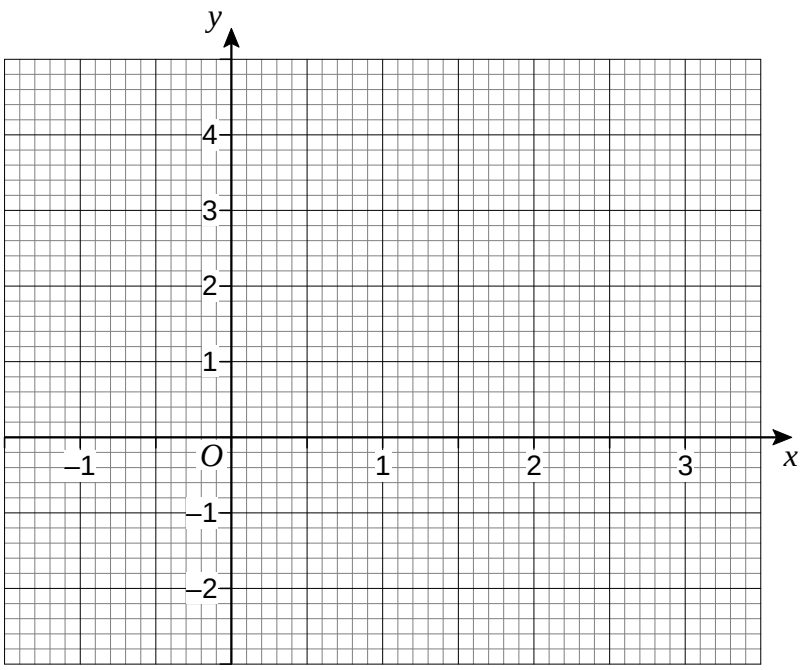
10 (a) Complete the table of values for $y = x^2 - 2x$

[2 marks]

x	–1	0	1	2	3
y		0	–1		

10 (b) Draw the graph of $y = x^2 - 2x$ for values of x from –1 to 3

[2 marks]



10 (c) Write down the coordinates of the turning point of the graph.

[1 mark]

Answer (_____ , _____)

11 Jon is drawing a quadrilateral.

The length of each side is 5.2 cm to 1 decimal place.

11 (a) Complete the error interval for the length of one side.

[2 marks]

Answer _____ cm $\leqslant$ length $<$ _____ cm

11 (b) Complete the error interval for the perimeter.

[2 marks]

Answer _____ cm $\leqslant$ perimeter $<$ _____ cm

Turn over for the next question

9

12 (a) Solve $\frac{2w - 3}{6} = 4$

[3 marks]

$w =$ _____

12 (b) Solve $4x^2 - 25 < 0$

[3 marks]

Answer _____

Do not write outside the box

12 (c) Solve $\frac{1}{y-6} = 5$

[3 marks]

$y =$ _____

Turn over for the next question

9

13 (a) Circle the value of $\cos 60°$

[1 mark]

$\frac{1}{\sqrt{3}}$ $\sqrt{3}$ $\frac{1}{2}$ $\frac{\sqrt{3}}{2}$

13 (b)

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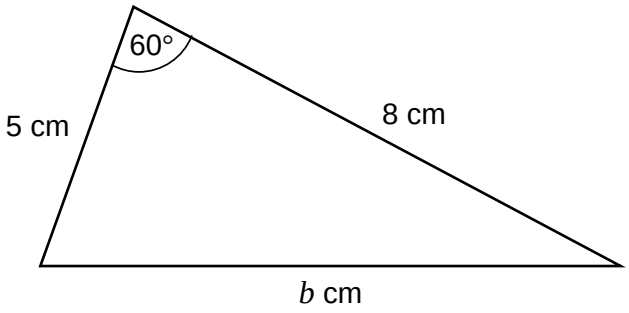
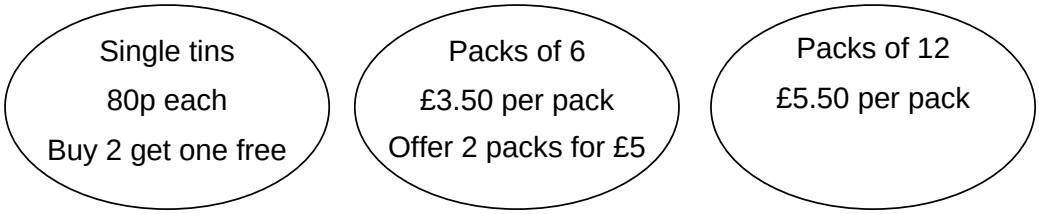


Show that $b = 7$

[3 marks]

14 Tins of dog food are sold as follows.



Work out the cheapest way to buy 21 tins.

You **must** show your working.

[4 marks]

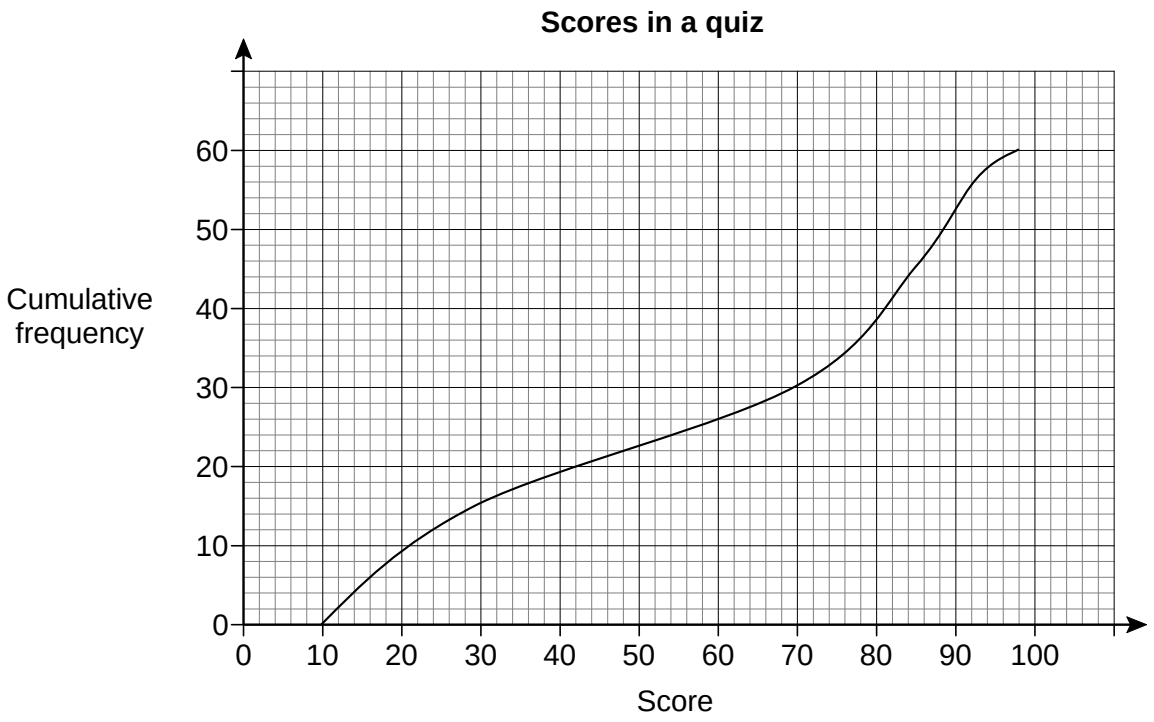
Answer _____

Turn over for the next question

8

15 60 people take part in a quiz.

The graph summarises their scores.



15 (a) Estimate what fraction of the 60 people scored **more** than 30

[2 marks]

Answer _____

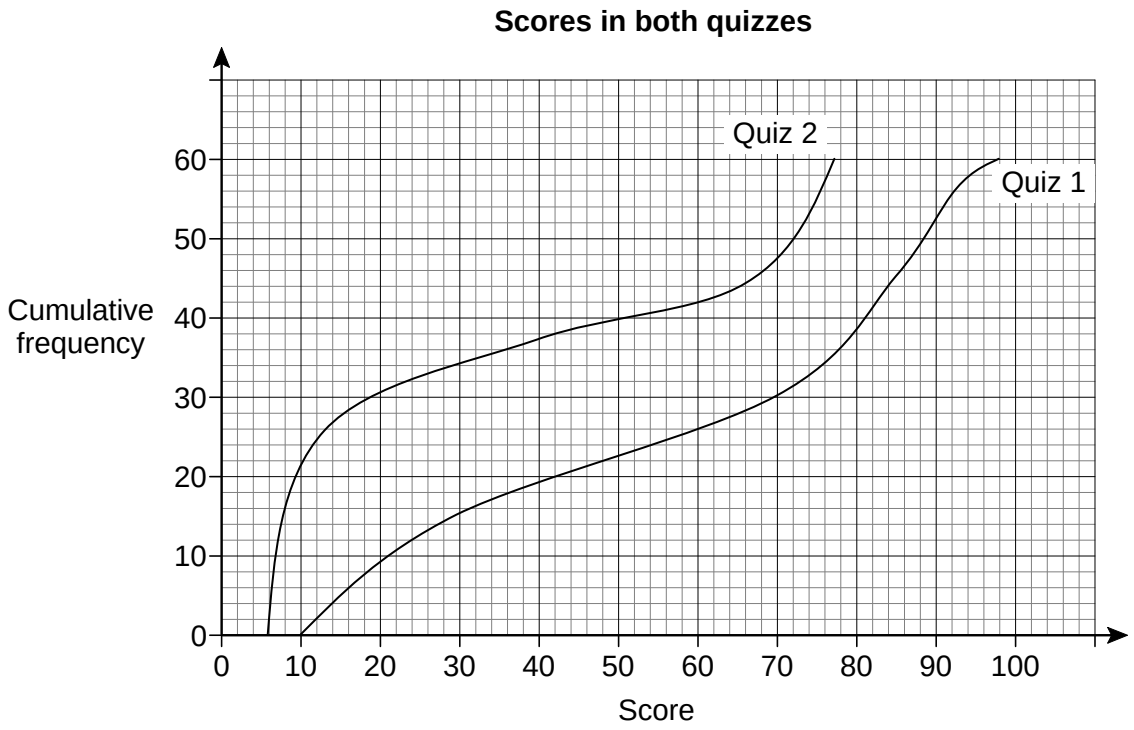
15 (b) Estimate the median score.

[1 mark]

Answer _____

15 (c) The same people take part in a second quiz.

The graph summarizes their scores for both quizzes.



Jack states,

"This quiz was easier than the first quiz because the graph is higher."

Does the graph support his statement?

Give a reason for your answer.

[2 marks]

☐ Yes ☐ No

16 A toy box contains red, yellow, blue and green bricks.

25% of the bricks are red.

There are 12 yellow bricks.

The ratio yellow to blue to green is 2 : 3 : 1

Show that there are 48 bricks in the box.

[4 marks]

17 (a) Work out the value of 8^{-2}

Circle your answer.

[1 mark]

-16 64 -64 $\frac{1}{64}$

17 (b) Solve $4^x = 8^{\frac{2}{3}}$

[3 marks]

$x =$ _____

17 (c) Simplify $\sqrt{3^0 \times (3^1 + 3^2)}$

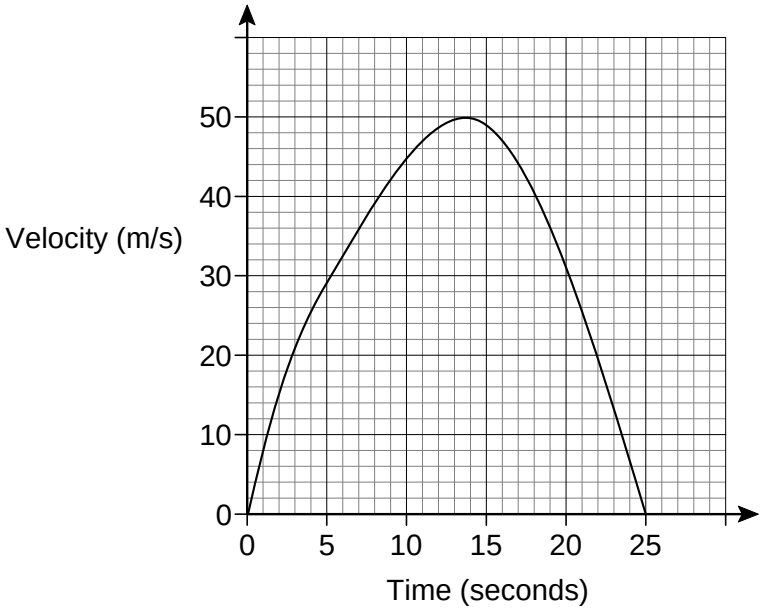
Give your answer in the form $a\sqrt{3}$

[3 marks]

Answer _____

11

18 Here is a velocity-time graph of a car.



Estimate the distance travelled in the first 10 seconds.

[2 marks]

Answer _____ metres

19 In this question all lengths are in centimetres.

The triangle and the trapezium are equal in area.

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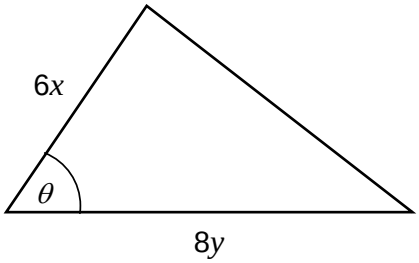
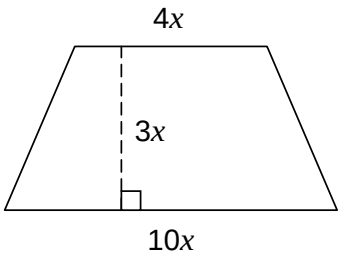




Work out an expression for y in terms of x, given that $\sin\theta = \frac{1}{3}$

Give your answer in the form $y = \frac{a}{b}x$ where a and b are integers.

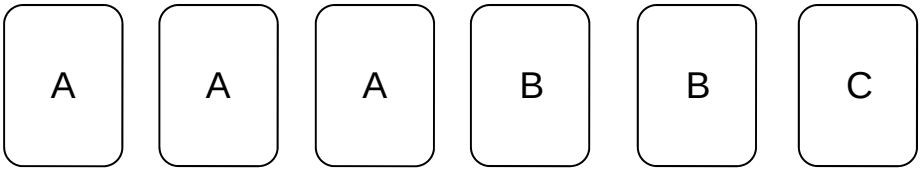
[4 marks]

Answer _____

Turn over for the next question

6

20 Here are six cards.



Two cards are picked at random.

20 (a) Assume that the first card chosen is not replaced.

Work out the probability that both cards are B.

[3 marks]

Answer _____

20 (b) In fact the first card was replaced.

How does this affect the answer to part (a)?

Tick a box.

Show working to support your answer.

[2 marks]

☐ Probability is now bigger

☐ Probability stays the same

☐ Probability is now smaller

21 Circle any fractions that are equivalent to $0.\dot{3}\dot{6}$

[1 mark]

$\frac{36}{100}$ $\frac{36}{99}$ $\frac{4}{11}$ $\frac{9}{25}$

22 $f(x) = 2x^2$

$g(x) = x + 5$

Circle the composite function $fg(x)$

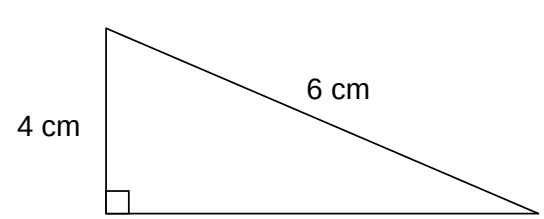
[1 mark]

$2x^2 + 5$ $2(x + 5)^2$ $2(x^2 + 5)$ $4(x + 5)^2$

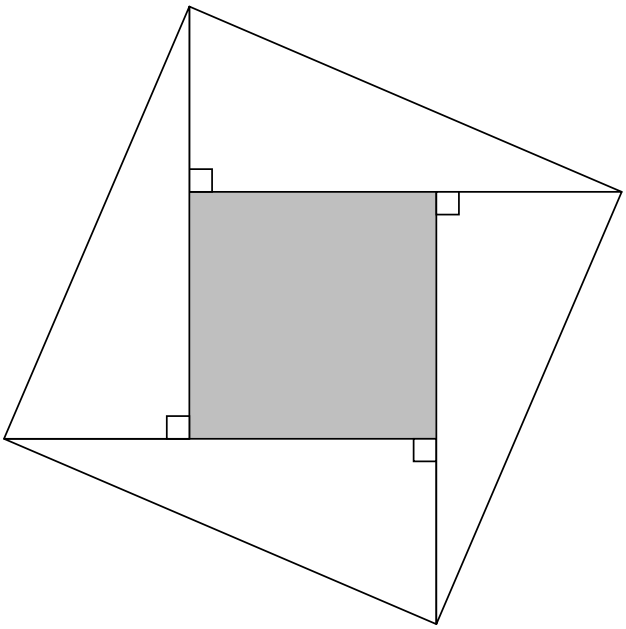
Turn over for the next question

7

23 The diagram shows a right-angled triangle.



Four of these triangles are used to make a shaded square as shown.



Work out the area of the shaded square.

Give your answer in surd form as simply as possible.

[6 marks]

Answer _____ cm^2

END OF QUESTIONS

6

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