AQA

2023 PRACTICE PAPER SET 2

Please write clearly, in block capitals.

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

Surname _____

Forename(s) _____

Candidate signature _____

GCSE MATHEMATICS

H

Higher Tier Paper 3 Calculator

Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:
- mathematical instruments
- 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	
TOTAL	

Do not write outside the box

1 (a) Simplify $(x^3)^2$

[1 mark]

Answer _____

1 (b) Simplify $\frac{y^8}{y^2}$

[1 mark]

Answer _____

2 Write down the sum of the **exterior** angles of any polygon.

[1 mark]

Answer _____

3 $y = \frac{5\sqrt{x}}{2}$

Work out the expression for y^2

[2 mark]

Answer _____

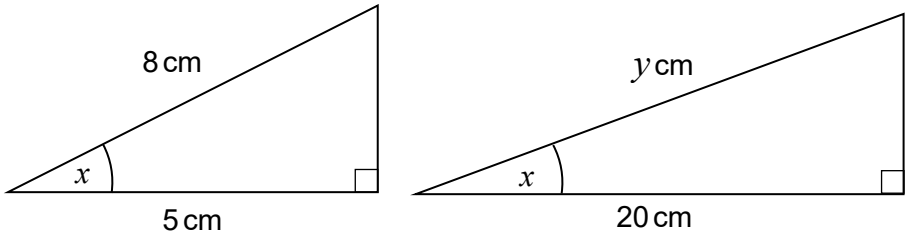
4 A time of 10.4 seconds is given to the nearest 0.1 of a second.

Complete the error interval.

[2 marks]

Answer _____ $\leqslant t <$ _____

5 These two right-angled triangles are similar.



Not drawn accurately

5 (a) Write down the value of $\cos x$

Give your answer as a fraction.

[1 mark]

Answer _____

5 (b) Work out the value of y

[2 marks]

Answer _____ cm

10

Do not write outside the box

6 In a band with 3 members, the mean age is 21 years old.

Ashley joins the band.

The mean age of **all** 4 members of the band is now 22 years old.

Work out the age of Ashley.

[4 marks]

Answer _____ years old

Do not write outside the box

7 John chooses a number at random from the digits 1 to 4

Matt also chooses a number at random from the digits 1 to 4

7 (a) Write down the probability that the **total** of the two numbers chosen is 10

[1 mark]

Answer _____

7 (b) Work out the probability that the **total** of the two numbers chosen is more than 6

[3 marks]

Answer _____

8

8 At a cinema

3 adult and 2 child tickets cost £46

1 adult and 2 child tickets cost £24

Work out the cost of an adult ticket and the cost of a child ticket.

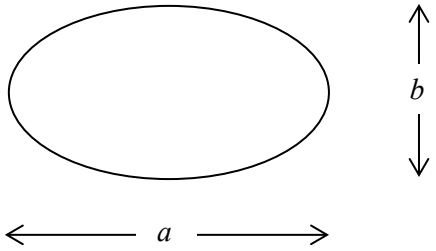
[3 marks]

Cost of an adult ticket £ _____

Cost of a child ticket £ _____

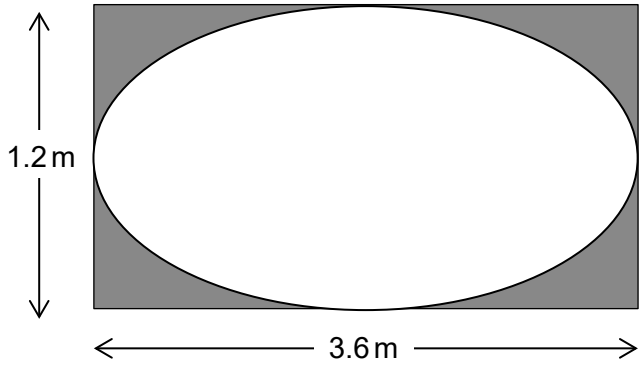
9 The area of an ellipse, width a and height b, is given by

$$\text{Area} = \frac{\pi ab}{4}$$



A sign is made from a rectangular metal sheet measuring 3.6 m by 1.2 m

Not drawn accurately



The shaded sections are removed to make the sign.

Work out the percentage of the rectangular metal sheet used to make the sign.

[3 marks]

Answer _____ %

6

Do not write outside the box

10 Company A claims that their products are half as likely to be faulty compared to Company B.

In a sample, 4% of products from Company A were faulty.

Here are the results of a sample from Company B.

Company B

	Number of products
Faulty	32
Not faulty	368

Comment on Company A's claim.
You **must** show your working.

[3 marks]

Do not write outside the box

11 A teacher asks Ami and Jak to convert 20 976 into standard form.

11 (a) Ami writes 20.976×10^3

What is wrong with Ami's answer?

[1 mark]

11 (b) Jak writes 2.0976×10^{-4}

What is wrong with Jak's answer?

[1 mark]

12 At a concert the ratio of men to women is 5 : 3

The ratio of women to children is 9 : 4

Show that more than half of the people at the concert are men.

[3 marks]

8

Do not write outside the box

13 Solve $4x^2 + 7x - 3 = 0$

Give your answers to 2 decimal places.

[3 marks]

$x =$ _____

14 A calculator gives a value of π as 3.14159

An approximation for π is $\sqrt{\frac{40}{3} - \sqrt{12}}$

Show that the value of the approximation is within 0.01% of the calculator value.

[4 marks]

15 Rearrange $e = \frac{f+7}{6-f}$ to make f the subject.

[4 marks]

Answer _____

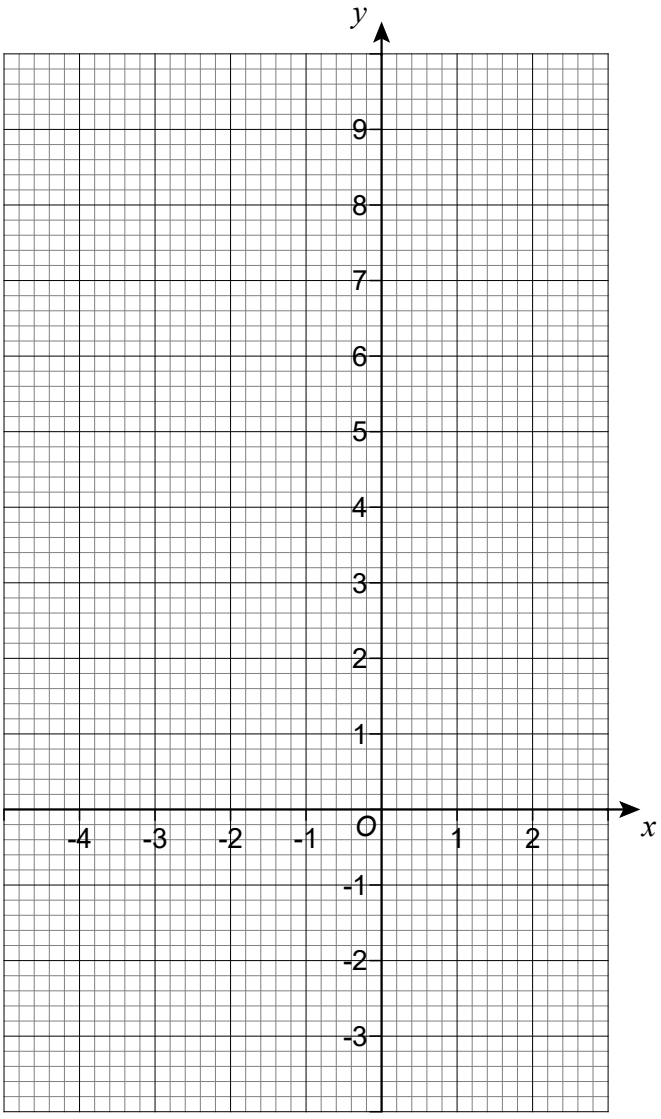
Do not write outside the box

16 The region R satisfies the three inequalities

$$y < 3 \qquad x + y \geqslant 1 \qquad y \geqslant 2x - 2$$

Show the region R on the grid.

[4 marks]



15

Do not write outside the box

17 The universal set contains the whole numbers 1 to 100

O is the set of odd numbers.

P is the set of prime numbers.

S is the set of square numbers.

17 (a) Explain why there are no numbers in $P \cap S$

[1 mark]

17 (b) How many numbers are there in $O \cup P$?

[1 mark]

Answer _____

18 a, b and c are three integers.

a is 5 less than b

c is 5 more than b

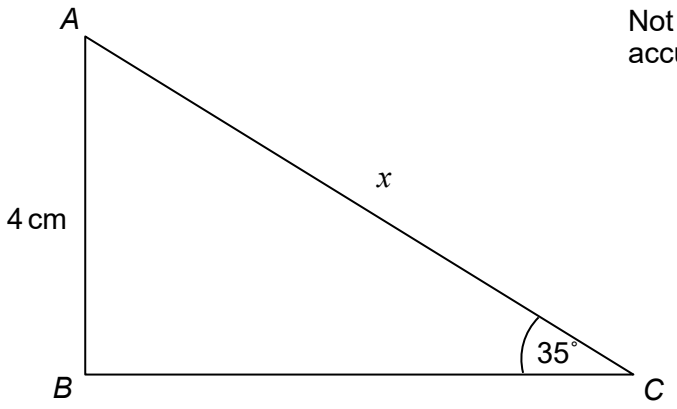
Prove that $ac + 25 = b^2$

[3 marks]

Do not write outside the box

19 Nigel is using trigonometry to work out the size of length x

He assumes that angle *ABC* is a right angle.



19 (a) Using Nigel's assumption, work out the length x

[2 marks]

Answer _____ cm

19 (b) In fact, angle *ABC* is 80°

How inaccurate does this make the answer to part **(a)**?

You **must** show your working.

[3 marks]

10

Turn over

20 An object is dropped from a height h cm.

It takes T seconds to reach the ground.

h is directly proportional to the square of T

When $h = 80$ $T = 4$

Work out the value of h when $T = 7.5$

[5 marks]

Answer _____

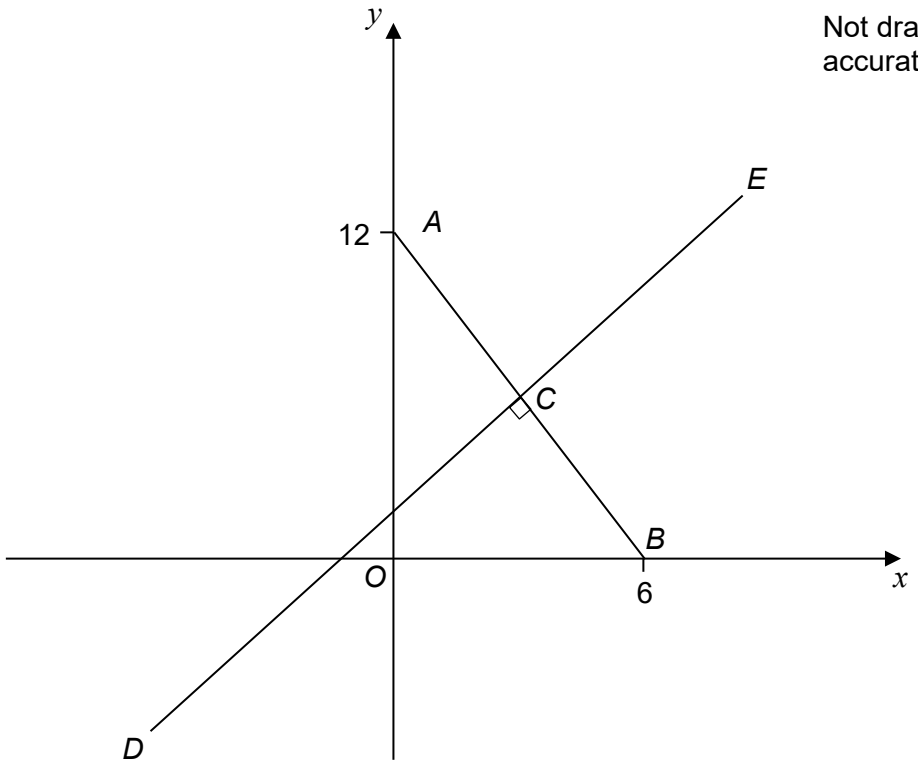
Do not write outside the box

21 *ACB* is a straight line.

A is the point (0, 12), and *B* is the point (6, 0)

C is the midpoint of *AB.*

Line *DCE* is perpendicular to line *ACB.*



Work out the equation of line *DCE*.

[5 marks]

Answer _____

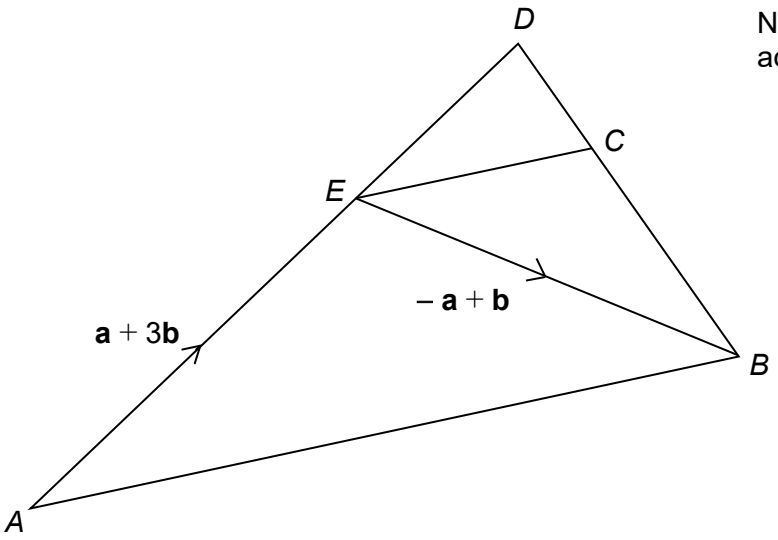
10

Do not write outside the box

22 *AED* is a straight line.

$\overrightarrow{AE} = \mathbf{a} + 3\mathbf{b}$

$\overrightarrow{EB} = -\mathbf{a} + \mathbf{b}$



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22 (a) Work out the vector $\overrightarrow{AB}$

[1 mark]

Answer _____

22 (b) $\overrightarrow{ED} = \frac{1}{3}\overrightarrow{AE}$ and $\overrightarrow{DC} = -\frac{1}{3}\mathbf{a}$

Prove that *EC* is parallel to *AB.*

[3 marks]

Do not write outside the box

23 The graph with equation $y = x^2$ is translated by vector $\begin{pmatrix} 0 \\ -2 \end{pmatrix}$

Circle the equation of the translated graph.

[1 mark]

$y = (x - 2)^2$ $y = (x + 2)^2$ $y = x^2 - 2$ $y = x^2 + 2$

24 For all values of x, $f(x) = \dfrac{9x + 4}{7}$

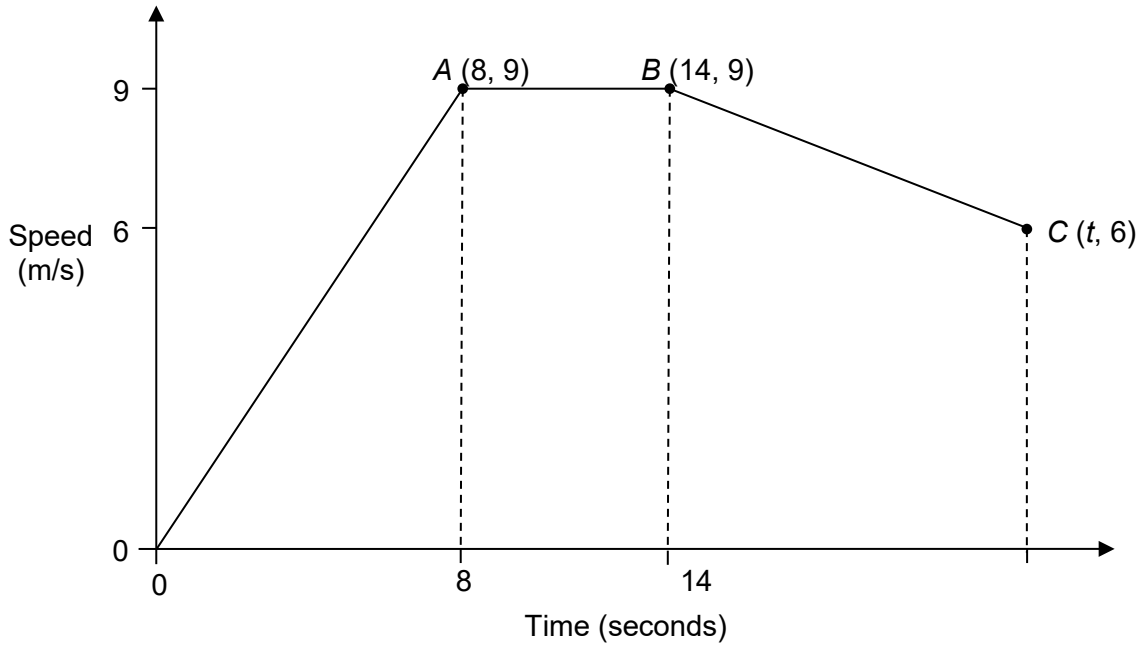
Work out $f^{-1}(x)$

[3 marks]

Answer _____

8

25 Here is a sketch of a speed-time graph for part of a journey.



The average speed from 0 to t seconds was 7.2 m/s

Work out the value of t

[5 marks]

Answer _____ seconds

END OF QUESTIONS

5