

Please write clearly, in block capitals.

Centre number

Candidate number

Surname _____

Forename(s) _____

Candidate signature _____

GCSE MATHEMATICS

H

Higher Tier Paper 3 Calculator

Exam Date

Morning

Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:

- a calculator
- mathematical instruments.



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.

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

- 1 Simplify $(x^5)^2$
Circle your answer.

[1 mark]

$x^{2.5}$

x^7

x^{10}

x^{25}

- 2 What is the sum of the **exterior** angles of any polygon?
Circle your answer.

[1 mark]

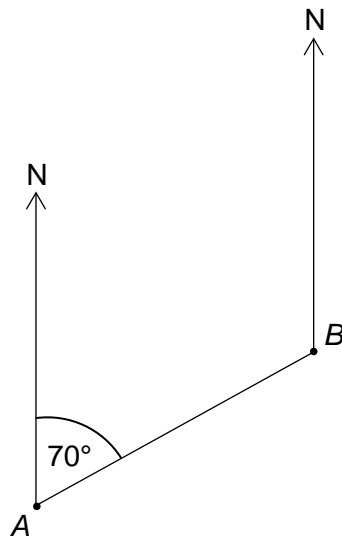
180°

360°

380°

540°

- 3 The bearing of B from A is 070°



Not drawn
accurately

Circle the bearing of A from B .

[1 mark]

110°

250°

290°

610°

4 $y = \frac{5\sqrt{x}}{2}$

Circle the expression for y^2

[1 mark]

$$\frac{25x}{4}$$

$$\frac{5x}{2}$$

$$\frac{5x^2}{2}$$

$$\frac{25x^2}{4}$$

- 5 Paul won a race with a time of 71.3 seconds.
This time, t , is to the nearest tenth of a second.

Complete the error interval due to rounding.

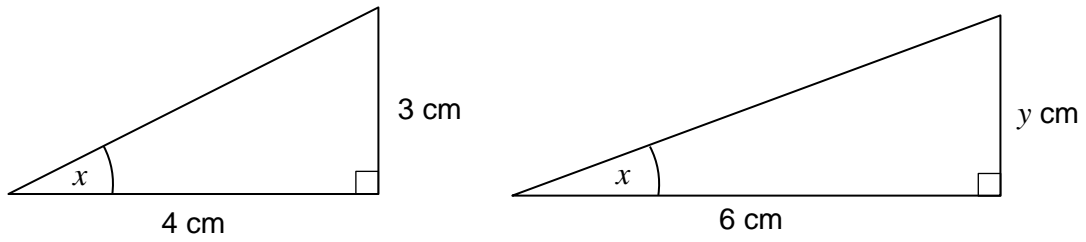
[2 marks]

Answer _____ $\leq t <$ _____

Turn over for the next question

- 6 These two right-angled triangles are similar.

Not drawn
accurately



- 6 (a) Write down the value of $\tan x$.
Give your answer as a fraction.

[1 mark]

Answer _____

- 6 (b) Work out the value of y .

[2 marks]

Answer _____ cm

- 7** At a nursery, the mean age of 4 children is 31 months.
Katy joins the nursery.
The mean age of **all** 5 children is now 30 months.
Work out the age of Katy.

[4 marks]

Answer _____ months

Turn over for the next question

8 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

8 (a) Write down the probability that the **sum** of the two numbers chosen is a two-digit number.

[1 mark]

Answer _____

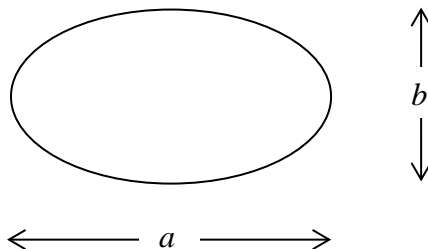
8 (b) Work out the probability that the **product** of the two numbers chosen is a two-digit number.

[3 marks]

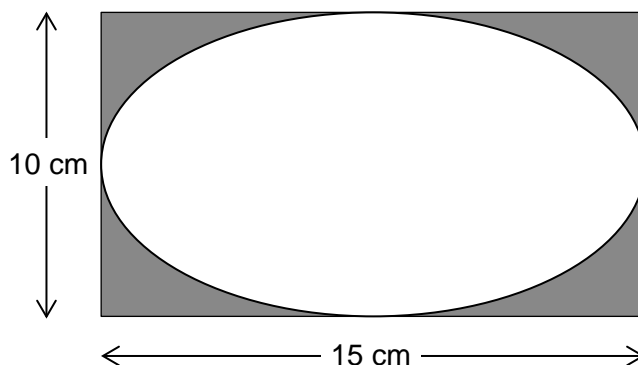
Answer _____

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

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



A rectangular photograph measures 15 cm by 10 cm
It is put into a frame as shown.



Not drawn
accurately

The part of the photograph that can be seen is an ellipse.

Work out the percentage of the photograph that can be seen.

[3 marks]

Answer _____ %

- 11 A doctor claims that the probability of having regular illness is doubled if you have poor sleep rather than good sleep.

In a survey, 16% of people with poor sleep had regular illness.

Here are the results for people with good sleep.

Good Sleep

	Number of people
Regular illness	24
Not regular illness	276

Comment on the doctor's claim.

You **must** show your working.

[3 marks]

12 A teacher asks Amy and Jack to convert 101 376 into standard form.

12 (a) Amy writes 10.1376×10^4

Criticise Amy's answer.

[1 mark]

12 (b) Jack writes 1.01376×10^{-5}

Criticise Jack's answer.

[1 mark]

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

The ratio of women to children is 7 : 4

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

[3 marks]

14 Use the quadratic formula to solve $5x^2 + 11x - 2 = 0$

Give your solutions to 2 decimal places.

[3 marks]

Answer _____

Turn over for the next question

15 The universal set contains the whole numbers 1 to n .

n is an even number greater than 100

O is the set of odd numbers.

P is the set of prime numbers.

S is the set of square numbers.

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

[1 mark]

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

Circle your answer.

[1 mark]

$$\frac{n}{2} - 1$$

$$\frac{n}{2}$$

$$\frac{n}{2} + 1$$

$$n$$

- 17 The region R satisfies the three inequalities

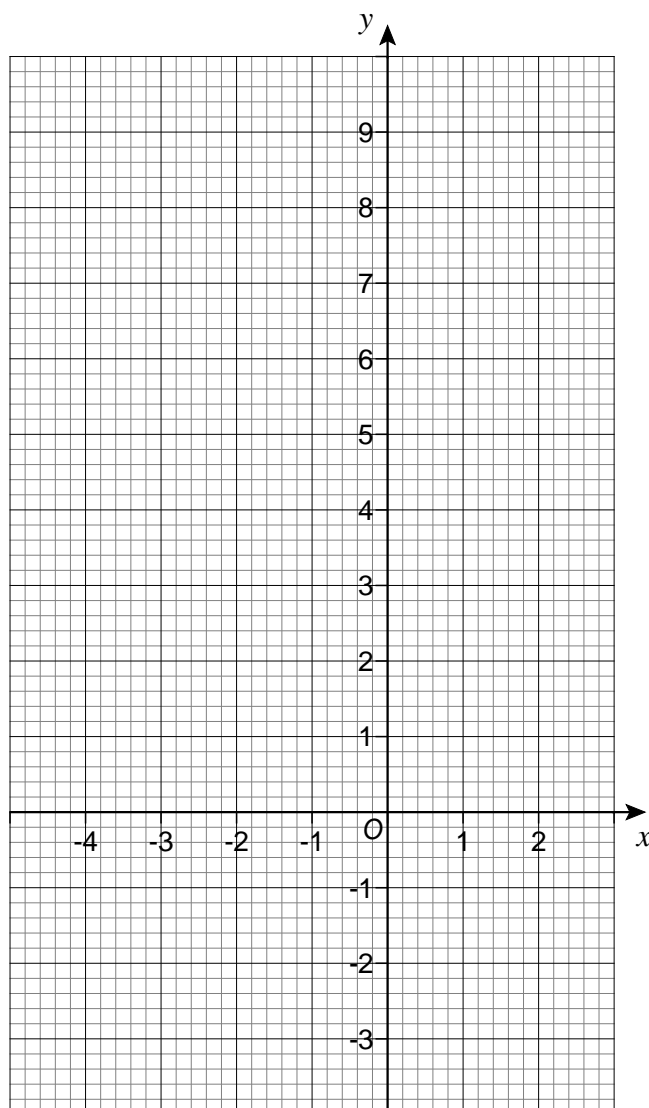
$$x > -3$$

$$x + y \leq 2$$

$$y \geq \frac{x}{2} - 1$$

Show the region R on the grid.

[4 marks]



18 Rearrange $c = \frac{4-d}{d+3}$ to make d the subject.

[4 marks]

Answer _____

19 Which of these points is **not** 5 units from the point (0, 0)?
Circle your answer.

[1 mark]

(-5, 0)

(1, 4)

(3, 4)

(0, 5)

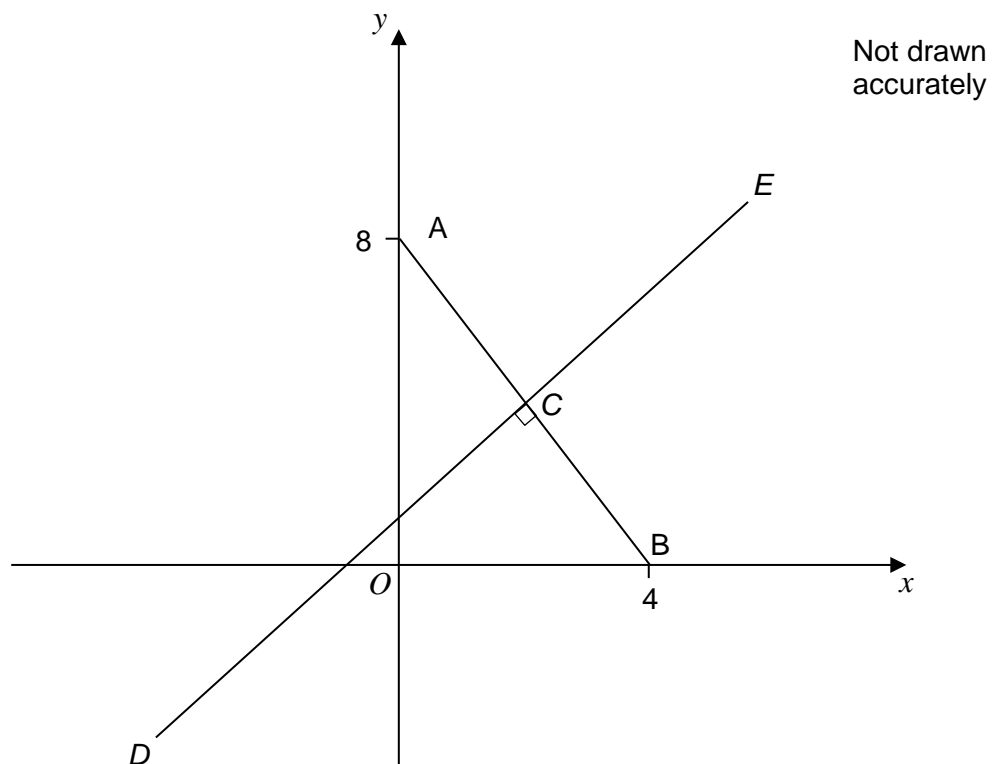
22

ACB is a straight line.

A is the point $(0, 8)$, and B is the point $(4, 0)$

C is the midpoint of AB .

Line DCE is perpendicular to line ACB .



Work out the equation of line DCE .

[5 marks]

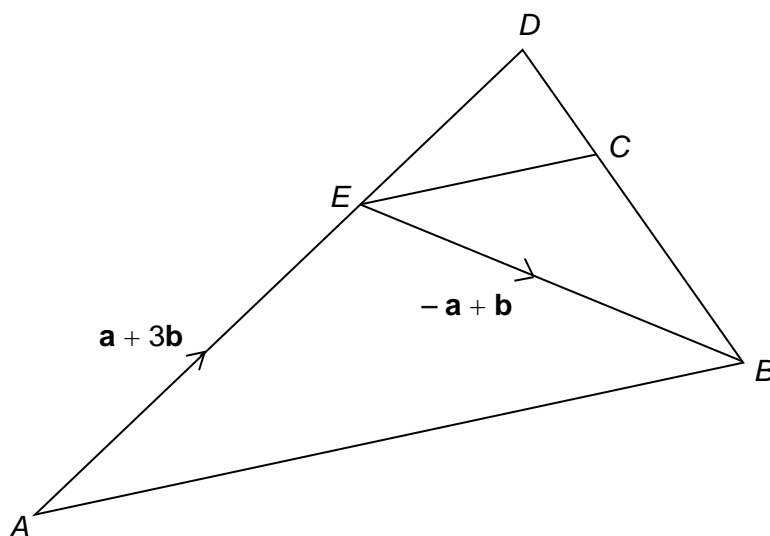
Answer _____

24 AED is a straight line.

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

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

Not drawn
accurately



24 (a) Work out the vector \vec{AB}

[1 mark]

Answer _____

24 (b) Also $\vec{ED} = \frac{1}{3}\vec{AE}$ and $\vec{DC} = -\frac{1}{3}\mathbf{a}$

Prove that EC is parallel to AB .

[3 marks]

28 For all values of x , $f(x) = \frac{4x - 3}{5}$

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

[3 marks]

Answer _____

.END OF QUESTIONS

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