

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname

Forename(s)

Candidate signature

GCSE MATHEMATICS

H

Higher Tier

Paper 1 Non-Calculator

Tuesday 21 May 2019

Morning

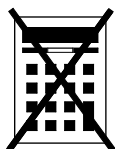
Time allowed: 1 hour 30 minutes

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.
- 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 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	

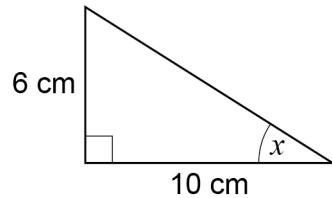


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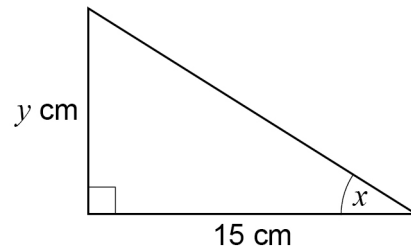
Answer **all** questions in the spaces provided

Do not write
outside the
box

- 1** Here are two right-angled triangles.



Not drawn
accurately



Circle the value of y .

[1 mark]

11

7.5

9

4

- 2** Work out the value of $\left(1\frac{2}{3}\right)^2$

Circle your answer.

[1 mark]

$1\frac{4}{9}$

$3\frac{1}{3}$

$2\frac{4}{9}$

$2\frac{7}{9}$

- 3** Work out the arc length, in metres, of a semicircle of radius 6 metres.

Circle your answer.

[1 mark]

3π

6π

12π

18π



- 4 Circle the fraction that is equivalent to 4.625

[1 mark]

$$\frac{39}{8}$$

$$\frac{37}{8}$$

$$\frac{185}{4}$$

$$\frac{17}{4}$$

- 5 (a) Write 0.00097 in standard form.

[1 mark]

Answer _____

- 5 (b) Work out $\frac{3 \times 10^5}{4 \times 10^3}$

Give your answer as an ordinary number.

[2 marks]

Answer _____

Turn over ►



6 Anna plays a game with an ordinary, fair dice.

If she rolls 1 she wins.

If she rolls 2 or 3 she loses.

If she rolls 4, 5 or 6 she rolls again.

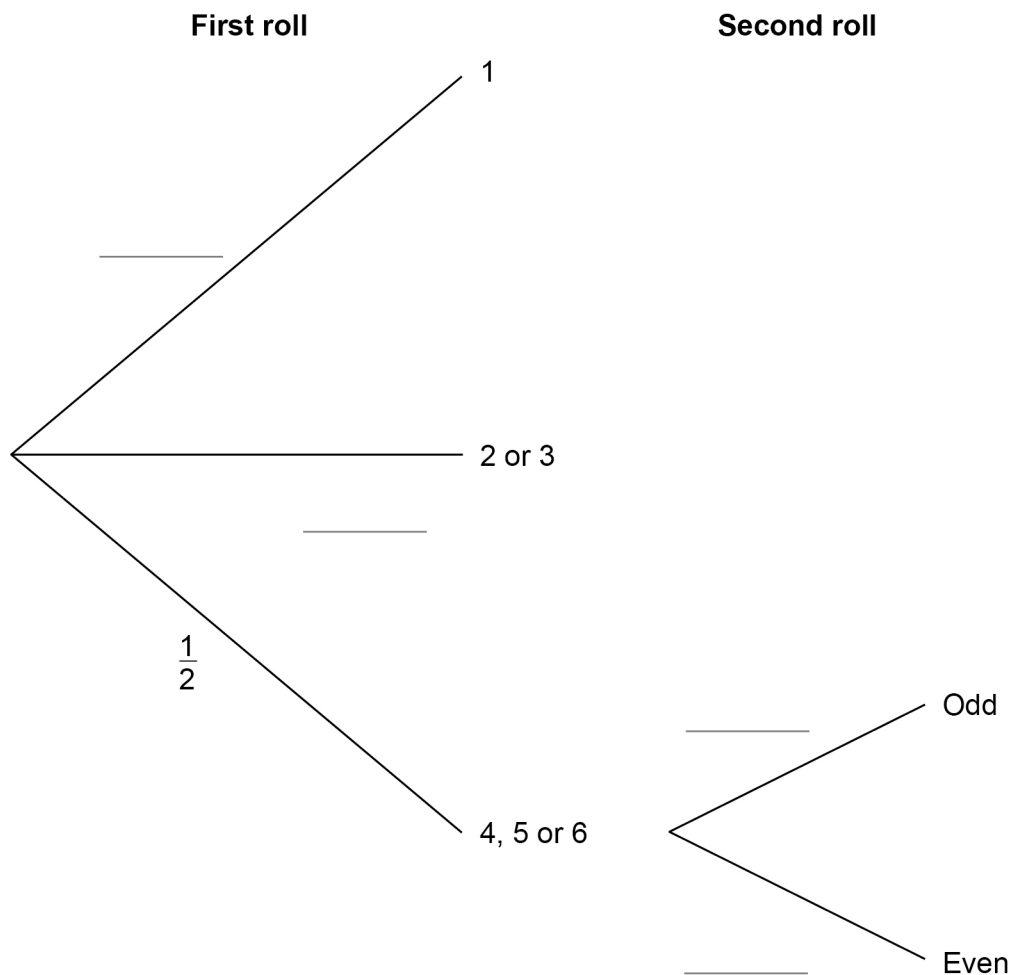
When she has to roll again,

if she rolls an odd number she wins

if she rolls an even number she loses.

6 (a) Complete the tree diagram with the four missing probabilities.

[2 marks]



- 6 (b)** Is Anna more likely to win or to lose?
You **must** work out the probability that she wins.

[4 marks]

Turn over for the next question

Turn over ►



- 7 Three friends arrive at a party.
Their arrival increases the number of people at the party by 20%
In total, how many people are now at the party?

[2 marks]

Answer _____

- 8 Work out the value of $(3^{12} \div 3^5) \div (3^2 \times 3)$

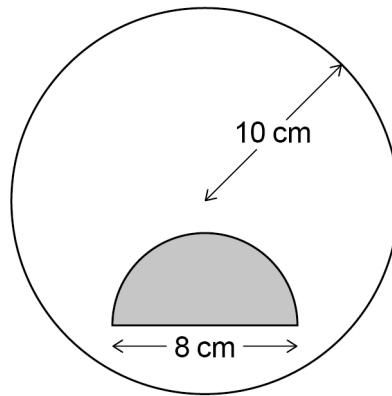
[3 marks]

Answer _____



9

A shaded semicircle is inside a circle as shown.

Not drawn
accuratelyThe **radius** of the circle is 10 cmThe **diameter** of the semicircle is 8 cm

How many times bigger is the unshaded area than the shaded area?

[4 marks]

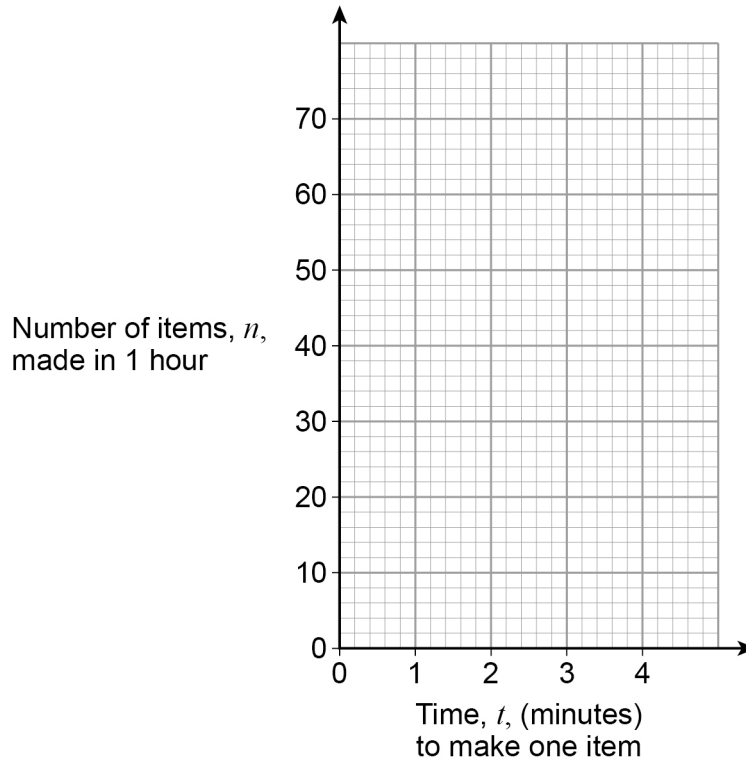
Answer _____

Turn over for the next question**Turn over ►**

- 10** The number of items, n , made in 1 hour by a machine is given by $n = \frac{60}{t}$
- t is the time in minutes the machine takes to make one item.
- The value of t changes for different types of item.

- 10 (a)** On the grid below, draw the graph of $n = \frac{60}{t}$ for values of t from 1 to 4

[2 marks]



- 10 (b)** The machine takes 3 minutes 30 seconds to make one item.
- Use your graph** to estimate the value of n .

[2 marks]

Answer _____



- 11** Ed and Fay shared £330 in the ratio 7 : 4
Ed gives Fay some of his money.
Fay now has the same amount as Ed.

How much does Ed give Fay?

[3 marks]

Answer £ _____

- 12** The next term of a sequence is made by adding the previous two terms.
Which of these sequences follows this rule?
Circle your answer.

[1 mark]

−9 2 −7 −5 −12

−3 5 −2 3 1

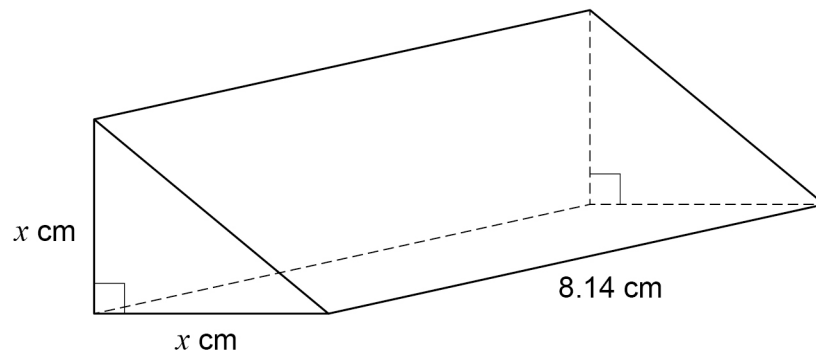
0 −3 −3 0 −3

−1 −1 −2 −3 1



13

The triangular cross section of a prism is an isosceles right-angled triangle.



The volume of the prism is 102 cm^3

Use approximations to estimate the value of x .

You **must** show your working.

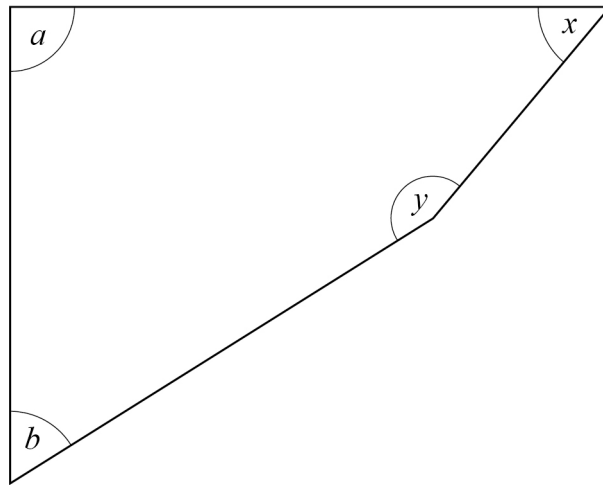
[3 marks]

Answer _____



14

Here is a quadrilateral.

Not drawn
accurately

$$a = 90^\circ \quad \text{and} \quad a : b = 5 : 3$$

$$x : y = 1 : 3$$

Show that $b = x$ **[3 marks]**

Turn over ►



- 15 Here is some information about the test marks of 120 students.

Mark, m	$0 < m \leq 10$	$10 < m \leq 20$	$20 < m \leq 30$	$30 < m \leq 40$	$40 < m \leq 50$
Frequency	20	28	40	20	12

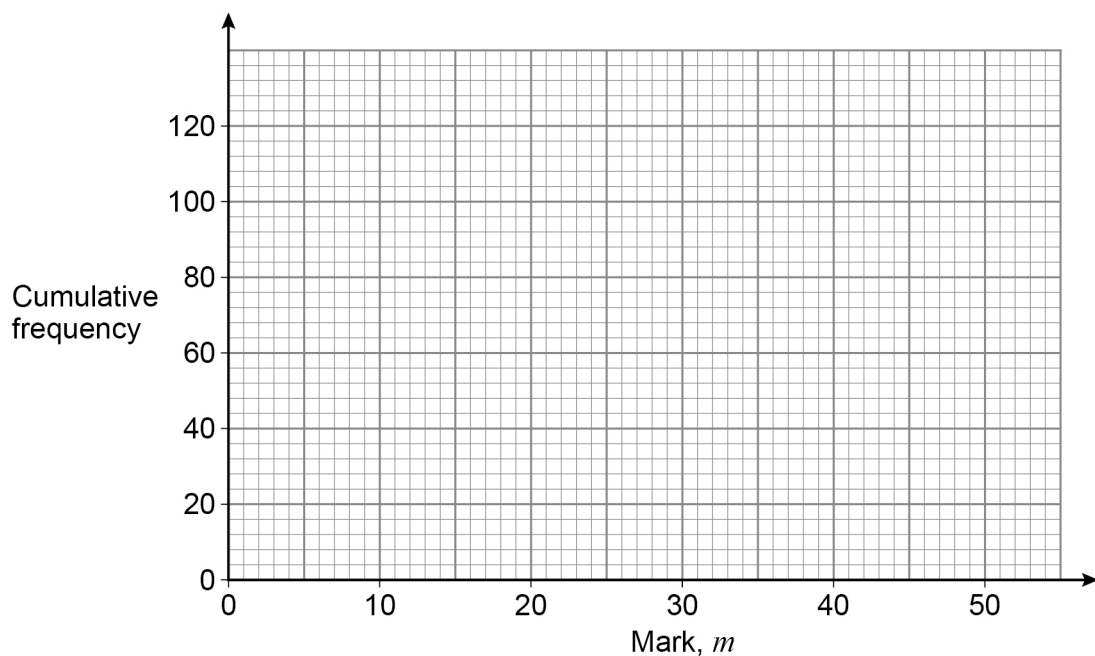
- 15 (a) Complete the cumulative frequency table.

[1 mark]

Mark, m	$m \leq 10$	$m \leq 20$	$m \leq 30$	$m \leq 40$	$m \leq 50$
Cumulative frequency	20	48			

- 15 (b) Draw a cumulative frequency graph.

[2 marks]



15 (c) Students who scored 15 marks or fewer take another test.

Use your graph to estimate how many students take another test.

[2 marks]

Answer _____

16

Simplify fully

$$\frac{4x - 8x^2}{12x - 6}$$

[3 marks]

Answer _____

Turn over for the next question



17 Toby is forming and solving equations.

17 (a)

The product of half of a number and three more than the number
is the same as
the square of the number

Toby uses y to represent the number.

Write an equation that Toby could form.

[2 marks]

Answer _____

17 (b) Toby forms another equation.

$$x = \frac{9}{8x}$$

He wants to work out the values of x .

Here is his working.

$$x = \frac{9}{8x}$$

$$8x^2 = 9$$

$$8x = 3 \text{ or } 8x = -3$$

$$x = \frac{3}{8} \text{ or } x = -\frac{3}{8}$$

What error has he made in his working?

[1 mark]



18 Here is an identity.

$$x^2 - y^2 \equiv (x + y)(x - y)$$

18 (a) Use the identity to work out the value of $193^2 - 7^2$
You **must** show your working.

[2 marks]

Answer _____

18 (b) Factorise $100a^2 - 81b^2$

[1 mark]

Answer _____

19 Circle the fraction that is equivalent to $0.\dot{1}$

[1 mark]

$$\frac{1}{9}$$

$$\frac{1}{99}$$

$$\frac{1}{10}$$

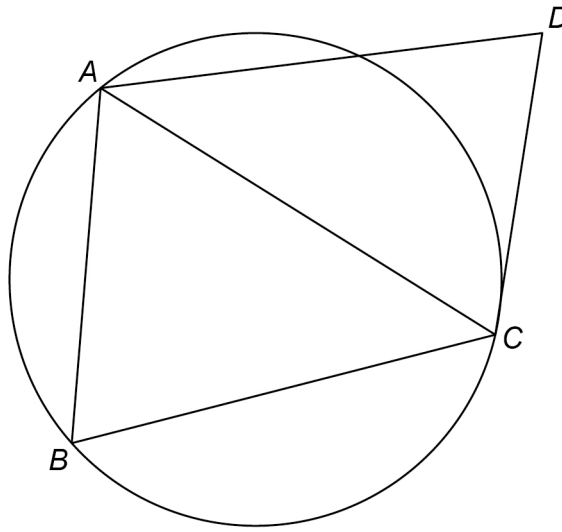
$$\frac{11}{100}$$



20

A , B and C are points on a circle.
 CD is a tangent.

Not drawn
accurately



20 (a) Assume that triangle ABC is isosceles with $AC = BC$

Prove that AB is parallel to DC .

[4 marks]



20 (b) In fact, triangle ABC is equilateral.

Tick the **two** boxes for the statements that **must** be correct.

[1 mark]

☐

AB is parallel to DC

☐

AC bisects angle BCD

☐

AC bisects angle BAD

21 Solve the simultaneous equations

$$2x + 3y = 5p$$

$$y = 2x + p$$

where p is a constant.

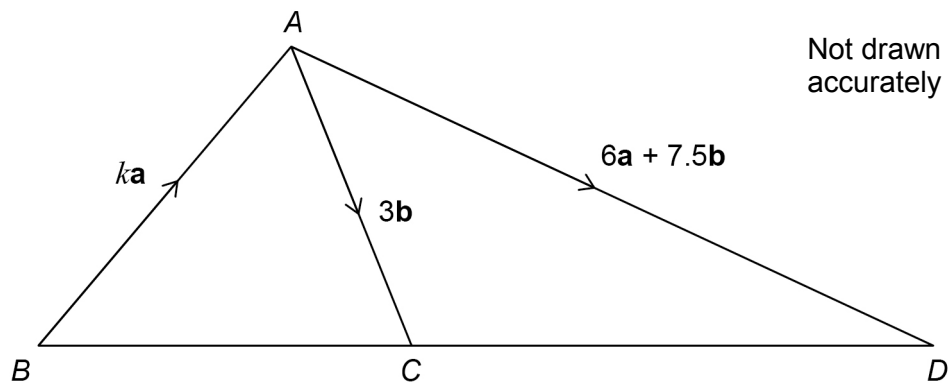
Give your answers in terms of p in their simplest form.

[4 marks]

$$x = \quad y = \quad$$



22

 ABC and ACD are triangles. k is a constant.22 (a) Show that $\overrightarrow{CD} = 6\mathbf{a} + 4.5\mathbf{b}$

[1 mark]

22 (b) BCD is a straight line.Work out the value of k .You **must** show your working.

[3 marks]

Answer _____



23

Simplify $8^4 \div 32^{\frac{2}{5}}$ Give your answer in the form 2^m where m is an integer.**[3 marks]**

Answer _____

24

 $f(x) = \sin(x - 90^\circ)$ Circle the value of $f(0^\circ)$ **[1 mark]**

1

0

 $-\frac{1}{2}$

-1

Turn over for the next question

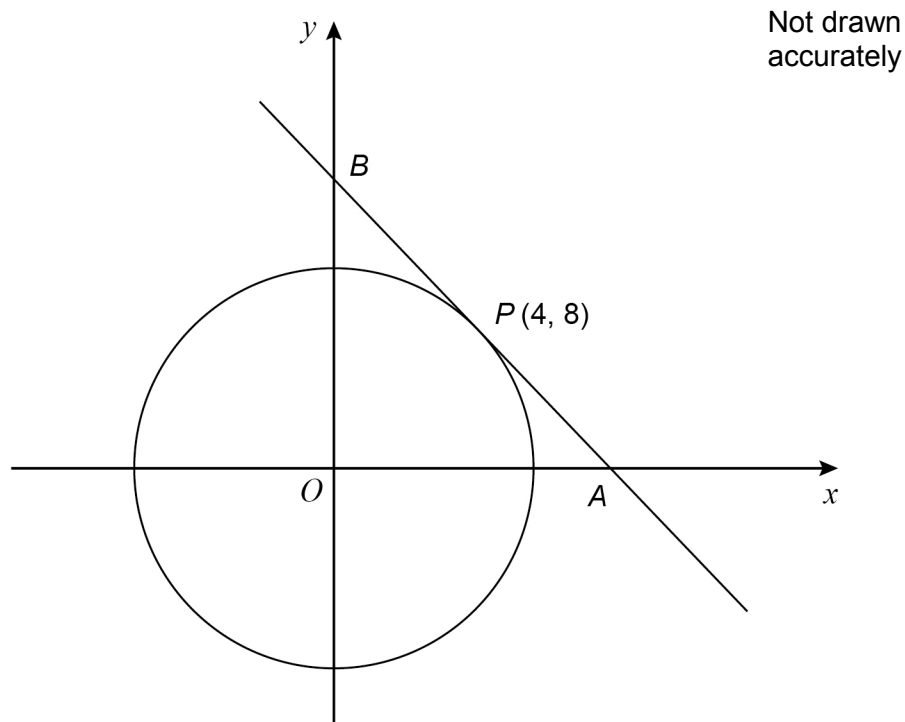
Turn over ►



25

$P(4, 8)$ is a point on a circle, centre O .

The tangent at P intersects the axes at points A and B .



25 (a) Show that the gradient of the tangent is $-\frac{1}{2}$

[2 marks]



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[4 marks]

[illegible]

Answer _____ units

Turn over for the next question

6

Turn over ►



26

The turning point of the graph $y = (x + a)^2 + b$ has x -coordinate -2
(3, 1) is another point on the graph.

Work out the y -coordinate of the turning point.

[3 marks]

Answer _____



27

Angle x is acute.

$$\cos x = \sin 60^\circ \times \tan 30^\circ$$

Work out the size of angle x .You **must** show your working.**[3 marks]**

Answer _____ degrees

END OF QUESTIONS

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2 4



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