



Surname \_\_\_\_\_

Other Names \_\_\_\_\_

Centre Number \_\_\_\_\_

Candidate Number \_\_\_\_\_

Candidate Signature \_\_\_\_\_

**GCSE**

**MATHEMATICS**

**H**

**Higher Tier      Paper 1 Non-Calculator**

**8300/1H**

**Tuesday 21 May 2019      Morning**

**Time allowed: 1 hour 30 minutes**

**For this paper you must have:**

- mathematical instruments

**You must NOT use a calculator.**



**At the top of the page, write your surname and other names, your centre number, your candidate number and add your signature.**

**[Turn over]**



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## **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 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.**

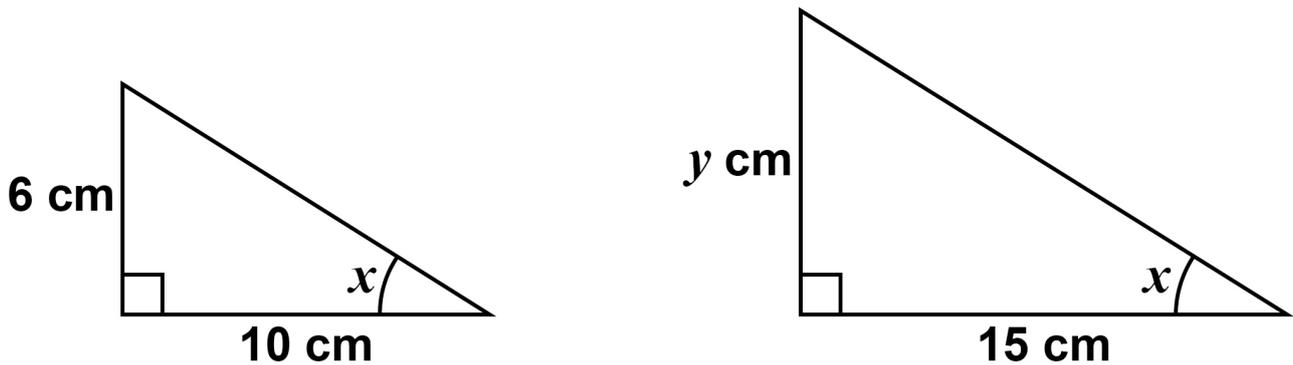
**DO NOT TURN OVER UNTIL TOLD TO DO SO**



Answer ALL questions in the spaces provided.

1 Here are two right-angled triangles.

They are 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]

$3\pi$

$6\pi$

$12\pi$

$18\pi$

- 4 Circle the fraction that is equivalent to 4.625  
[1 mark]

$\frac{39}{8}$

$\frac{37}{8}$

$\frac{185}{4}$

$\frac{17}{4}$

[Turn over]



5 (a) Write 0.000 97 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]

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Answer \_\_\_\_\_

7



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**[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.**

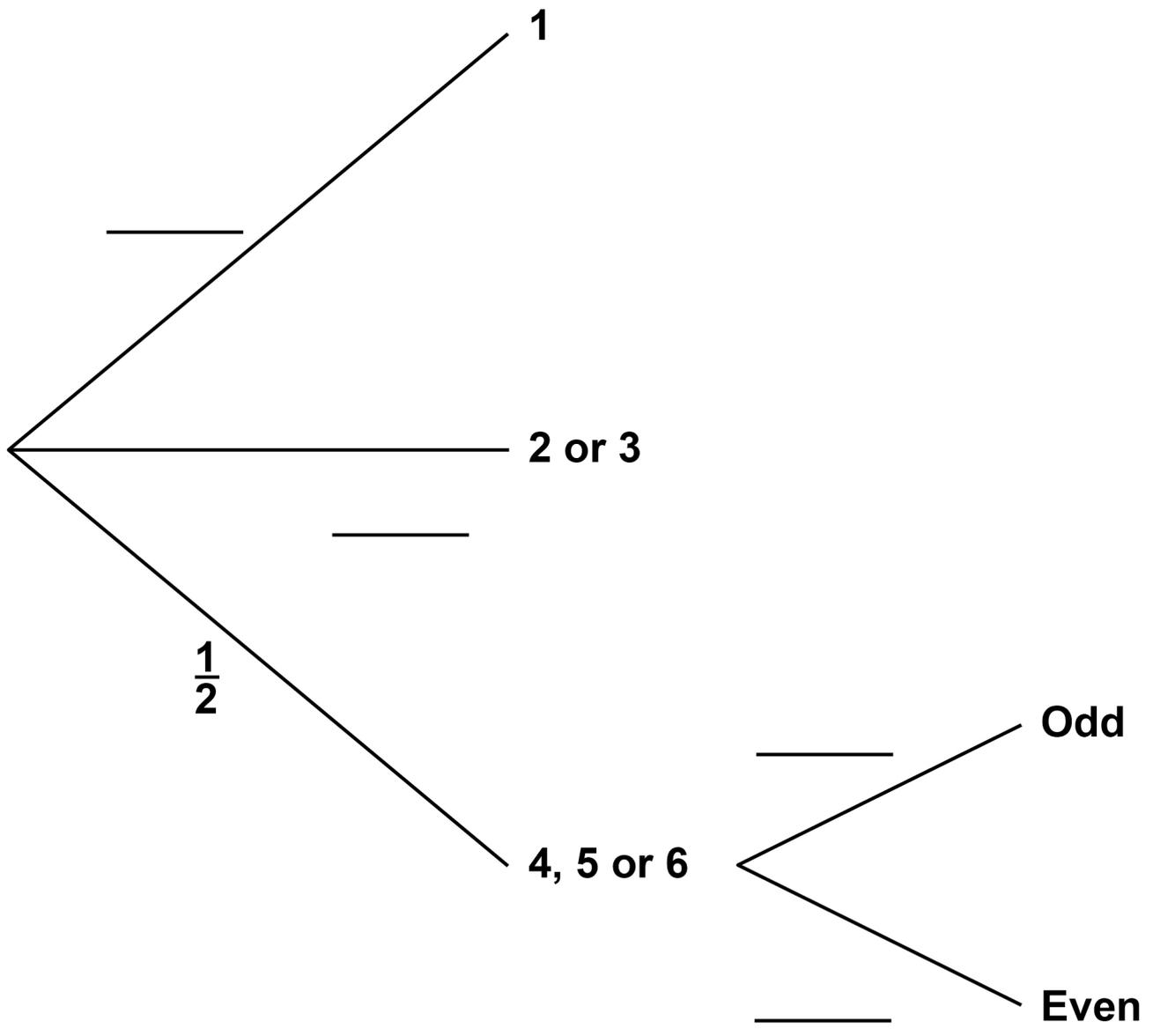
**6 (a) Complete the tree diagram on the opposite page with the four missing probabilities. [2 marks]**



9

First roll

Second roll



[Turn over]



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

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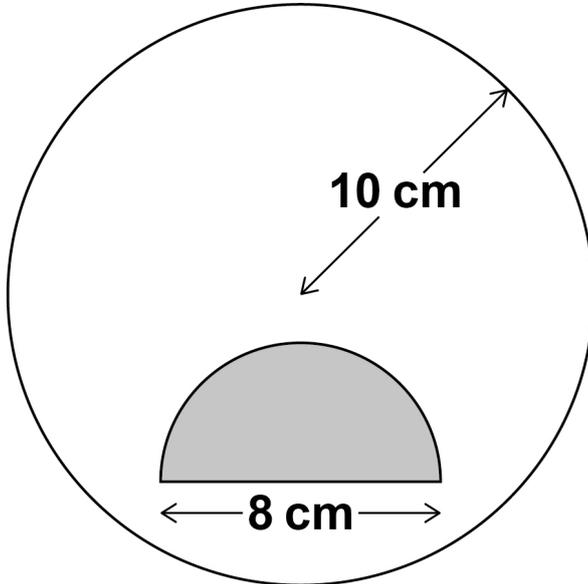
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Answer \_\_\_\_\_

[Turn over]



- 9 A shaded semicircle is inside a circle as shown. It is not drawn accurately.



The RADIUS of the circle is 10 cm

The DIAMETER of the semicircle is 8 cm

How many times bigger is the unshaded area than the shaded area? [4 marks]

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**Answer** \_\_\_\_\_

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**[Turn over]**



- 10 The number of items,  $n$ , made in 1 hour by a machine is given by

$$n = \frac{60}{t}$$

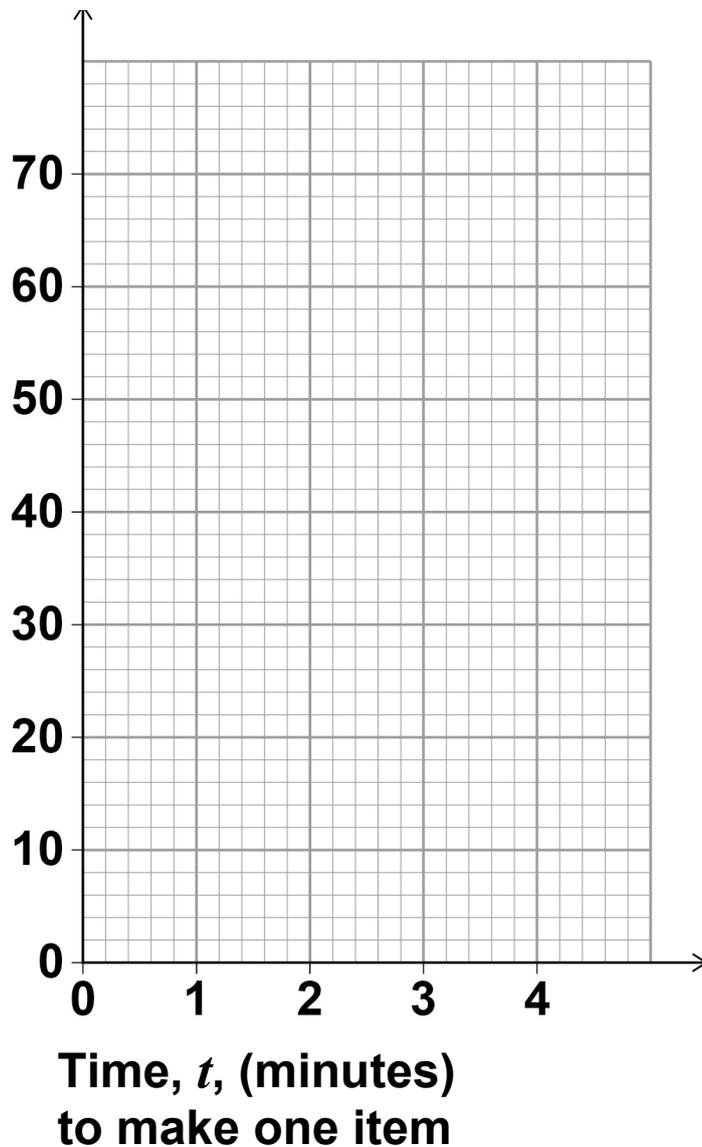
$t$  is the time in minutes the machine takes to make one item.

The value of  $t$  changes for different types of item.

- 10 (a) On the grid opposite, draw the graph of  $n = \frac{60}{t}$  for values of  $t$  from 1 to 4  
[2 marks]



Number of items,  $n$ ,  
made in 1 hour



- 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 \_\_\_\_\_

[Turn over]





- 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

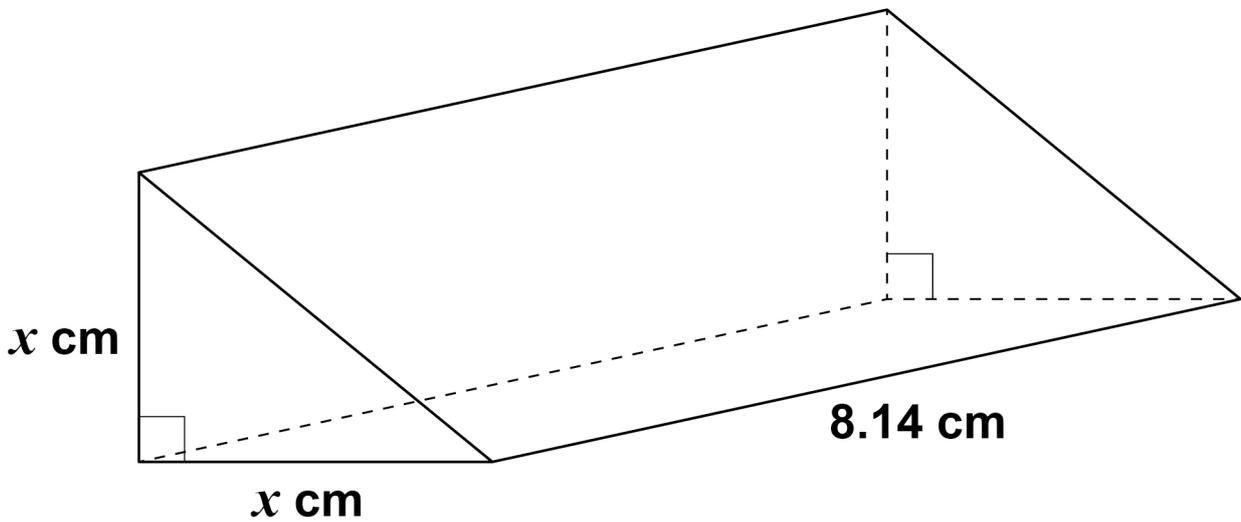
-1 -1 -2 -3 1

8

[Turn over]



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



The volume of the prism is  $102 \text{ cm}^3$

Use approximations to estimate the value of  $x$ .

You **MUST** show your working. [3 marks]

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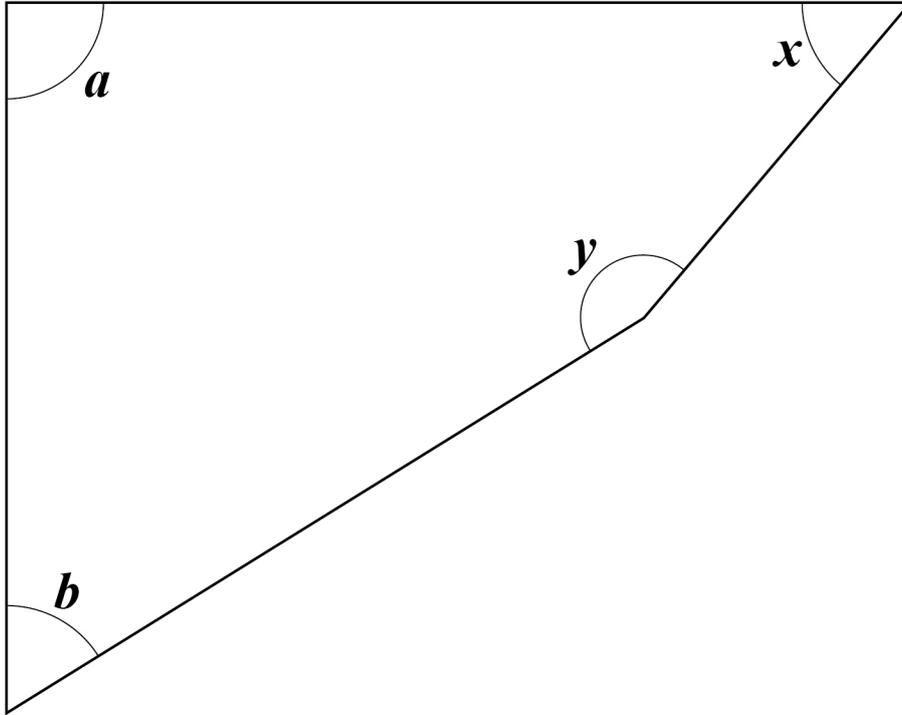
**Answer** \_\_\_\_\_

**[Turn over]**



14 Here is a quadrilateral.

It is not drawn accurately.



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

$$x : y = 1 : 3$$

Show that  $b = x$

[3 marks]

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

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

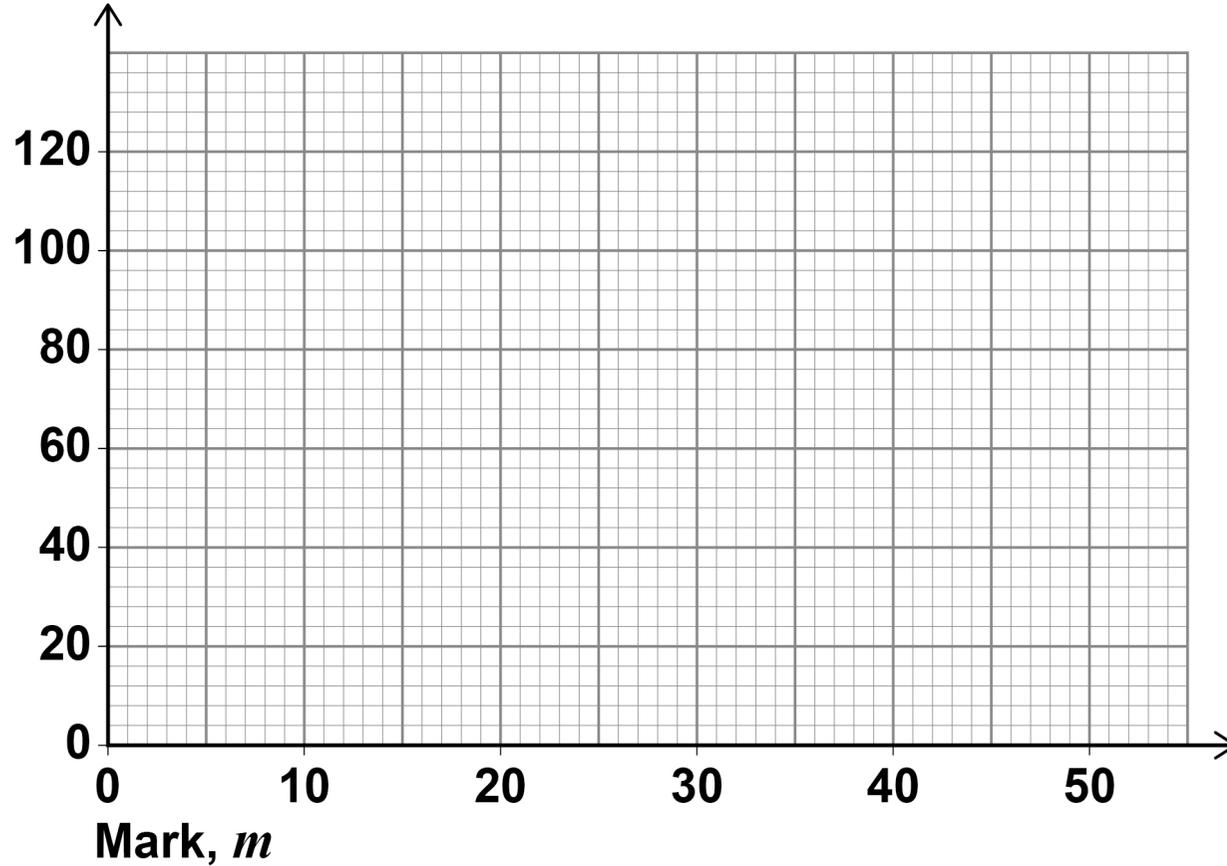
15 (a) Complete the cumulative frequency table. [1 mark]

<b>Mark, <math>m</math></b>	$m \leq 10$	$m \leq 20$	$m \leq 30$	$m \leq 40$	$m \leq 50$
<b>Cumulative frequency</b>	20	48			



15 (b) Draw a cumulative frequency graph. [2 marks]

Cumulative  
frequency



25

[Turn over]



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**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]**

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**Answer** \_\_\_\_\_

**[Turn over]**



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

[3 marks]

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Answer \_\_\_\_\_

[Turn over]

8



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]

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Answer \_\_\_\_\_

17 (b) Toby forms another equation.

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

He wants to work out the values of  $x$ .

Here is his working.

$$\begin{aligned}x &= \frac{9}{8x} \\8x^2 &= 9 \\8x &= 3 \text{ or } 8x = -3 \\x &= \frac{3}{8} \text{ or } x = -\frac{3}{8}\end{aligned}$$

What error has he made in his working?

[1 mark]

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[Turn over]



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]

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Answer \_\_\_\_\_

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

[1 mark]

Answer \_\_\_\_\_



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

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

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

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

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

[Turn over]

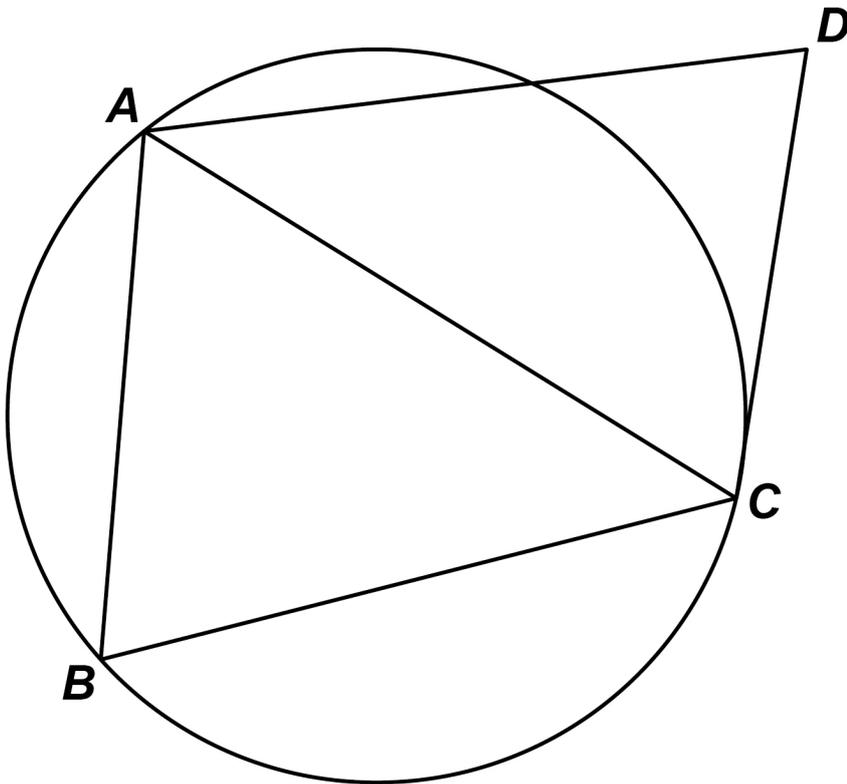
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20  $A$ ,  $B$  and  $C$  are points on a circle.

$CD$  is a tangent.

The diagram is not drawn accurately.



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

Prove that  $AB$  is parallel to  $DC$ . [4 marks]

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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  $BAD$

[Turn over]





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$x =$  \_\_\_\_\_  $y =$  \_\_\_\_\_

9

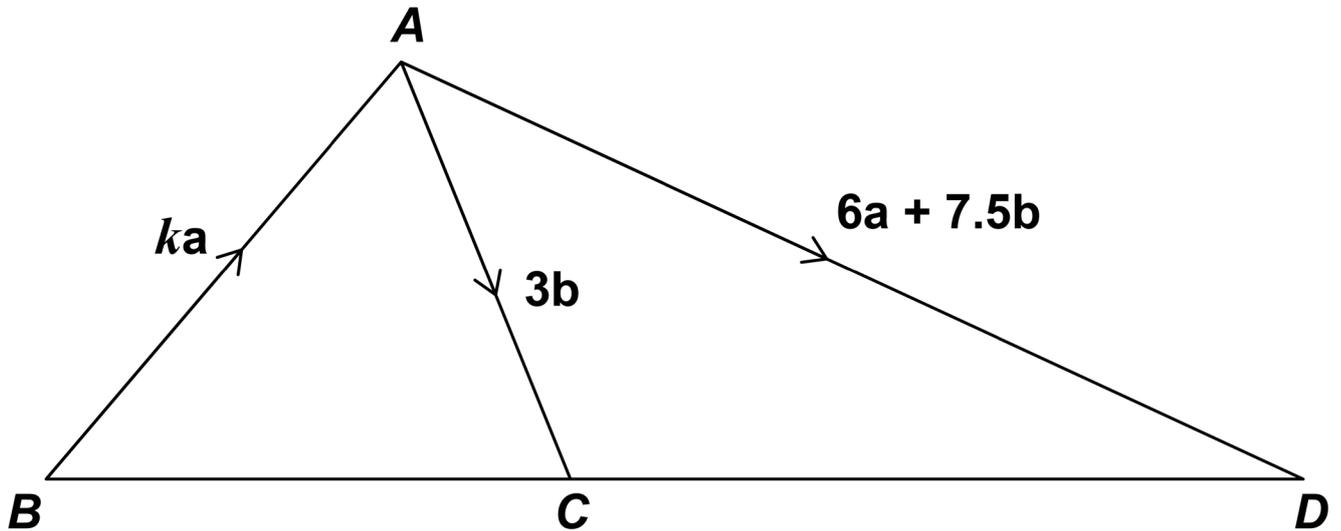
[Turn over]



22  $ABC$  and  $ACD$  are triangles.

$k$  is a constant.

The diagram is not drawn accurately.



22 (a) Show that  $\vec{CD} = 6a + 4.5b$   
[1 mark]

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22 (b)  $BCD$  is a straight line.

Work out the value of  $k$ .

You must show your working. [3 marks]

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Answer \_\_\_\_\_

[Turn over]





24  $f(x) = \sin(x - 90^\circ)$

Circle the value of  $f(0^\circ)$

[1 mark]

1

0

$-\frac{1}{2}$

-1

8

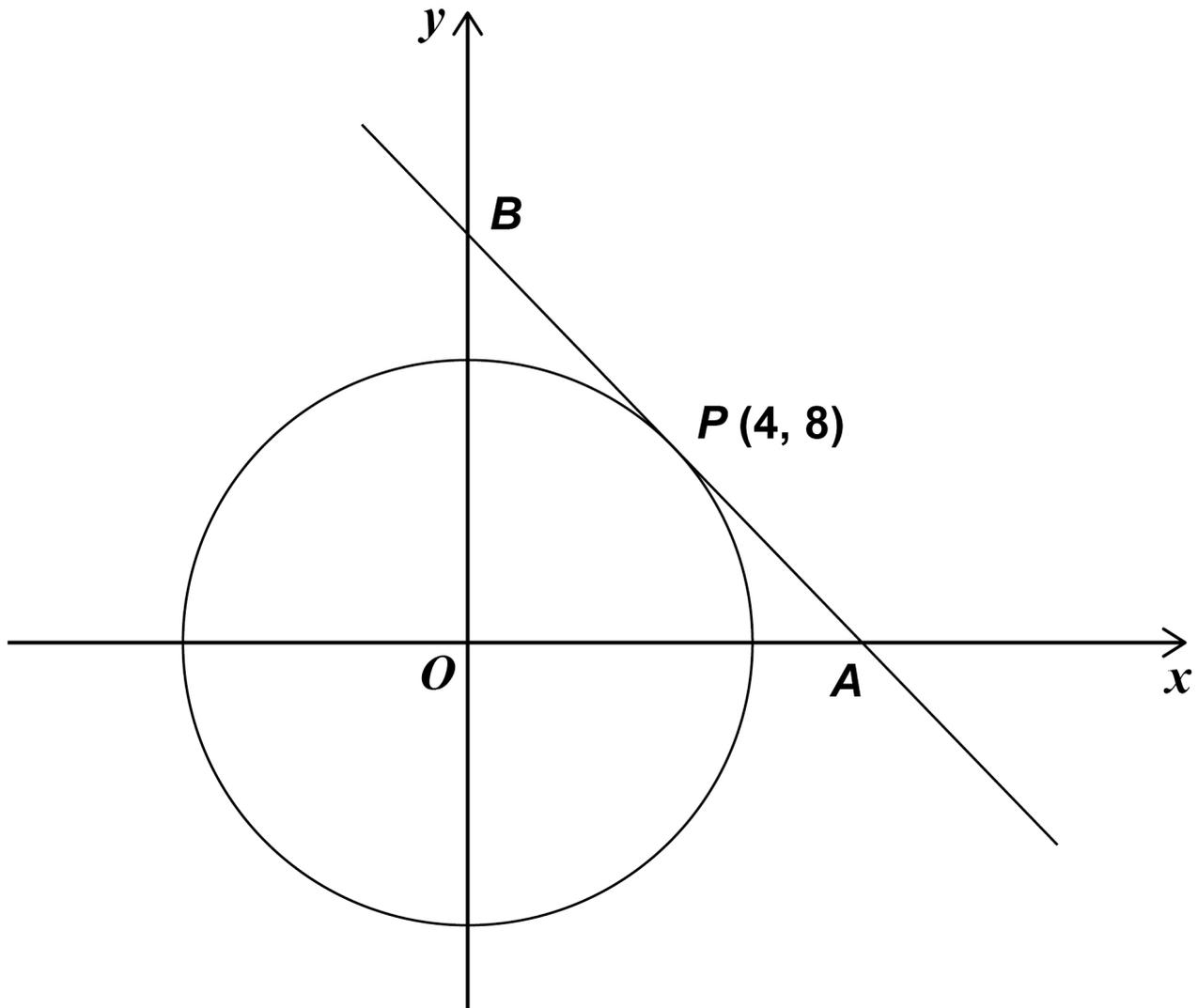
[Turn over]



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

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

The diagram is not drawn accurately.



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

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[Turn over]





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Answer \_\_\_\_\_ units

6

[Turn over]







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For Examiner's Use	
Pages	Mark
4–6	
8–11	
12–15	
16–19	
20–23	
24–29	
30–33	
34–37	
38–41	
42–45	
46–47	
<b>TOTAL</b>	

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