

Please write clearly in block capitals.

Centre number

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Candidate number

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# GCSE MATHEMATICS

# H

Higher Tier

Paper 1 Non-Calculator

Tuesday 21 May 2019

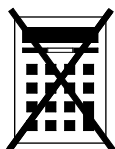
Morning

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.

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	
<b>TOTAL</b>	

## Advice

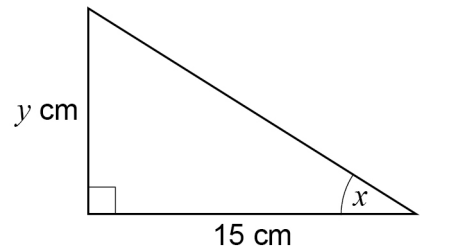
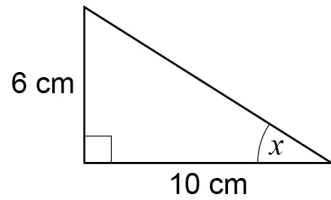
In all calculations, show clearly how you work out your answer.



J U N 1 9 8 3 0 0 1 H 0 1

Answer **all** questions in the spaces provided

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



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]

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

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

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

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

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]

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Answer \_\_\_\_\_

7

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.

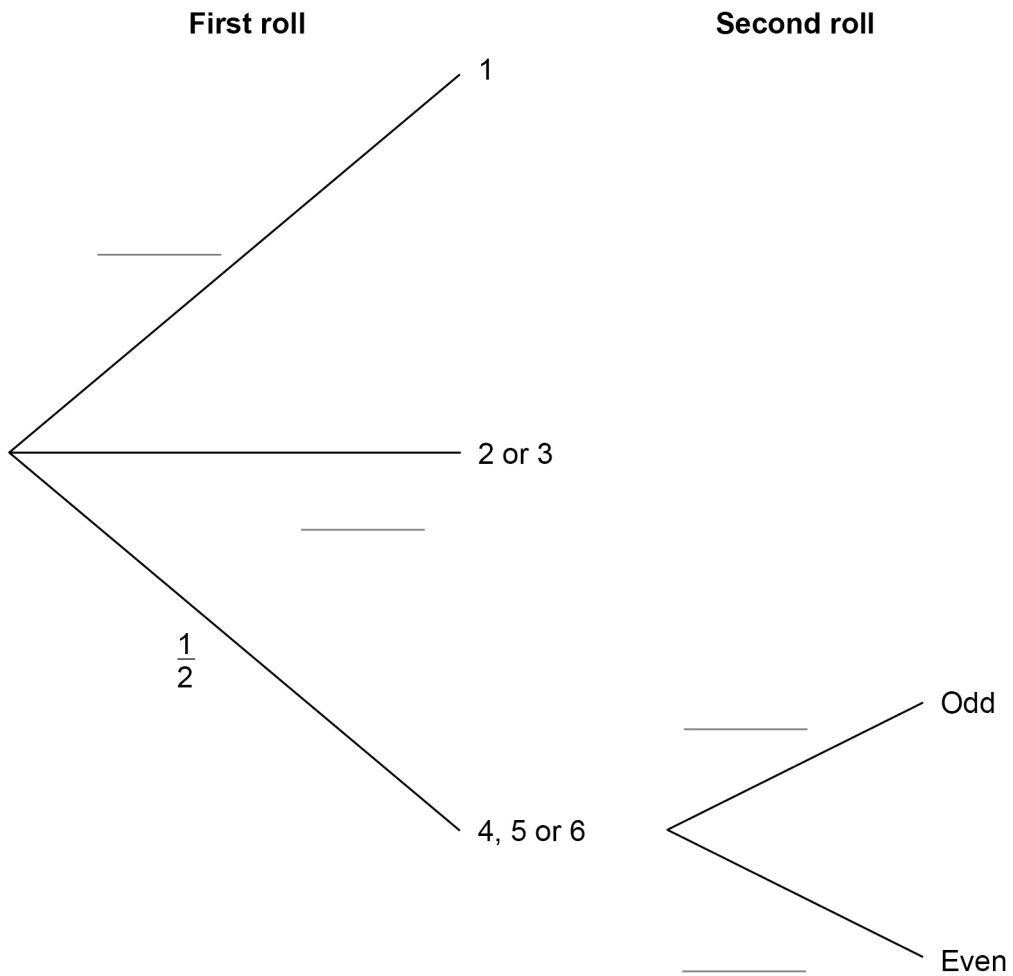
When she has to roll again,

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]**

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**Turn over for the next question**



- 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]**

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Answer \_\_\_\_\_

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

**[3 marks]**

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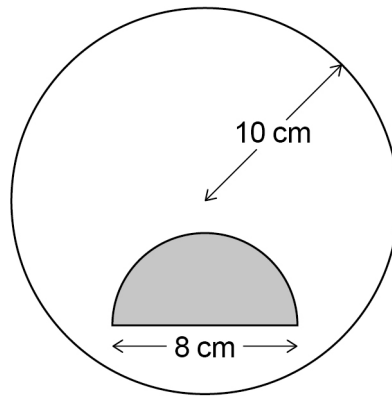
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Answer \_\_\_\_\_



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]**


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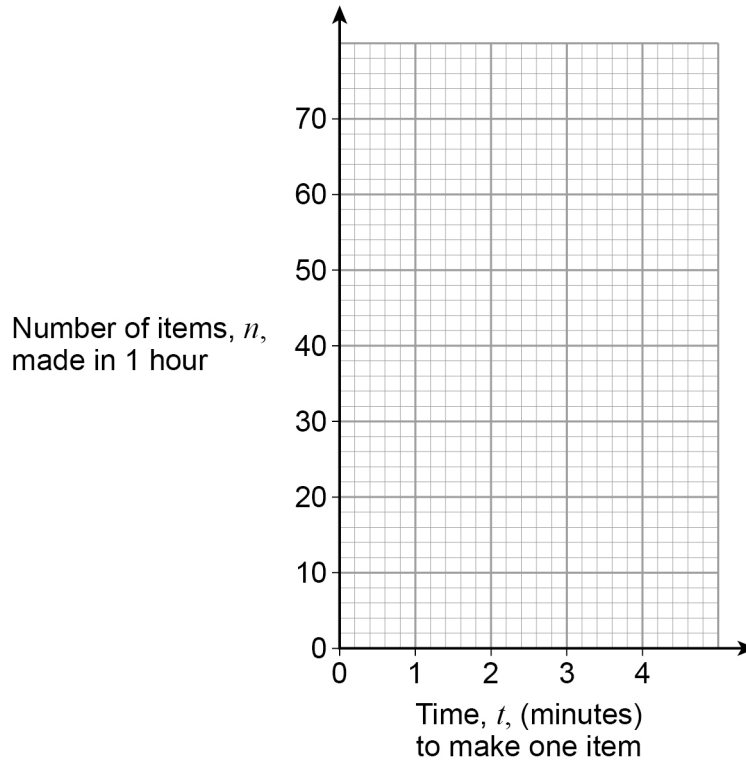
Answer \_\_\_\_\_

**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]**

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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

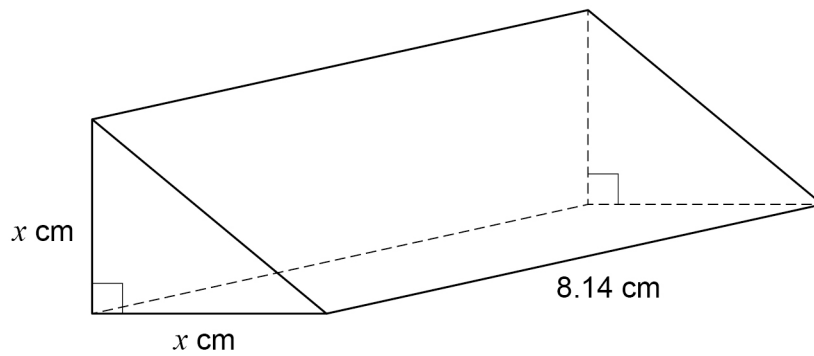
0 -3 -3 0 -3

-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  $102 \text{ cm}^3$

Use approximations to estimate the value of  $x$ .

You **must** show your working.

[3 marks]

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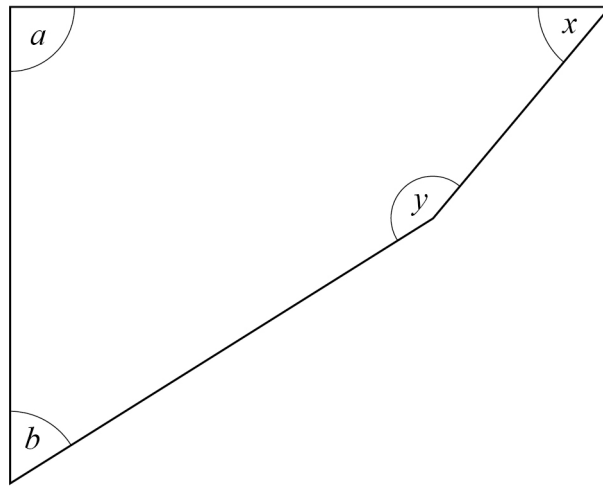
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Answer \_\_\_\_\_



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]**


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Turn over ►



- 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

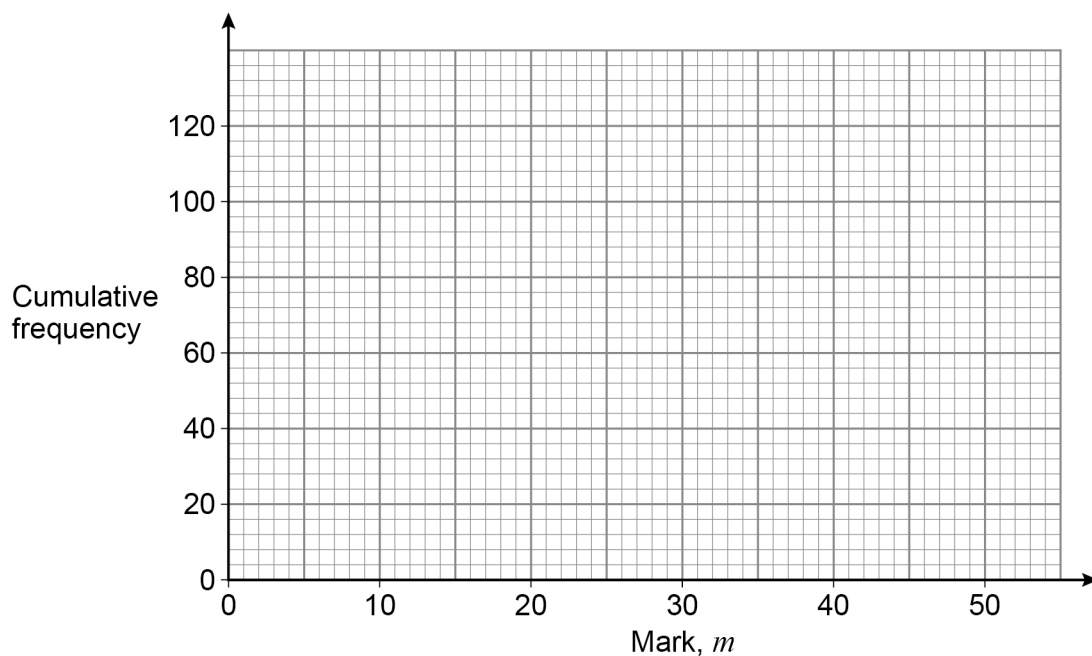
- 15 (a) Complete the cumulative frequency table.

[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]



**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 \_\_\_\_\_

**16** Simplify fully

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

**[3 marks]**

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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]

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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.

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

$$8x^2 = 9$$

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

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

What error has he made in his working?

[1 mark]

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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]

$\frac{1}{9}$

$\frac{1}{99}$

$\frac{1}{10}$

$\frac{11}{100}$

7

Turn over ►

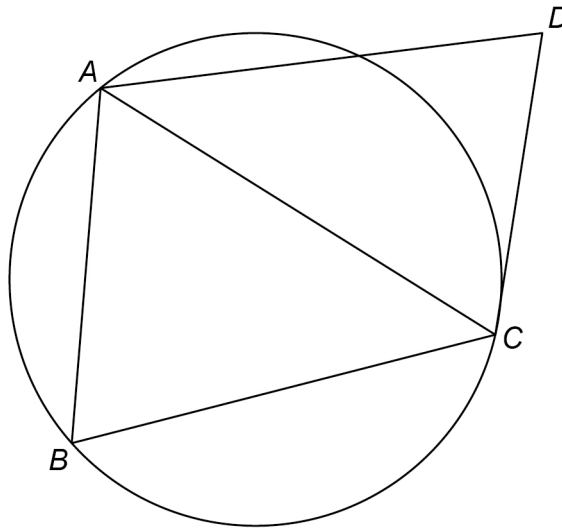


20

$A$ ,  $B$  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]

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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  $BAD$

**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]**

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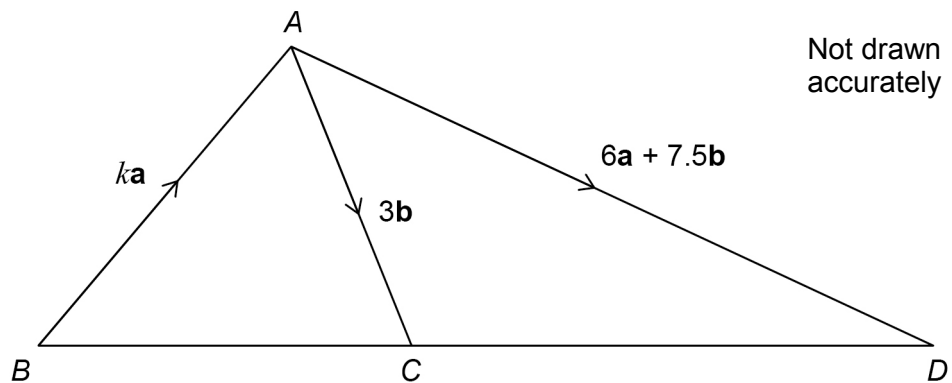


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$$x = \underline{\hspace{2cm}} \quad y = \underline{\hspace{2cm}}$$



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]

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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 \_\_\_\_\_



23 Simplify  $8^4 \div 32^{\frac{2}{5}}$

Give your answer in the form  $2^m$  where  $m$  is an integer.

[3 marks]

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Answer \_\_\_\_\_

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

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

[1 mark]

1

0

$-\frac{1}{2}$

-1

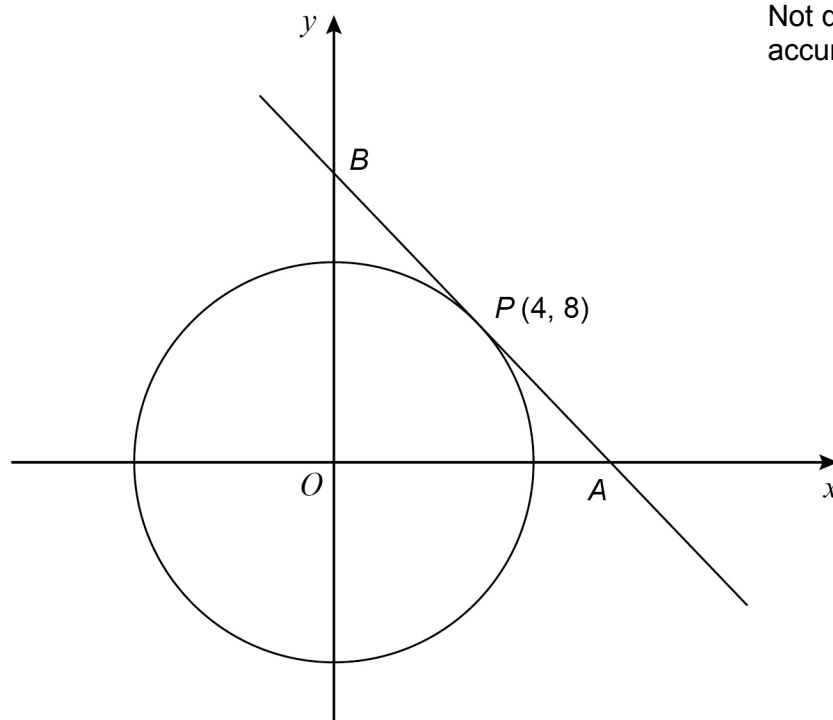
Turn over for the next question



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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**25 (b)** Work out the length  $AB$ .

Give your answer in the form  $a\sqrt{5}$  where  $a$  is an integer.

You **must** show your working.

**[4 marks]**

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

**Turn over for the next question**



- 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]**

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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]**

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Answer \_\_\_\_\_ degrees

**END OF QUESTIONS**

**There are no questions printed on this page**

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2 4



1 9 6 G 8 3 0 0 / 1 H

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