WJEC CBAC

GCSE LINKED PAIR PILOT

4364/02

W15-4364-02

METHODS IN MATHEMATICS
UNIT 2: Methods (Calculator)
HIGHER TIER

A.M. MONDAY, 19 January 2015

2 hours

ADDITIONAL MATERIALS

A calculator will be required for this paper.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

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

Take π as 3·14 or use the π button on your calculator.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question **3***(a)*.

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	8	
2.	3	
3.	8	
4.	5	
5.	6	
6.	10	
7.	5	
8.	7	
9.	6	
10.	4	
11.	3	
12.	4	
13.	5	
14.	5	
15.	8	
16.	9	
17.	4	
Total	100	

Formula List

Area of trapezium $= \frac{1}{2}(a + b)h$
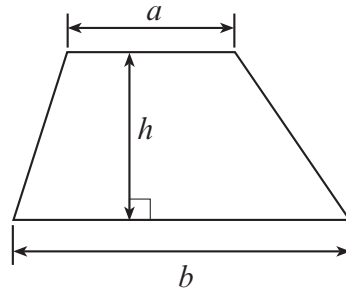
Volume of prism = area of cross-section × length
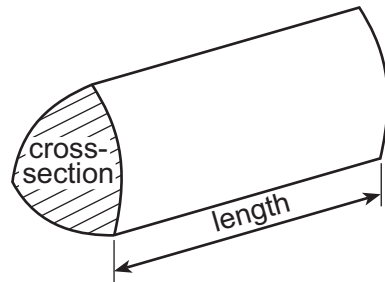
Volume of sphere $= \frac{4}{3}\pi r^3$

Surface area of sphere $= 4\pi r^2$
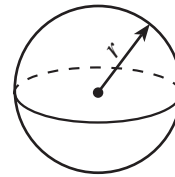
Volume of cone $= \frac{1}{3}\pi r^2 h$

Curved surface area of cone $= \pi r l$
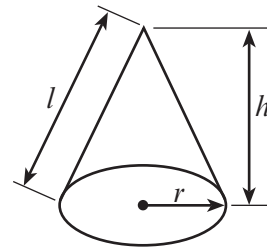
In any triangle ABC

Sine rule $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$

Area of triangle $= \frac{1}{2}ab \sin C$
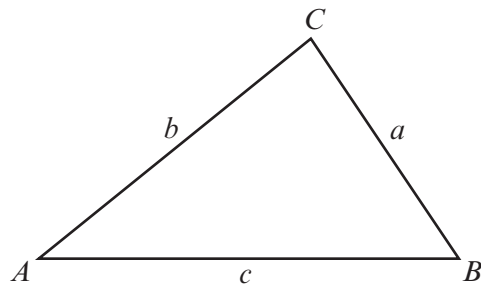
The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$

where $a \neq 0$ are given by

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

(4364-02)

1. *(a)* Write 249·6 as a percentage of 960. [2]

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(b) Write 0·060954 correct to two significant figures. [1]

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(c) Find the answer when $\frac{5}{16}$ of 88 is subtracted from 9·6. [2]

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(d) Find the value of $\dfrac{1}{2 \cdot 6^3 + 3 \times \sqrt{4 \cdot 2}}$, giving your answer correct to 3 decimal places. [3]

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2.

| 8 | (| − |) | 24 | 4 |

| 5 | + | × | ÷ | 2 | 7 |
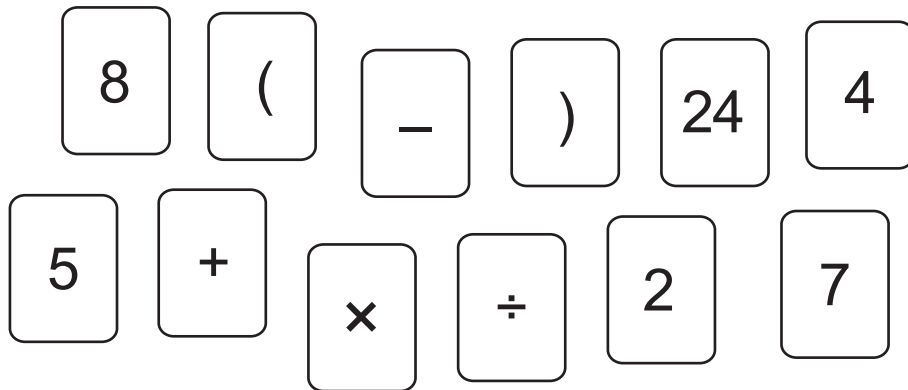
Use only cards from the selection shown above to create calculations with answers of 60, −7 and 21.

Remember:
- there are no other cards available to use
- a card may be used once only in each calculation
- a complete selection of these cards is available for each calculation.

[3]

For example, to create a calculation with the answer 13,

| 8 | + | 5 | = 13.

(a)   = 60

(b)   = −7

(c)   = 21

3. *(a)* *You will be assessed on the quality of your written communication in this part of the question.*

The volume of a cuboid is 385 cm^3.
The height of the cuboid is 11 cm.
The length and the width of the cuboid are both whole numbers of centimetres.
Calculate a possible length and width of this cuboid.
You must show all your working. [5]

(b)

4·5 cm

2·3 cm

1·9 cm

8·8 cm
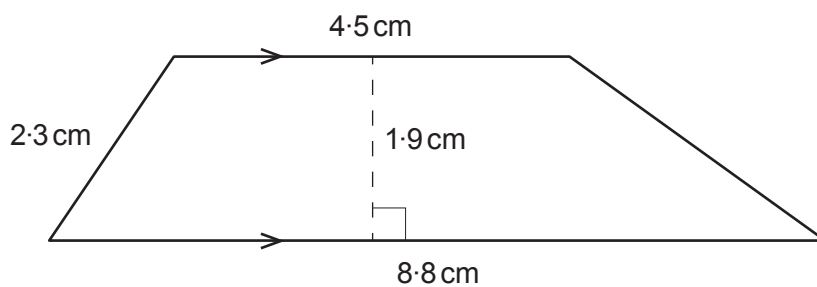
Diagram not drawn to scale

Calculate the area of the trapezium shown above, giving the units for your answer. [3]

4. The diagram shows two circles.

The area of the smaller circle is $\frac{4}{9}$ of the area of the larger circle.
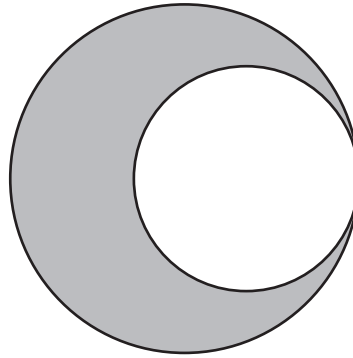
Diagram not drawn to scale

The radius of the smaller circle is 6·2 cm.
Calculate the area of the shaded region, giving your answer correct to 3 significant figures. [5]

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5. *(a)* Match a calculation shown below with each of the statements in the table. [3]

A	B	C	D
$1\frac{2}{5} \times 700$	$0 \cdot 23 \times 600$	$1 \cdot 23 \times 600$	$\frac{2}{5} \times 500$
E	**F**	**G**	**H**
$2 \cdot 3 \times 600$	$\frac{1}{5} \times 400$	$\frac{5}{6} \times 400$	$\frac{2}{5} \times 700$
I	**J**	**K**	**L**
$0 \cdot 4 \times 700$	$\frac{3}{5} \div 500$	$\frac{1}{6} \times 400$	$\frac{2}{5} \div 500$

Statement	Calculation
600 metres increased by 23%	
Smaller share of £400 when shared in the ratio 1:5	
Amount of £500 left after $\frac{3}{5}$ of the £500 is given to charity	
700 metres increased by 40%	

(b) Give an example to show that increasing a measurement by 20%, then reducing this increased measurement by 20%, does not take you back to the original measurement.

[3]

6. *(a)* Solve $\dfrac{32}{x} = 8$. [1]

(b) Solve $3(4x - 9) = 33$. [3]

(c) Solve $\dfrac{x + 17}{3} = 5$. [2]

(d) Write down the greatest whole number that satisfies the inequality $66x < 349$. [2]

(e) Solve the inequality $5x - 22 < 188$. [2]

7. Calculate the lengths p and q in the right-angled triangles shown below. [5]

2·7 cm p 4·1 cm

6·2 cm   14·6 cm q

Diagram not drawn to scale

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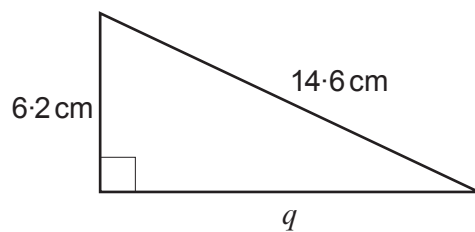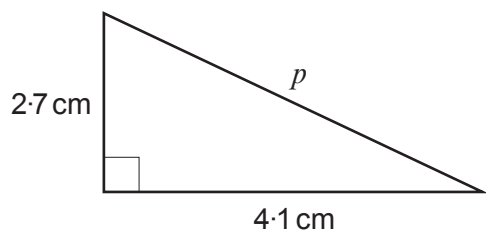
8. *(a)* Reflect the shape in the *x*-axis. [2]
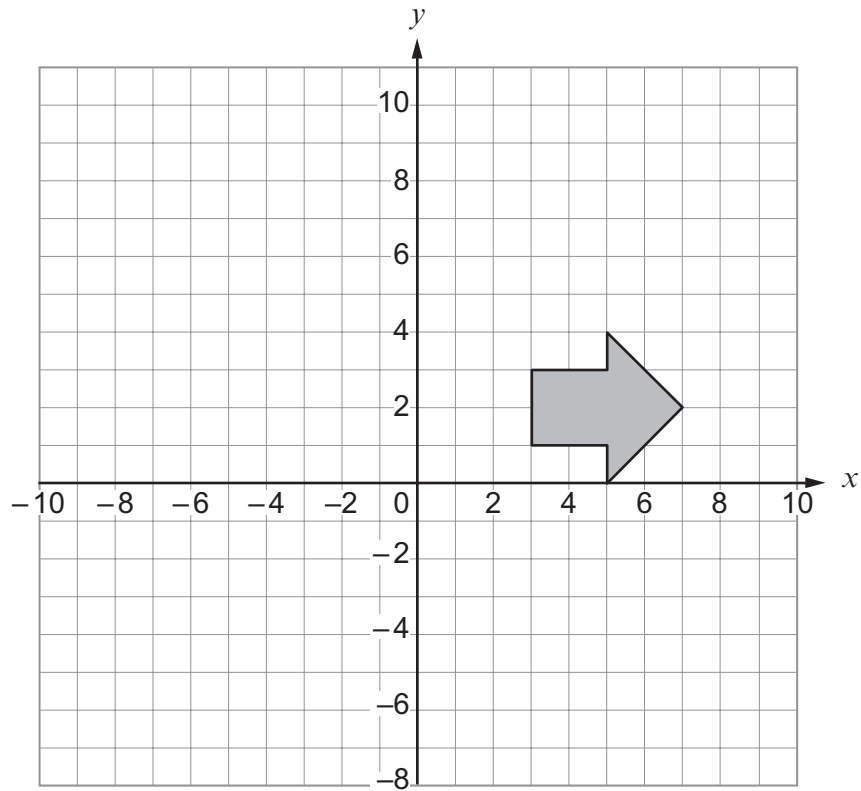
(b) Rotate the shape through 90° anticlockwise about the point (1, –1). [2]
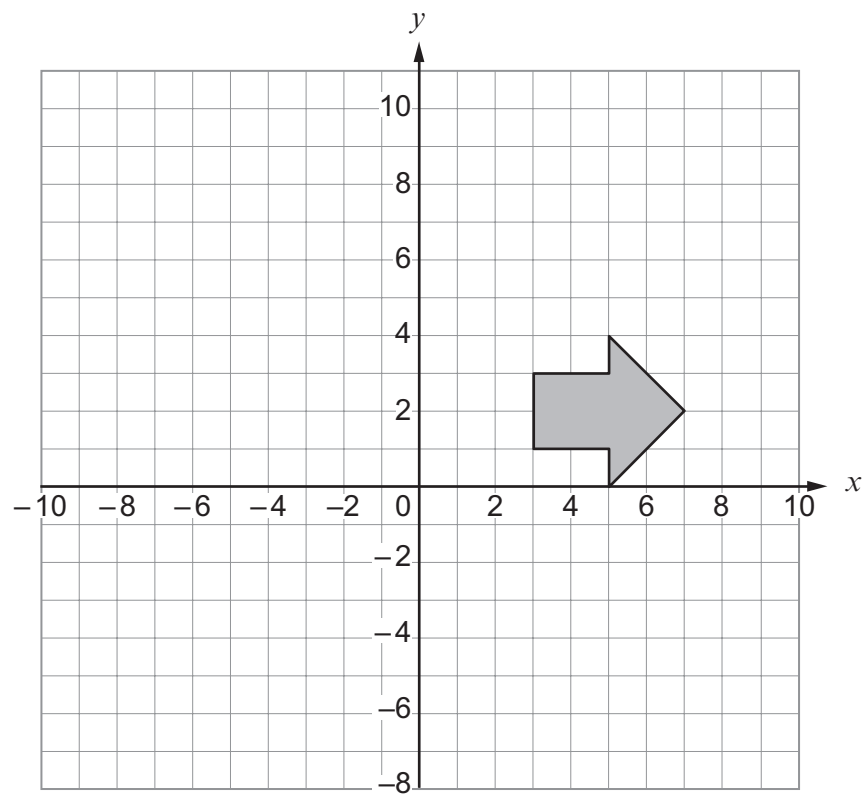
(c)
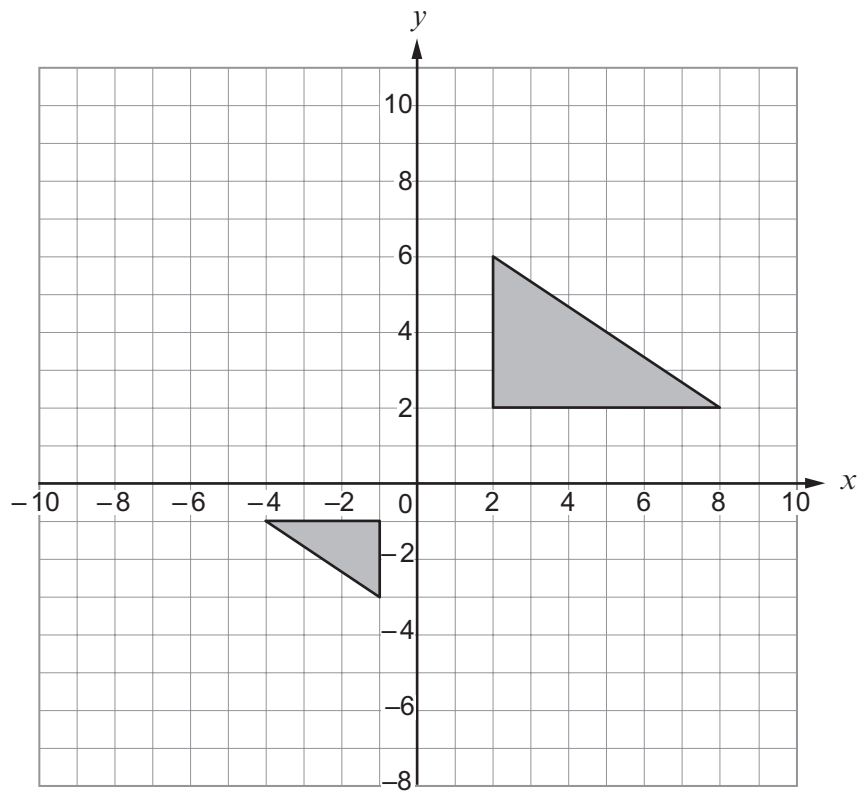
The larger triangle is transformed to the smaller triangle.
Complete the following sentences to describe this transformation.

The coordinates of the centre of the enlargement are (........, ...).   [1]

The scale factor of the enlargement of the larger triangle to the smaller triangle

is ....   [2]

9. *(a)* It is known that $a = \frac{48}{b}$ and that $b = \frac{3}{c}$.

Calculate the value of a when $c = 24$. [3]

(b) It is known that x is proportional to y.
When $x = 4$, $y = 0{\cdot}8$.
Calculate the value of x when $y = 6$. [3]

10. Evaluate each of the following giving all of your answers in **standard form**.

(a) $4 \cdot 5 \times 10^8 + 9 \cdot 4 \times 10^7$ [1]

Answer in standard form: ....

(b) $\dfrac{6 \times 10^{12}}{3 \times 10^{-6}}$ [1]

Answer in standard form: ....

(c) The product of 1000 and six million. [2]

Answer in standard form: ....

11. Use the quadratic formula to solve $x^2 + 5x + 2 = 0$.
Give your answers correct to 2 decimal places. [3]

12.
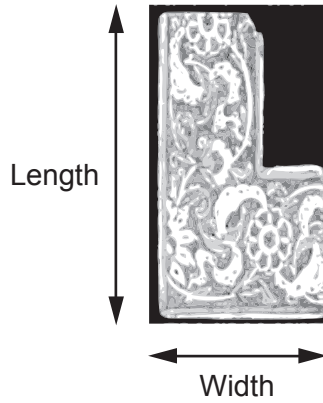
Length

Width

Diagram not drawn to scale

A tile is made so that the sum of its length and width must be 20 cm.
Draw a graph to show possible lengths and widths of this tile.   [4]

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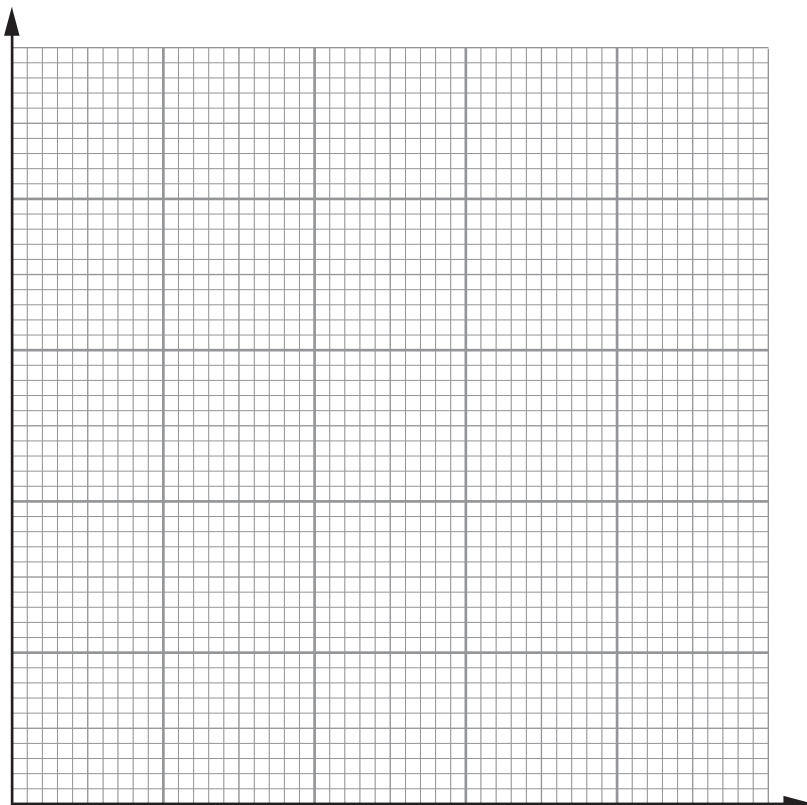
13.
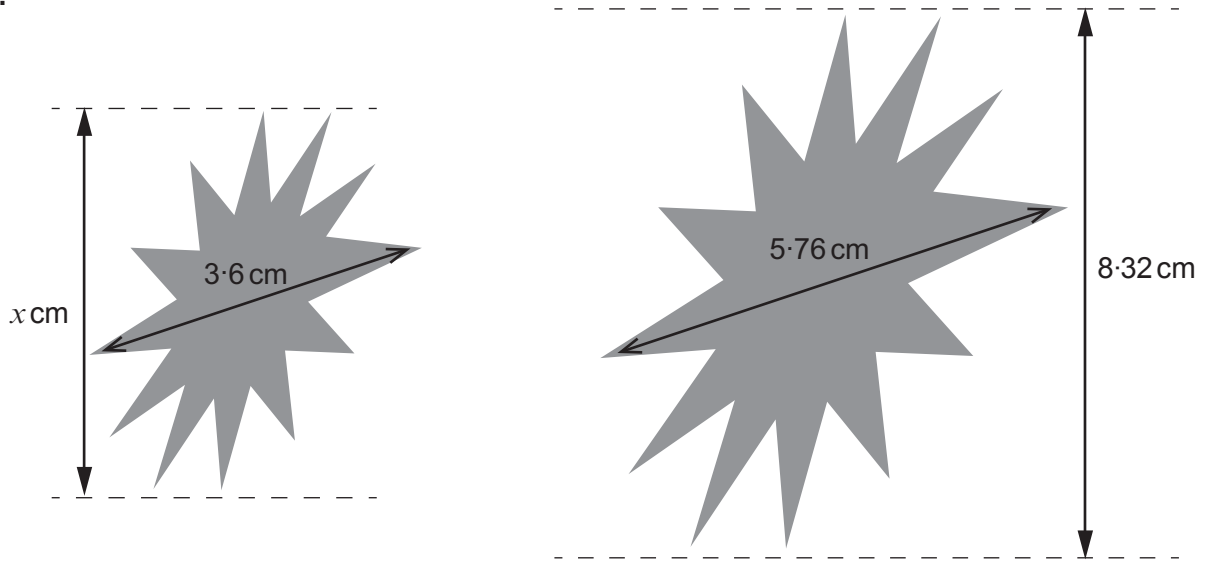
Diagram not drawn to scale

The diagram above shows two similar shapes.

(a) Calculate the length x. [2]

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(b) The area of the smaller shape is $13 \cdot 6 \, cm^2$.
Calculate the area of the larger shape. [3]

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14. The vectors **OM**, **ON** and **OP** are shown in the diagram below.
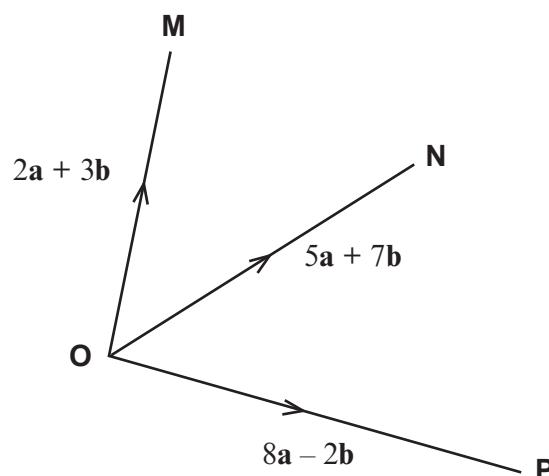
Diagram not drawn to scale

(a) Find **MN** in terms of **a** and **b**.
Give your answer in its simplest form. [2]

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(b) The point **R** is the mid-point of **OP**.
Find **RN** in terms of **a** and **b**.
Give your answer in its simplest form. [3]

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15.

Diagram not drawn to scale

Calculate the area of triangle *DEC*. [8]

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Turn over.

16.

$(x + 3)$ cm Area = 28·875 cm^2

$(y + 6)$ cm

(a) Prove that $xy + 3y + 6x = 39·75$.
You must show your working. [3]

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(b)

Triangle: $(x + 3)$ cm, Area = $28{\cdot}875$ cm², $(y + 6)$ cm

Rectangle: y cm, $(x + 3)$ cm, Perimeter 20 cm

Use an algebraic method to calculate the dimensions of the rectangle. [6]

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Turn over for Question 17

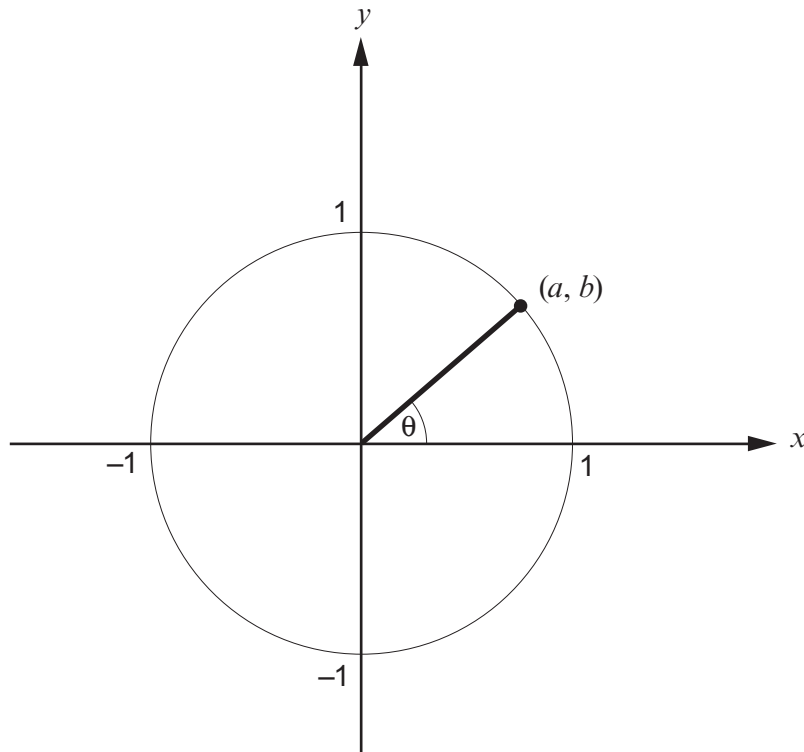**17.** The sketch below shows a circle with its centre at the origin and radius 1 unit.
The point (a, b) is a point on the circumference of the circle.

The angle θ is shown on the diagram.
Complete the following statements, in terms of a and b.

[4]

(a) cos θ = ...

(b) tan θ = ...

(c) sin θ = ...

END OF PAPER