Surname		Centre Number	Candidate Number
Other Names			0

GCSE LINKED PAIR PILOT

wjec cbac

4364/02

S15-4364-02

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

A.M. MONDAY, 8 June 2015

2 hours

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	9	
2.	8	
3.	3	
4.	6	
5.	5	
6.	8	
7.	9	
8.	7	
9.	4	
10.	2	
11.	4	
12.	3	
13.	3	
14.	7	
15.	4	
16.	9	
17.	6	
18.	3	
Total	100	

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 **5**.

CJ*(S15-4364-02)

Formula List

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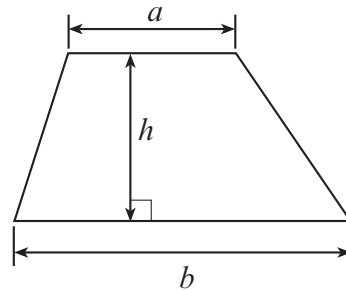
Volume of prism = area of cross-section × length
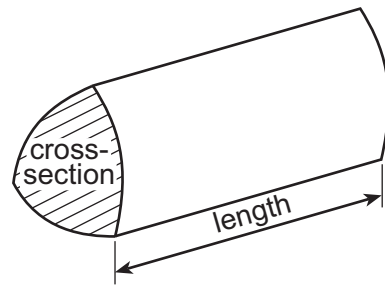
Volume of sphere $= \frac{4}{3}\pi r^3$

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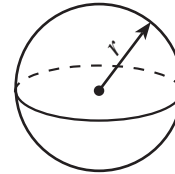
Volume of cone $= \frac{1}{3}\pi r^2 h$

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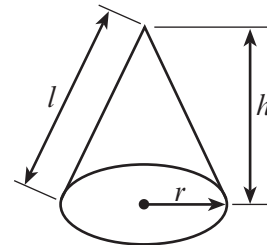
In any triangle ABC

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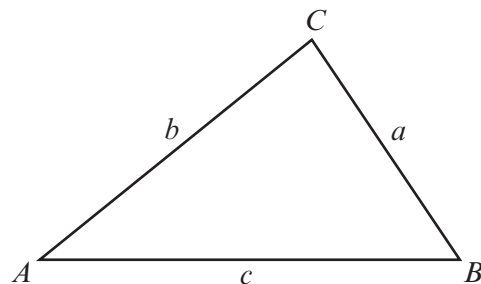
The Quadratic Equation

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

where $a \neq 0$ are given by

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

1. *(a)* Solve $\dfrac{4x}{5} = 16$. [2]

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(b) Solve $\dfrac{7}{x} = 14$. [1]

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(c) Solve $4(7x - 11) = 40$. [3]

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(d) (i) Solve the inequality $2x + 3 > 35$. [2]

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(ii) Hence, write down the smallest whole number that satisfies the inequality $2x + 3 > 35$. [1]

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Turn over.

2. *(a)* Enlarge the shape shown by a scale factor of 2 using *A* as the centre of enlargement. [3]
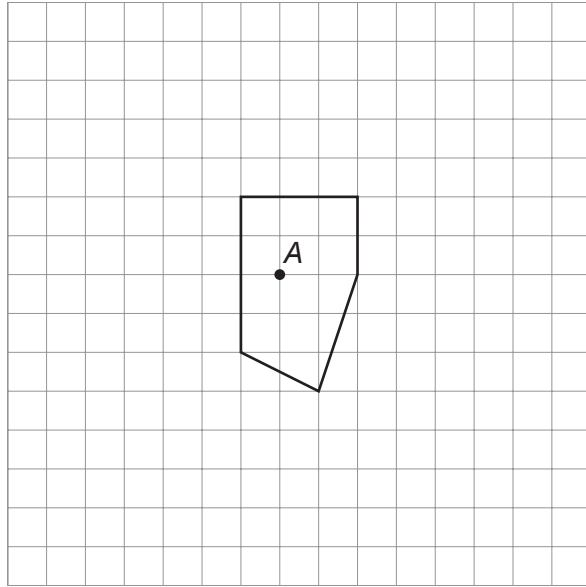
(b) Reflect the rectangle shown below in the line $x = 1$. [2]

(4364-02)
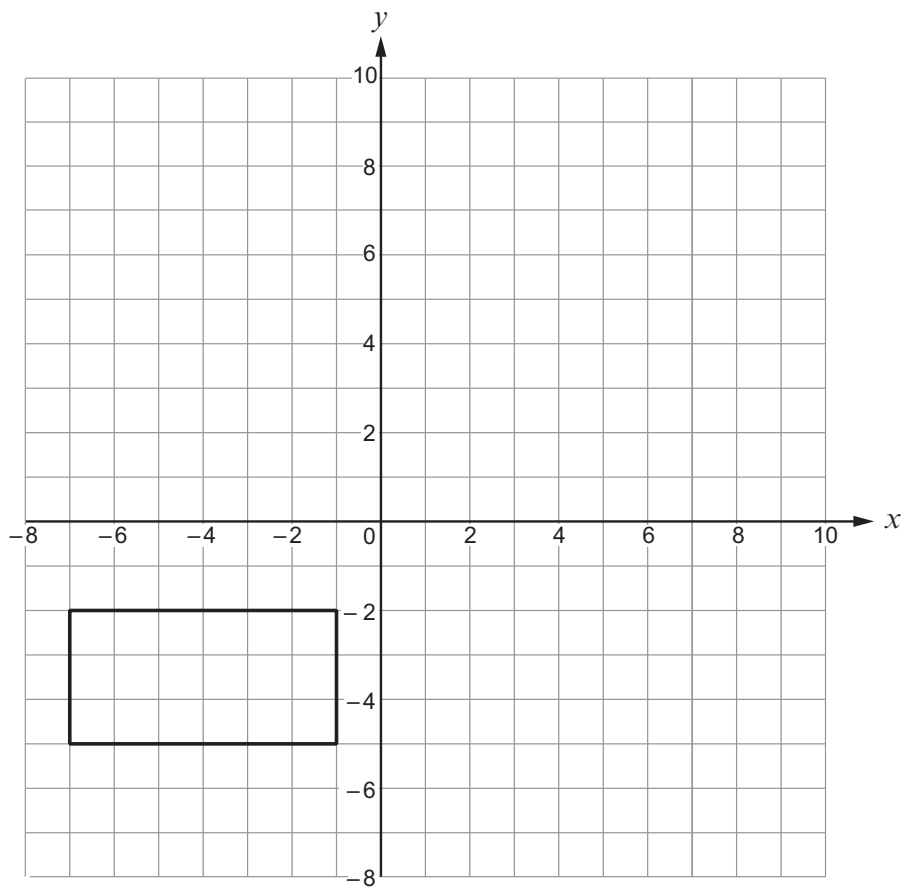
(c) Translate the rectangle shown below by $\begin{pmatrix} 8 \\ 5 \end{pmatrix}$.   [1]
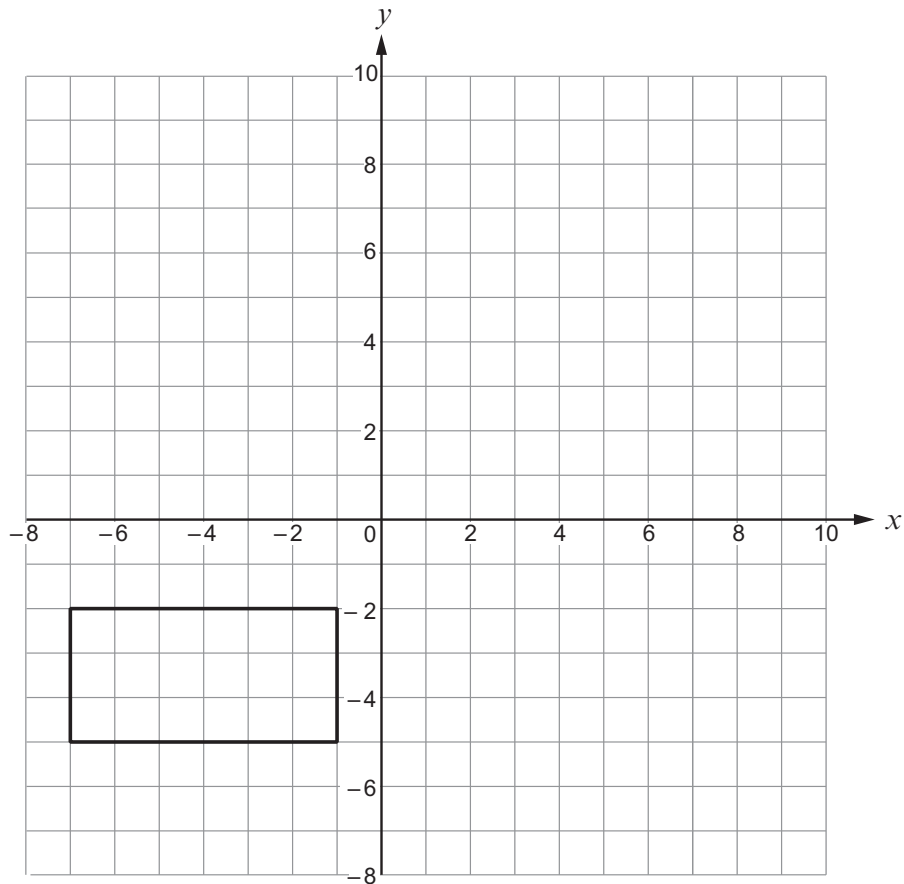
(d) Rotate the triangle through 90° anticlockwise about *O*.   [2]

Turn over.
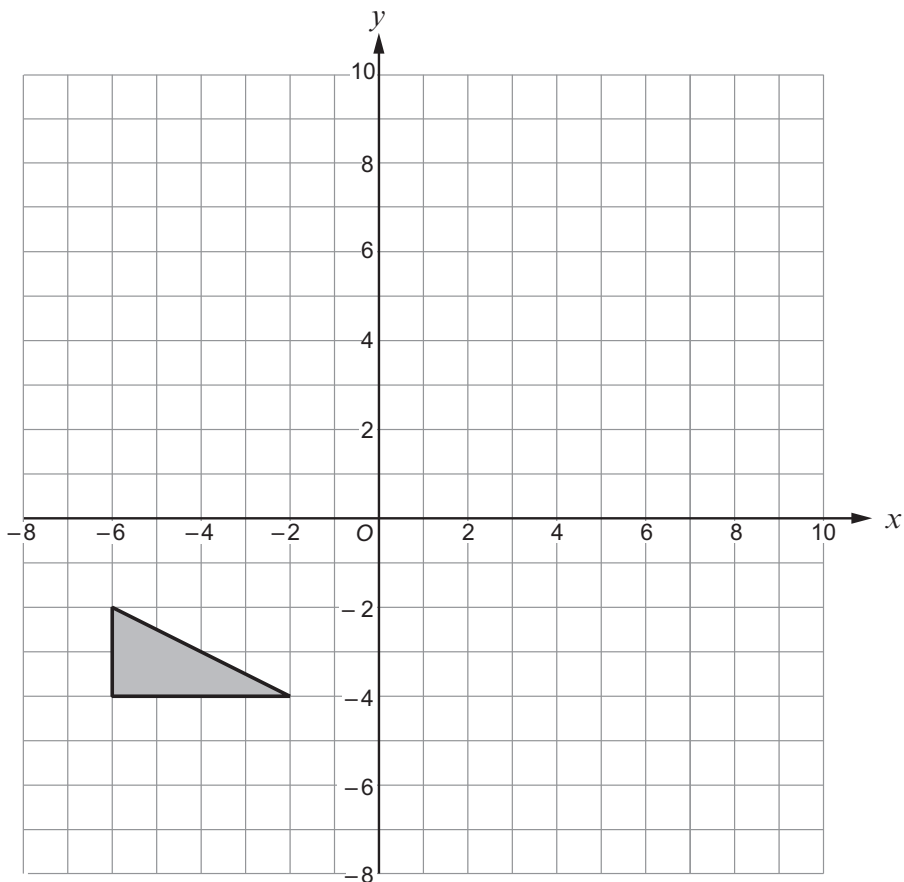
3.

A pen costs $4x$ pence.
A pencil costs $2 + 3x$ pence.

The total cost of a pen and a pencil is 65 pence.
Write an equation in x and solve it to find the value of x. [3]

4. *(a)*

8·6 cm

2·8 cm

10·4 cm
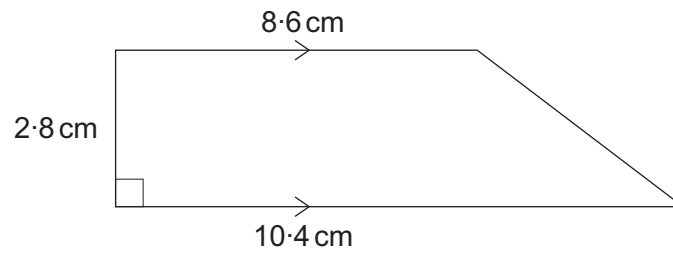
Diagram not drawn to scale

Calculate the area of the trapezium. [2]

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(b)

50 cm

30 cm

40 cm

60 cm
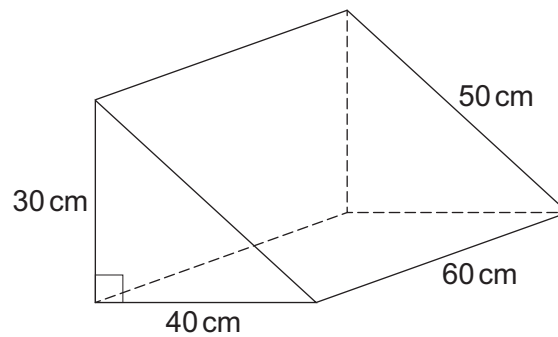
Diagram not drawn to scale

Calculate the volume of the triangular prism.
Give the units of your answer. [4]

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5. *You will be assessed on the quality of your written communication in this question.*

Agnes and Bryn both buy identical pizzas to share with friends.

Agnes gives Carwyn $\frac{2}{5}$ of her pizza.

Bryn shares his pizza in the ratio $1:2:3:4$ and gives Dafydd the largest piece.

Does Carwyn have:

- the same size piece of pizza as Dafydd, or
- a larger piece of pizza than Dafydd, or
- a smaller piece of pizza than Dafydd?

You must explain your answer and show all your working. [5]

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6. *(a)* The shape below shows a semi circle attached to a rectangle.
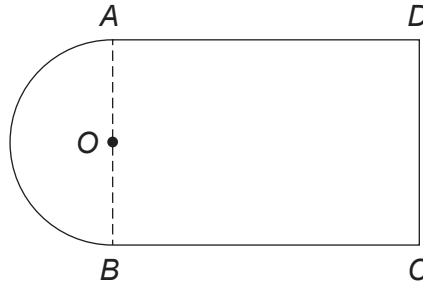
Diagram not drawn to scale

The radius of the semi circle is 6·1 cm and the length *BC* = 16·7 cm.
Calculate the area of the shape. [6]

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(b) A circle has a circumference of 24π cm.
Calculate the radius of the circle. [2]

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7. *(a)*
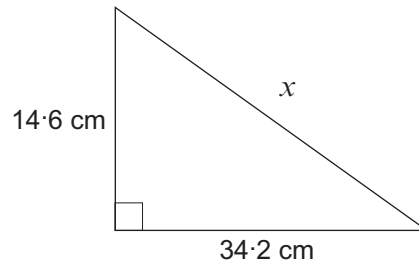
Diagram not drawn to scale

Calculate the length x. [3]

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(b)
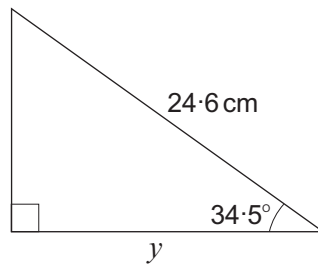
Diagram not drawn to scale

Calculate the length y. [3]

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(c)

14·7 cm

z

24·7°
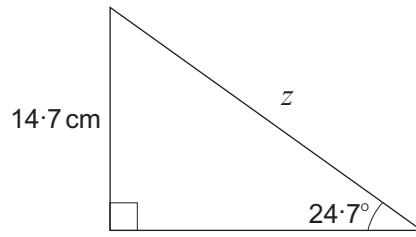
Diagram not drawn to scale

Calculate the length z.   [3]

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8. *(a)* The price of fuel has increased by 20% each year.
The cost of fuel was £1.49 per litre on 1st January 2015.
If the price of fuel continues increasing at the same rate, what would you expect the cost of a litre of fuel to be on 1st January 2020?
Give your answer correct to the nearest penny. [4]

(b) After an increase of 24%, the cost of 1 tonne of coal is £451.36.
Calculate the cost of 1 tonne of coal before the increase in price. [3]

9.
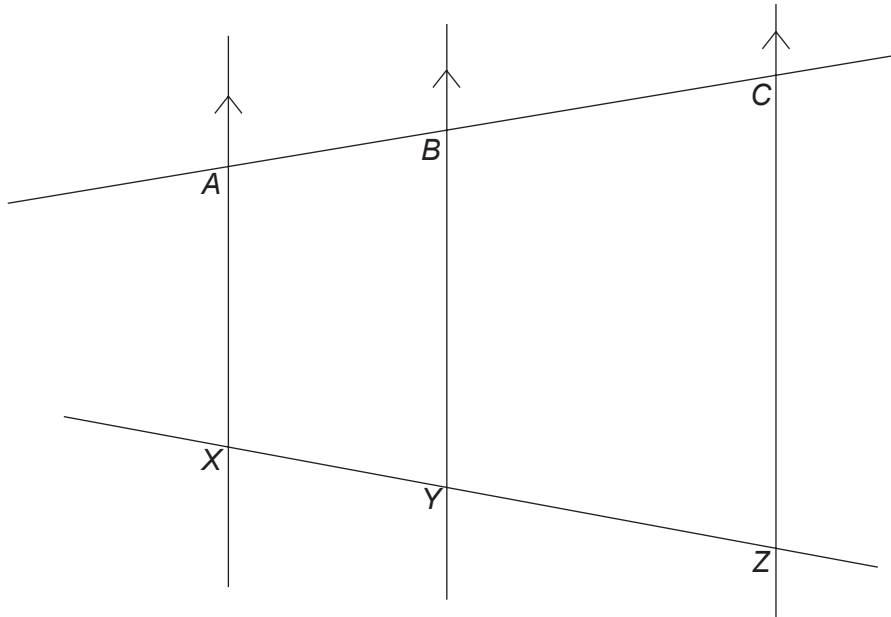
Diagram not drawn to scale

Given that AB = 30 cm, BC = 50 cm and XZ = 89·6 cm, calculate the lengths of XY and YZ.
You must show all your working. [4]

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10. Evaluate $\dfrac{8\cdot44 \times 10^{-8} \times 4\cdot53 \times 10^{-4}}{2\cdot34 \times 10^{16}}$.

Express your answer in standard form **correct to 3 significant figures**. [2]

11. The heart shapes shown below are similar.
A number of corresponding lengths are shown.

0·84 cm

0·6 cm

y cm

4·48 cm

2·8 cm

x cm
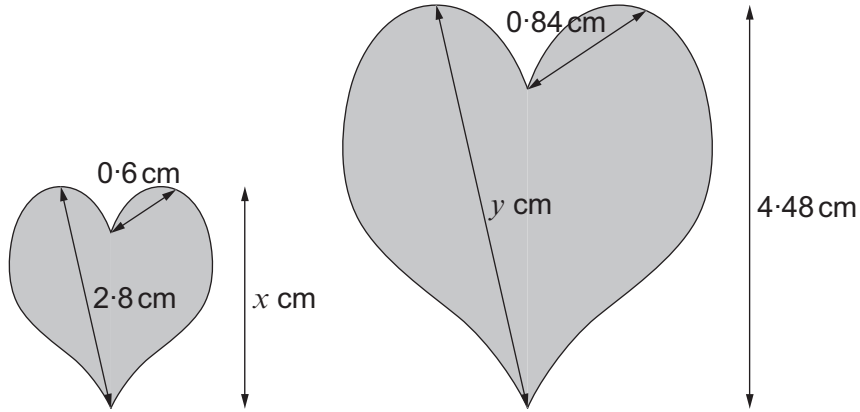
Diagram not drawn to scale

Calculate the lengths x and y.
You must show all your working. [4]

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$x =$ .... cm $y =$ .... cm

12. There is a relationship between x and y.
The table shows some values of y for a number of values of x.

x	1	2	4
y	200	100	50

(a) Write down a relationship between x and y by completing the following statement. [2]

$$y =$$

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(b) Write down the value of y when $x = 25$. [1]

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13. Explain, using algebra, why the sum of any 3 consecutive whole numbers is always divisible by 3. [3]

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14. *(a)* Triangle A has sides of length x cm, $(2x + 3)$ cm and $2x$ cm.
The perimeter of triangle A is 123 cm.
Calculate the lengths of **all** the sides of this triangle.
You must show all your working. [4]

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(b) Triangle B has sides of length y cm, $(2y + 3)$ cm and $2y$ cm.
Is triangle A similar to triangle B?
You must give a reason for your answer. [1]

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(c) Triangle C has sides of length $3g$ cm, $4g$ cm and $6g$ cm.
Triangle D has sides of length $3h$ cm, $4h$ cm and $6h$ cm.

Explain why triangle C is similar to triangle D and state when the two triangles would be congruent. [2]

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15. Given that   **OA** $= 12\mathbf{x} + 8\mathbf{y},$ **OB** $= 5\mathbf{x} + 10\mathbf{y}$ and   **CO** $= -14\mathbf{x} + 11\mathbf{y},$ write down each of the following vectors in its simplest form.

   (a) **BA** [2]

   (b) **AC** [2]

16. *(a)* Solve the following simultaneous equations using an algebraic method. [6]

$$4x^2 + xy - 8 = 0$$
$$x + y = 2$$

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(b) Use the formula method to solve $3x^2 + 5x - 4 = 0$, giving your answer correct to 2 decimal places. [3]

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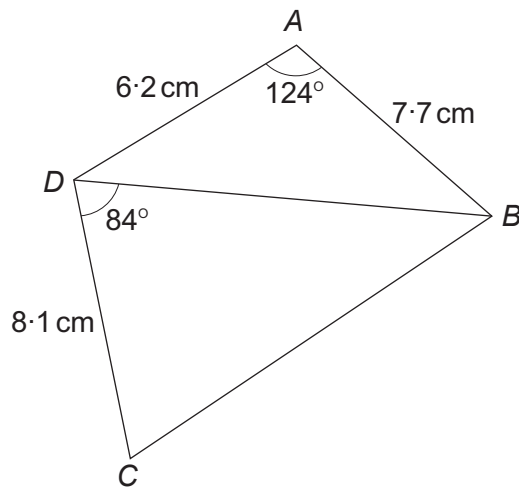
17. The diagram shows a quadrilateral *ABCD*.
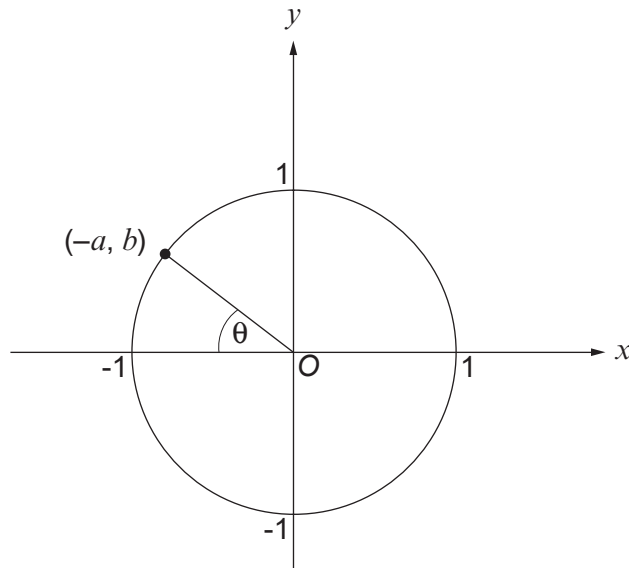
Diagram not drawn to scale

Calculate the area of triangle *BCD*. [6]

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

The angle θ is shown on the diagram.
Complete the following statements, in terms of a and b.   [3]

$\cos \theta =$

$\tan \theta =$

END OF PAPER

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