

Candidate Name	Centre Number	Candidate Number
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GCSE LINKED PAIR PILOT

4363/02

METHODS IN MATHEMATICS UNIT 1: METHODS (NON-CALCULATOR) HIGHER TIER

P.M. MONDAY, 13 June 2011

2 hours

**CALCULATORS ARE
NOT TO BE USED
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.

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.

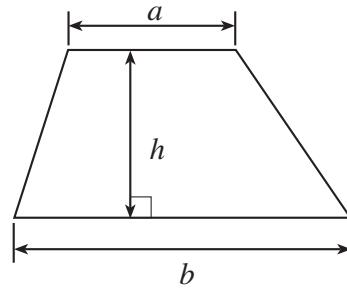
The number of marks is given in brackets at the end of each question or part-question.

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

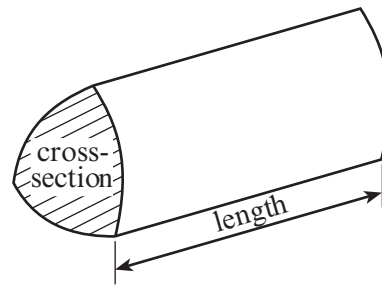
For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1	2	
2	9	
3	5	
4	9	
5	8	
6	3	
7	3	
8	15	
9	5	
10	2	
11	4	
12	6	
13	12	
14	9	
15	8	
TOTAL MARK		

Formula List

Area of trapezium = $\frac{1}{2}(a + b)h$

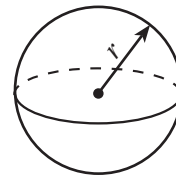


Volume of prism = area of cross-section \times length



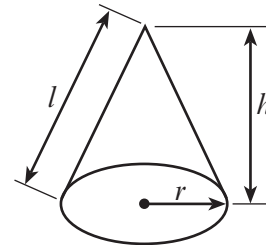
Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$



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

Curved surface area of cone = $\pi r l$

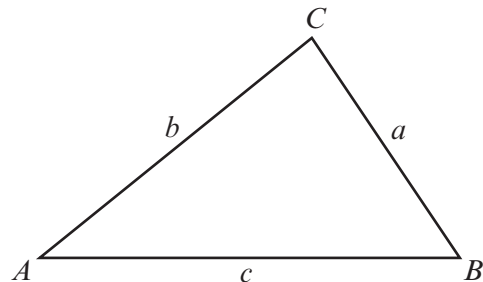


In any triangle ABC

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

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

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



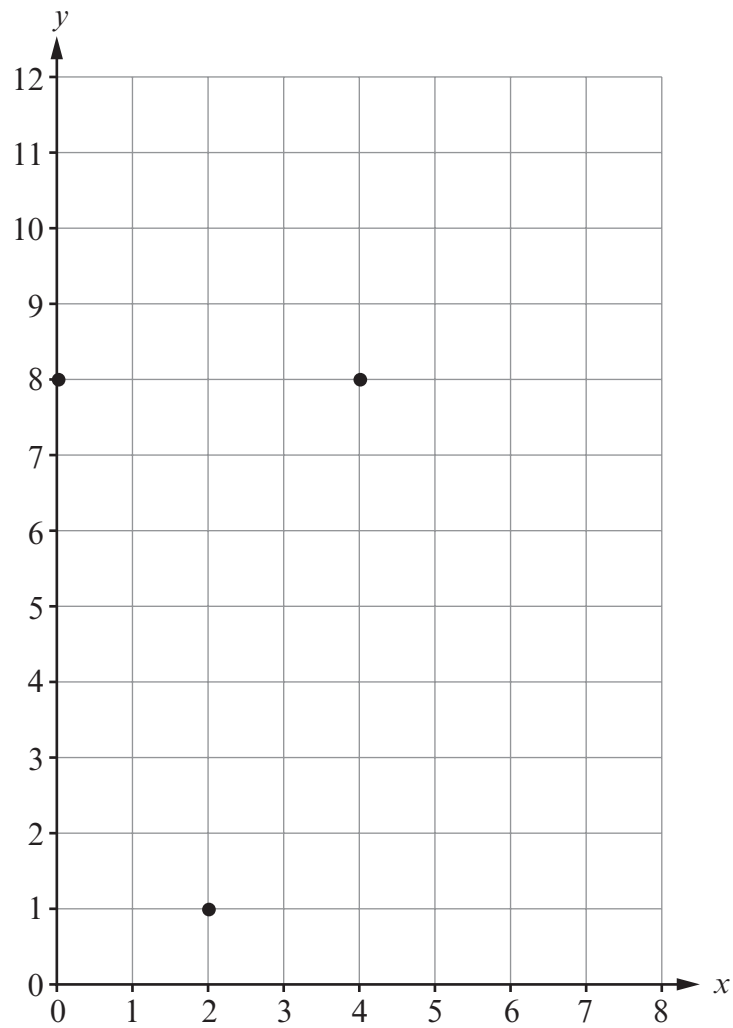
The Quadratic Equation

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. Three points $(0, 8)$, $(4, 8)$ and $(2, 1)$ are shown on the grid below.



Give the coordinates of a possible fourth point that could be plotted on the grid in order to make a kite when all four points are joined together.

(.....,))

[2]

2. (a) Calculate the size of each of the angles marked x , y and z in the diagram below.

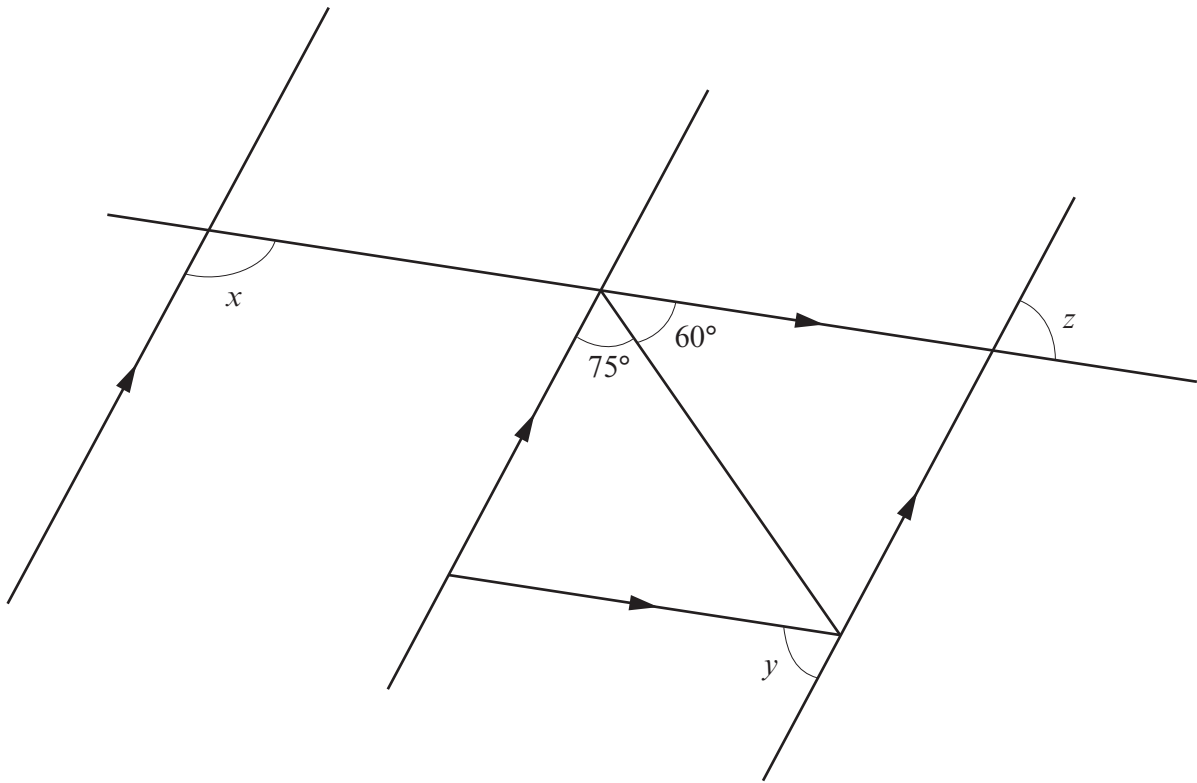


Diagram not drawn to scale

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$$x = \dots\dots\dots^\circ \quad y = \dots\dots\dots^\circ \quad z = \dots\dots\dots^\circ$$

[4]

- (b) Three of the interior angles of a pentagon are 110° , 120° and 170° .
The other two angles are equal.
Calculate the size of each of the other two interior angles.

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4. (a) Find the highest common factor of 30 and 45.

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[1]

- (b) Find the lowest common multiple of 18 and 24.

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- (c) Showing **all** your working, write $\frac{4}{15}$, $\frac{1}{6}$ and $\frac{2}{5}$ in descending order.

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- (d) Express 525 as a product of prime numbers using index notation.

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[3]

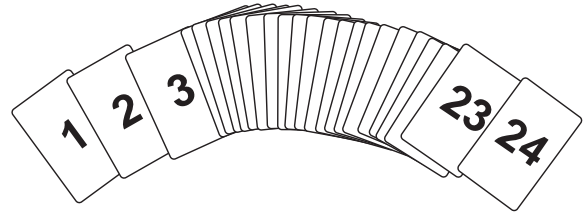
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5. A set of 24 cards are numbered from 1 to 24.

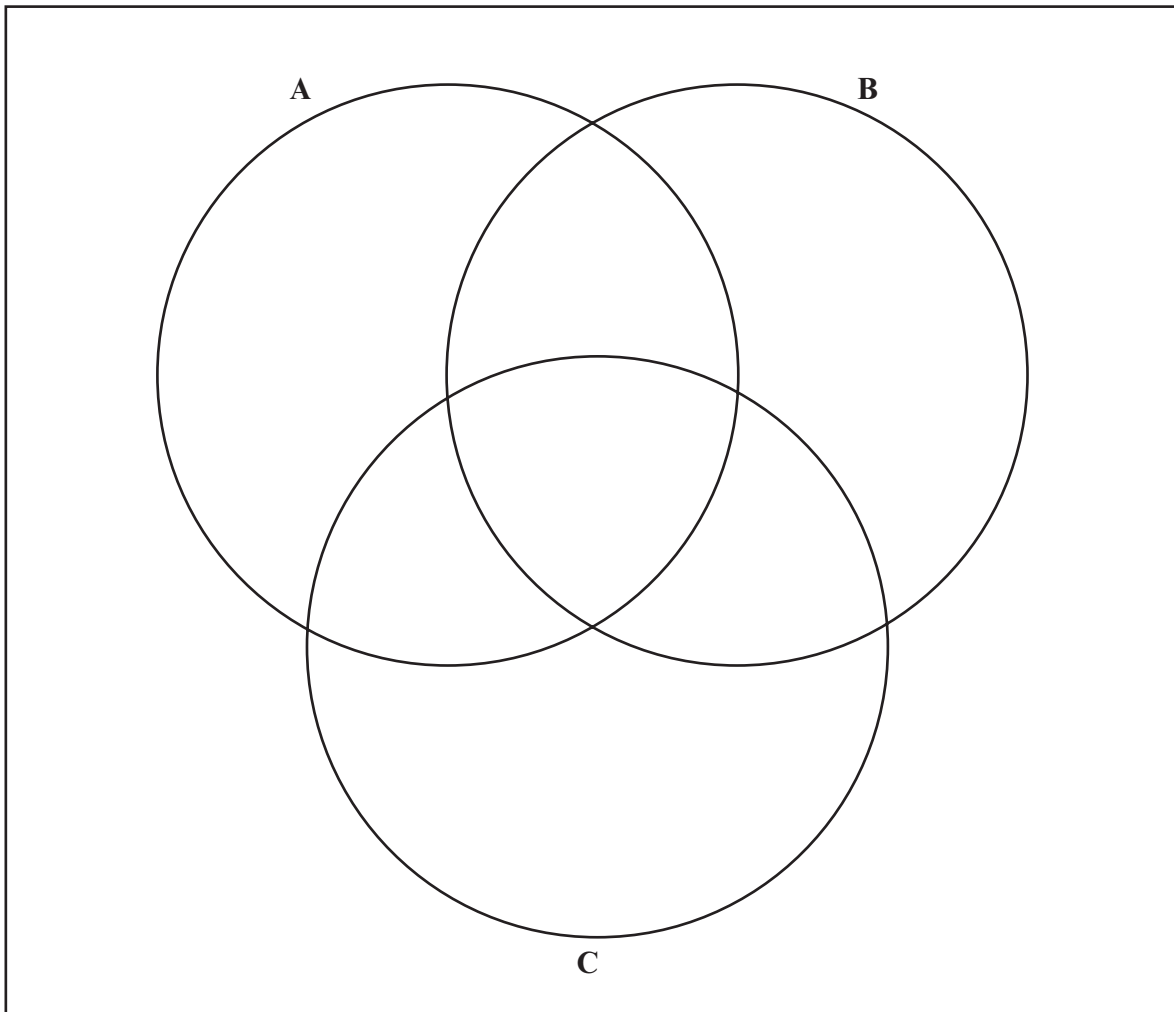
Set **A** are the cards with the even numbers from 2 to 24 inclusive.

Set **B** are the cards with the multiples of three from 3 to 24 inclusive.

Set **C** are the cards with the multiples of four from 4 to 24 inclusive.



- (a) Complete the Venn diagram.



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[5]

(b) One card from the pack of 24 cards is selected at random.
Find the probability that the card chosen is

(i) a multiple of 3,

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..... [1]

(ii) odd,

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..... [1]

(iii) a multiple of 3, or a multiple of 4, or a multiple of both 3 and 4.

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..... [1]

6. Admiralty Brass contains copper, zinc and tin in the ratio 69 : 30 : 1.
When 345 kg of copper is used to make Admiralty Brass, calculate the quantities of zinc and tin that are needed.

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Zinc = kg Tin = kg [3]

(d) Simplify $6(4y + 3) + 5(3y - 8)$.

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[2]

(e) Expand $w(3w^3 - 5)$.

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[2]

(f) Find the value of $5g^2 - 6h$ when $g = -2$ and $h = -\frac{1}{2}$.

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(g) Solve $x^2 - 3x - 10 = 0$.

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
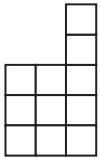
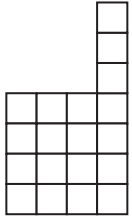
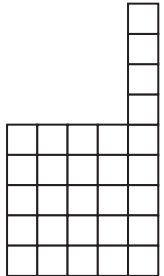

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[3]

11. Use the table below to find an expression for the number of small squares in Pattern number n .

Pattern number	Shape	Number of small squares
1		5
2		11
3		19
4	
⋮	⋮	⋮
n	

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12. (a) Which is the greater $(n + 1)^2$ or $n^2 + 2n + 2$?
You **must** show **all** your working.

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[3]

- (b) Which is the greater $0.\dot{1}\dot{2}$ or $\frac{119}{990}$?
You **must** show **all** your working.

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[3]

13. (a) Simplify each of the following.

(i) $8^{\frac{2}{3}}$

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[2]

(ii) $25^{-\frac{1}{2}}$

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[2]

(b) Expand and simplify $(7 - \pi)(10 - \pi)$, leaving π in your answer.

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(c) Find the value of $(\sqrt{32} - \sqrt{2})^2$.

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(d) Given that $p = \sqrt{7}$, $q = \sqrt{11}$ and $r = \sqrt{154}$, write pqr in the form $a\sqrt{2}$.

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14. (a) Find the length marked w .
You **must** give a reason for your answer.

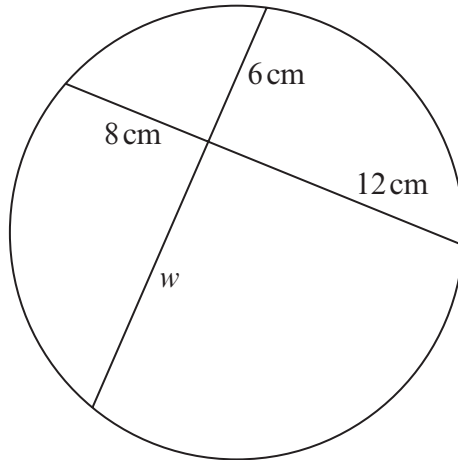


Diagram is not drawn to scale

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[3]

- (b) Given that CD is a tangent to the circle, find the size of the angle marked x .
You **must** give a reason for your answer.

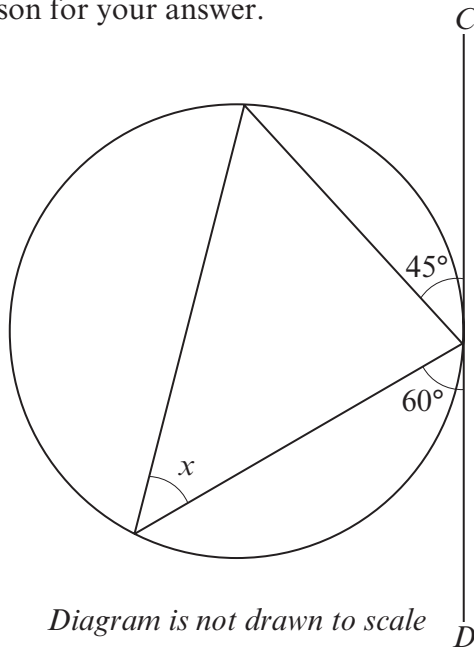


Diagram is not drawn to scale

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- (c) Find the size of the angle marked y .
You **must** give a reason for your answer.

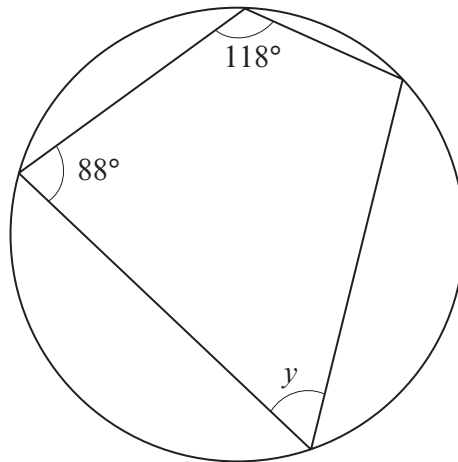


Diagram is not drawn to scale

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- (d) Given that point O is the centre of the circle, find the size of the angle marked z .
You **must** give a reason for your answer.

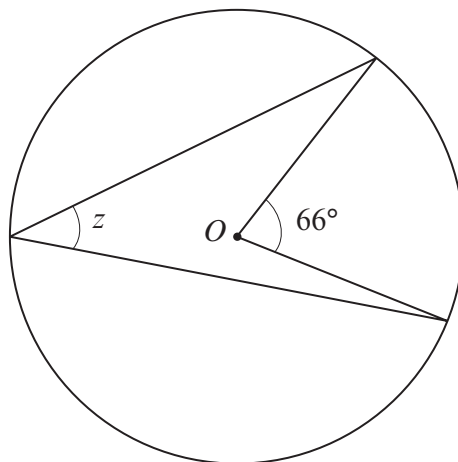


Diagram is not drawn to scale

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[2]

15.



Five cards are numbered 2, 3, 5, 7, 11 respectively.
The cards are shuffled and two cards are chosen at random.

(a) Calculate the probability that at least one of the numbers is odd.

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(b) Calculate the probability that the **sum** of the numbers on the chosen cards is odd.

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(c) Calculate the probability that the **product** of the numbers on the chosen cards is odd.

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