

Surname	Centre Number	Candidate Number
Other Names		0



**GCSE**

4370/05



A15-4370-05

**MATHEMATICS – LINEAR  
PAPER 1  
HIGHER TIER**

A.M. WEDNESDAY, 4 November 2015

2 hours

**CALCULATORS ARE  
NOT TO BE USED  
FOR THIS PAPER**

**ADDITIONAL MATERIALS**

A ruler, a protractor and a pair of compasses may be required.

**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  $\pi$  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.

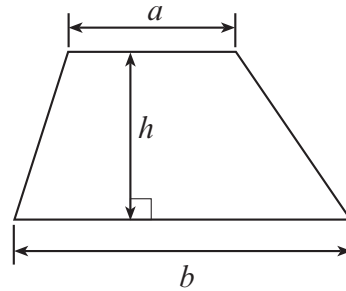
You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question 4.

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

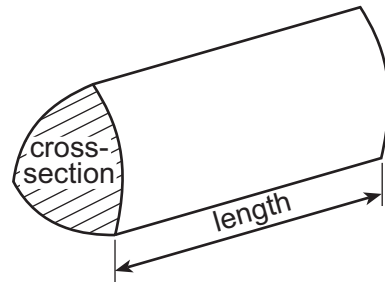
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## Formula List

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

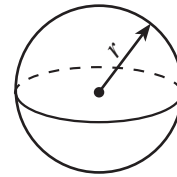


**Volume of prism** = area of cross-section  $\times$  length



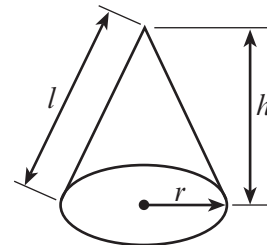
**Volume of sphere**  $= \frac{4}{3} \pi r^3$

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



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

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

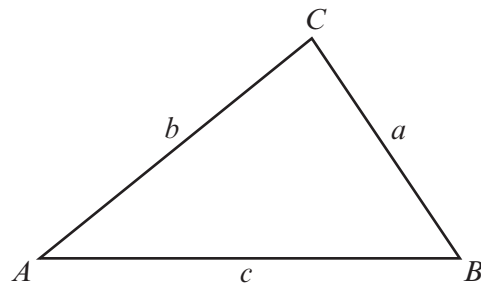


In any triangle  $ABC$

**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. (a) Solve  $8x - 9 = 21 + 5x$ .

[3]

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- (b) Simplify  $6e - 4f - 10e - f$ .

[2]

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- (c) Solve  $\frac{x}{7} = 14$ .

[1]

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[2]

- [5]

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- A diagram showing two polygons sharing a common vertex labeled  $A$ . The polygon on the left is an octagon, and the polygon on the right is a pentagon. The angle between the two polygons at vertex  $A$  is labeled  $x$ .





[4]

7. In a survey, a total of 392 pupils were chosen from years 7, 8 and 9 and asked the following question.

What is your favourite sport in this list?

football	rugby	swimming	cycling
			

The results are summarised in the table below.

Favourite sports					
Year	Football 	Rugby 	Swimming 	Cycling 	Total
7	45	38	23	15	121
8	32	64	14	28	138
9	26	46	34	27	133
<b>Total</b>	103	148	71	70	392

In each of the following parts, a pupil is selected at random.

- (a) Calculate the probability of selecting a pupil whose favourite sport is swimming. [1]

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- (b) Calculate the probability of selecting a Year 8 pupil. [1]

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- (c) The pupil selected is in Year 8.  
Calculate the probability that this pupil's favourite sport is cycling. [2]

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- (d) The favourite sport of the selected pupil is football.  
What is the probability that this pupil is in Year 7?

[2]

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- (e) The pupil selected is **not** in Year 7.  
What is the probability that this pupil's favourite sport is **not** football?

[3]

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8. (a) On the graph paper provided, draw the region which satisfies **all** of the following inequalities.

$$\begin{aligned}x + y &\geq 3 \\ y &\leq -2x + 6 \\ y &\leq 2\end{aligned}$$

**Make sure that you clearly indicate the region that represents your answer.** [3]

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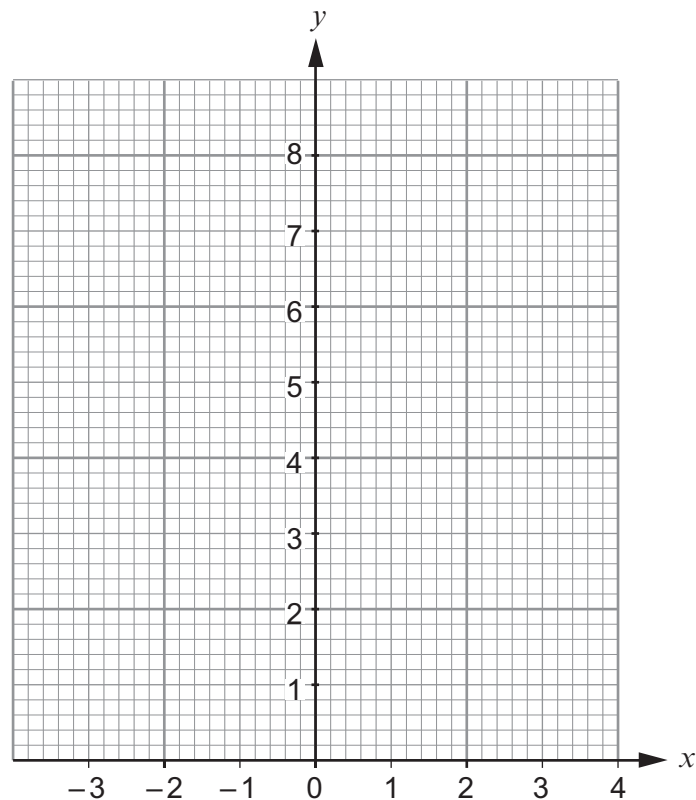
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- (b) Do each of the points listed in the table below lie within the region? Complete the table by stating yes or no.

[1]

Point with coordinates	Lies within the region, yes or no?
(2, 1.5)	
(2, 2)	
(2, 2.5)	

9. (a) The  $n$ th term of a sequence is  $5n^2 - 3n$ .  
Write down the first three terms of the sequence.

[2]

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- (b) Find the 20th term of the sequence with  $n$ th term  $4n - n^2$ .

[1]

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- (c) Find the  $n$ th term of the sequence 2, 8, 18, 32, 50, 72 ...

[2]

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10. (a) Expand and simplify  $(2x + 7)(3x - 1)$ .

[3]

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(b) Simplify  $\frac{(x+3)^{12}}{(x+3)^4}$ .

[1]

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- (c) It is known that  $y = kx^2$ , and that when  $x = 3$ ,  $y = -36$ .  
Calculate the value of  $y$  when  $x = 5$ .

[4]

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11. The table below shows some values of  $y = x^3 - 3x + 4$  for values of  $x$  from  $-3$  to  $3$ .

$x$	$-3$	$-2$	$-1$	$0$	$1$	$2$	$3$
$y = x^3 - 3x + 4$	$-14$		$6$	$4$	$2$	$6$	

Examiner  
only

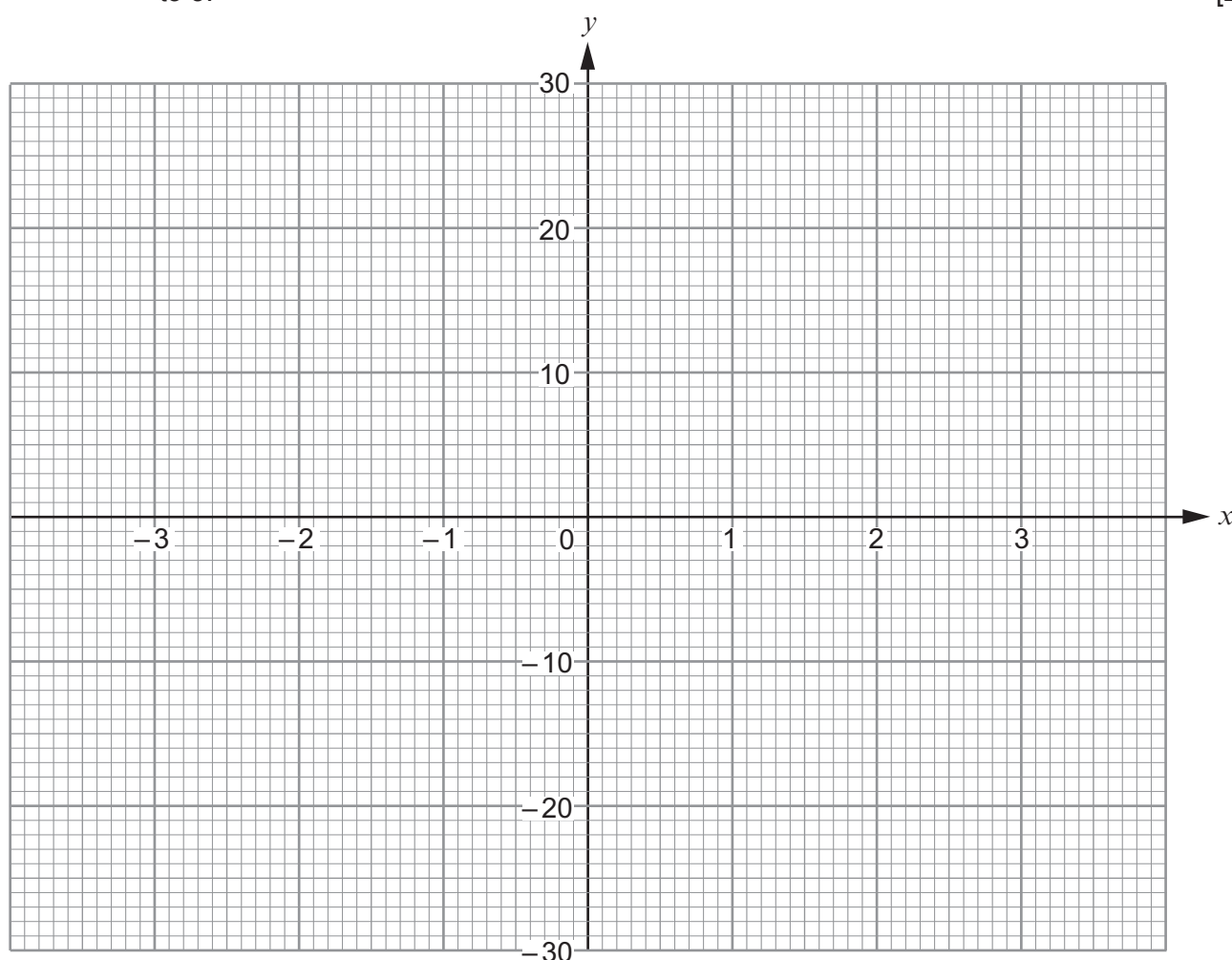
(a) Complete the table above.

[2]

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(b) On the graph paper below draw the graph of  $y = x^3 - 3x + 4$  for the values of  $x$  from  $-3$  to  $3$ .

[2]



(c) Use your graph to write down the coordinates of the two points where the gradient is zero.

[2]

(....., ..... ) (....., ..... )

(d) Use your graph to write down the solution of the equation  $x^3 - 3x + 4 = 0$ .

[1]

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13. (a) Make  $h$  the subject of the formula.  
Give your answer in its simplest form.

[3]

$$5p + 7h = 11q + 3p$$

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- (b) Make  $f$  the subject of the formula.

[3]

$$ef - d = kf + t$$

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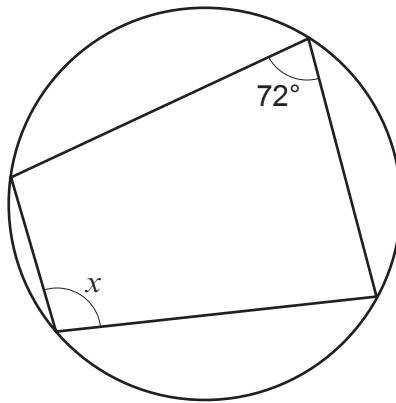
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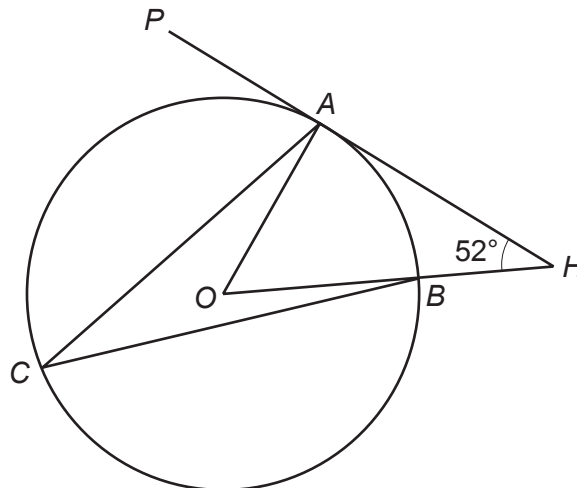
14. (a)

Examiner  
only*Diagram not drawn to scale*Calculate the size of the angle  $x$  in the diagram above.

[1]

$$x = \dots\dots\dots^\circ$$

- (b) The diagram below shows a circle with centre  $O$ .  
 $A$ ,  $B$  and  $C$  are points on the circumference of the circle.  
 The tangent,  $PAH$ , touches the circle at  $A$ .  
 $OBH$  is a straight line.

*Diagram not drawn to scale*

Given that  $\hat{AHB} = 52^\circ$ , calculate  $\hat{ACB}$ .  
 You must show your working.

[3]

$$\hat{ACB} = \dots\dots\dots^\circ$$



15. (a) Evaluate  $26^0$ .

[1]

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(b) Express  $8^{-\frac{2}{3}}$  as a fraction.

[2]

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(c) Simplify  $\sqrt{288}$ .  
Write your answer in surd form.

[2]

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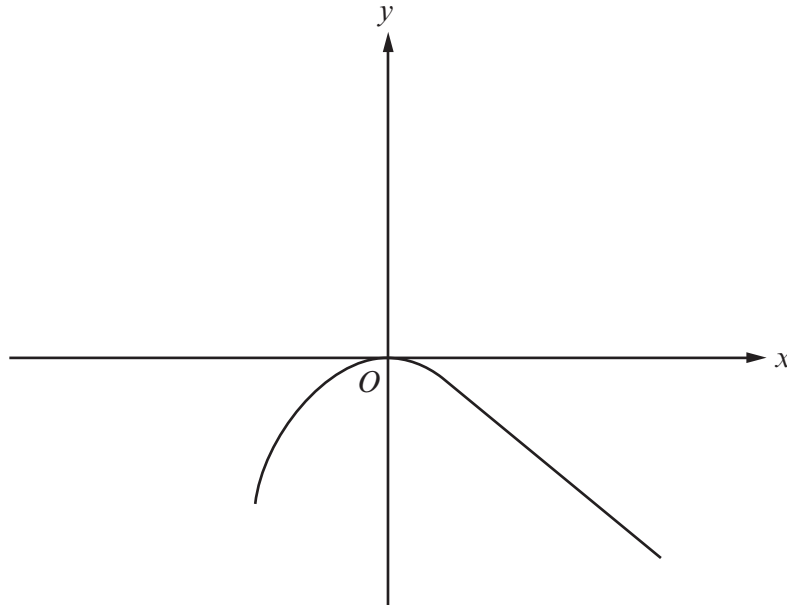
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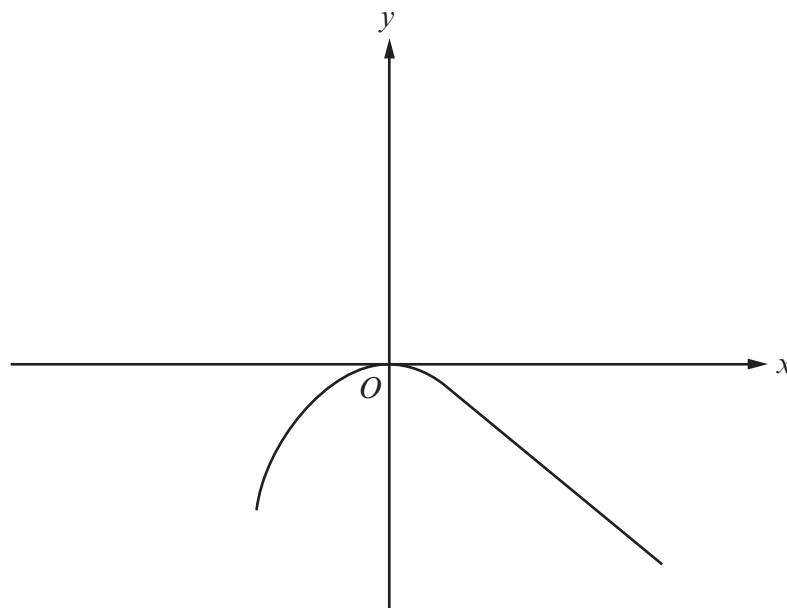
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16. (a) The diagram below shows a sketch of  $y = f(x)$ .  
On the same diagram, sketch the curve  $y = f(x + 3)$ .  
Mark clearly the coordinates of the point where this curve touches an axis. [2]



- (b) The diagram below shows another sketch of  $y = f(x)$ .  
On the same diagram below
- sketch the curve  $y = -f(x)$ , then
  - sketch the curve  $y = -f(x) + 2$ .

Mark clearly the coordinates of the point where the curve  $y = -f(x) + 2$  meets the y-axis. [3]



- In 2 hours, Ben cycles 44 km, measured correct to the nearest 2 km.  
In 3 hours, Sara cycles 40 km, measured correct to the nearest 2 km.

Calculate, in km/h, the greatest possible difference between Ben's average speed and Sara's average speed.

[4]

**18.** Solve the following equation.

[7]

Examiner  
only

$$\frac{8}{2x-1} + \frac{5x+9}{3x+1} = 4$$

**END OF PAPER**