

Surname	Centre Number	Candidate Number
Other Names		0



**GCSE**

4370/06

**MATHEMATICS – LINEAR  
PAPER 2  
HIGHER TIER**

A.M. MONDAY, 11 November 2013

2 hours

**ADDITIONAL MATERIALS**

A calculator will be required for this paper.

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 or use the  $\pi$  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.

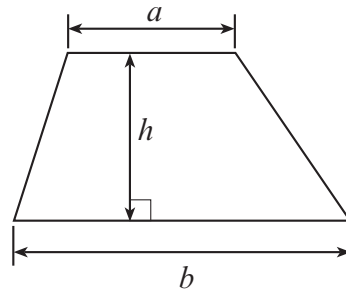
The number of marks is given in brackets at the end of each question or part-question.

You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question 8(a).

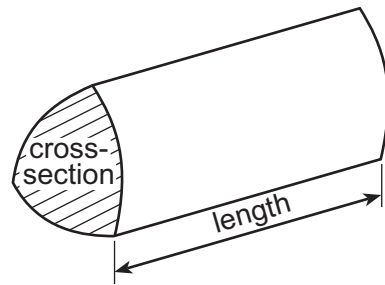
For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	4	
2.	4	
3.	6	
4.	8	
5.	7	
6.	5	
7.	4	
8.	9	
9.	5	
10.	3	
11.	6	
12.	4	
13.	7	
14.	4	
15.	6	
16.	5	
17.	7	
18.	6	
<b>Total</b>	<b>100</b>	

### Formula List

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

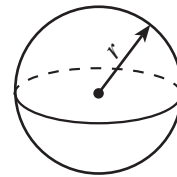


**Volume of prism** = area of cross-section  $\times$  length



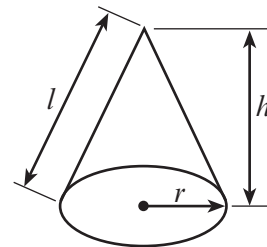
**Volume of sphere**  $= \frac{4}{3} \pi r^3$

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



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

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

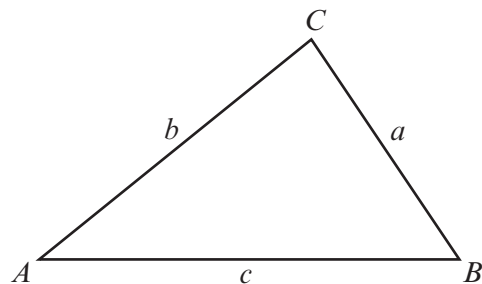


In any triangle  $ABC$

**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. Agatha and Bryn each bought some pens.  
Each pen Agatha bought cost £2.20.  
Each pen Bryn bought cost £1.40.  
Altogether, the cost of the pens was £13.  
How many pens did they buy altogether?

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2. (a) Calculate the size of an interior angle in a regular 12-sided polygon.

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- (b) Do regular 12-sided polygons tessellate?  
You must give a reason for your answer.

[1]

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3. (a) Simplify each of the following.

(i)  $-7g - 4h - 6g - (-8h)$

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(ii)  $3p^6 \times 5p^5$

[1]

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(iii)  $\frac{46y^6}{23y^2}$

[1]

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(b) Pencils cost  $x$  pence each.

Pens cost twice as much as pencils.

Write and simplify an expression, in terms of  $x$ , for the total cost of 3 pencils and 4 pens. [2]

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4. (a) In Newterry, the mean daily rainfall for the first week in April was 3.8 cm. Comparing this first week with the following week, it rained:

- 1 cm more on Sunday, Monday and Tuesday of the second week than on these days during the first week,
- 1 cm less on Wednesday, Thursday and Friday of the second week than on these days during the first week,
- the same amount on the Saturday of the second week as on the Saturday of the first week.

What was the mean daily rainfall in the second week?  
Give a reason for your answer.

[2]

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- (b) In Summerfield, the rainfall for each of 30 days was measured. The results are summarised in the table below.

Daily rainfall, $r$ , in cm	Number of days
$0.5 \leq r < 1.5$	5
$1.5 \leq r < 2.5$	11
$2.5 \leq r < 3.5$	13
$3.5 \leq r < 4.5$	1

- (i) Calculate an estimate for the mean daily rainfall for the 30 days. [4]

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- (ii) State the modal class. [1]

Modal class .....

- (iii) Write down the class in which the median lies. [1]

Median class .....

5. (a) An internet company, offering money exchange, displays a conversion exchange table as shown below.

		Exchange from				
		US dollars 1\$	GB pounds £1	Canadian dollars 1\$	euros 1€	Australian dollars 1\$
Exchange to	US dollars	1	1.59003	0.967202	1.4304	0.916279
	GB pounds	0.628915	1	0.608287	0.8996	0.576261
	Canadian dollars	1.03391	1.64395	1	1.4789	0.94735
	euros	0.699105	1.1116	0.676175	1	0.640575
	Australian dollars	1.09137	1.73532	1.05557	1.56109	1

The method of using this table of exchanges is as follows:

To exchange GB pounds to euros, read down the table, £1 is 1.1116 euros.

Using the exchange rates from the table, calculate the following.

- (i) Exchange 200 US dollars to Australian dollars. [2]

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- (ii) How many Canadian dollars were exchanged to give 250 euros? [2]

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- (b) Fill in the **two** gaps, indicated with dotted lines, in the following conversion exchange table. [3]

		Exchange from		
		Hong Kong dollar 1\$	Japanese yen 1 yen	euro 1€
Exchange to	Hong Kong dollar	1		.....
	Japanese yen		1	133·5
	euro	0·090147	.....	1

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6. (a) Solve  $\frac{x}{3} + 42 = 53$  .

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(b) Solve  $\frac{40 - x}{11} = 4$  .

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7. A solution to the equation  $3x^3 - x = 4.5$  lies between 1.2 and 1.3.  
Find this solution correct to 2 decimal places.

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(b) Calculate the volume of the cuboid shown in the diagram.

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9. (a) Lucy bought a designer jacket for £120.  
She made a profit of 26 % by selling the jacket in an auction.  
How much did Lucy's jacket sell for in the auction?

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- (b) Given that 65 % of a measurement is 43.55 metres, calculate the whole measurement.

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10. On the graph paper provided, draw the region which satisfies **all** of the following inequalities.

$$\begin{aligned}x + y &\leq 4 \\ y &\leq 2x + 4 \\ y &\geq 1\end{aligned}$$

Make sure that you clearly indicate the region that represents your answer.

[3]

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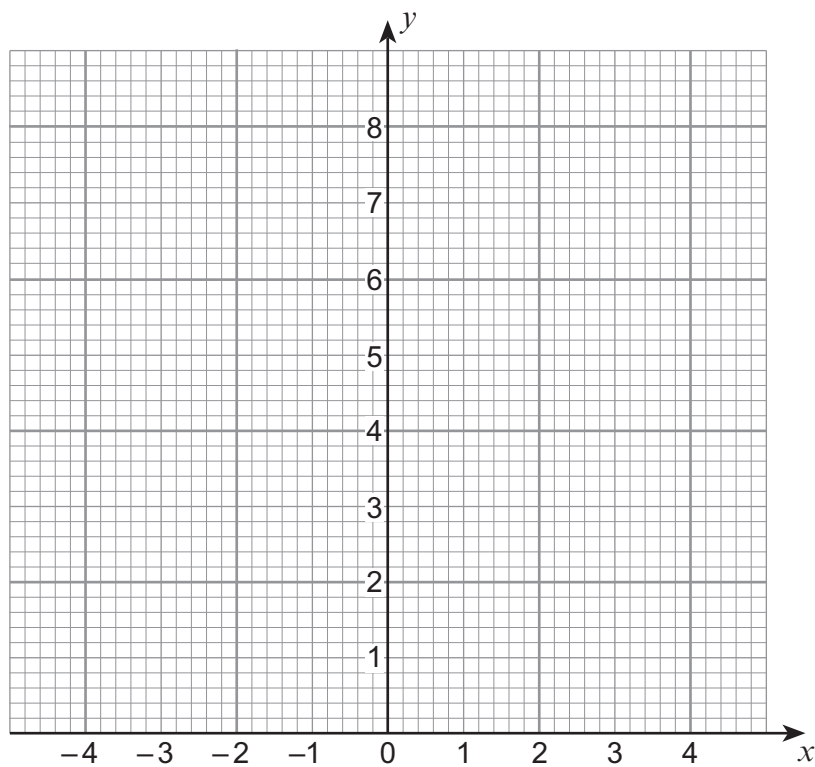
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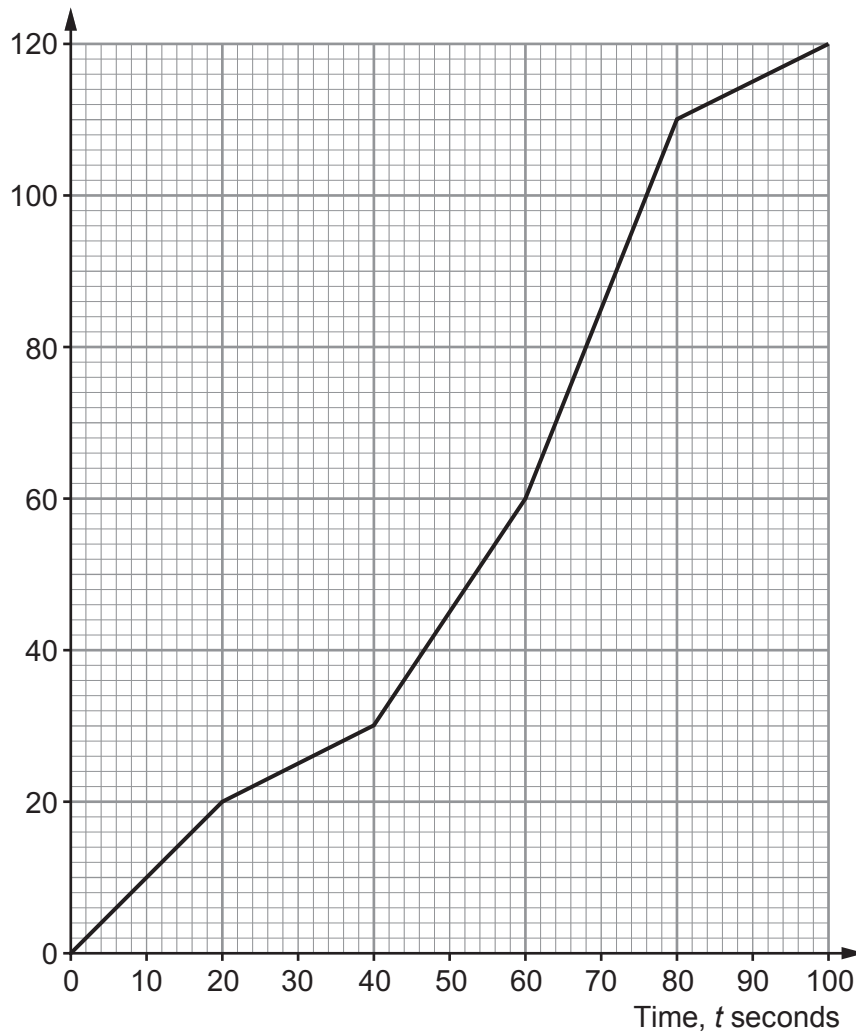
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11. The times taken by customer service operators to answer 120 telephone calls are illustrated in the cumulative frequency diagram shown below.

Cumulative frequency



- (a) Calculate an estimate for the interquartile range.

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- (b) Calculate an estimate for the percentage of telephone calls that were answered within 50 seconds. [2]

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- (c) The customer service team was given a target to answer 90% of the telephone calls within 75 seconds.  
Did the team meet its target?  
You must show your working and give a reason for your answer. [2]

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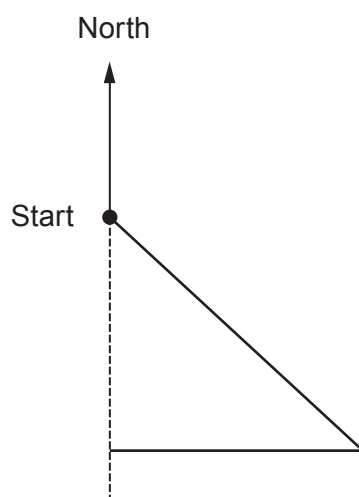
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12. A yacht sails on a bearing of  $138^\circ$  for 3.2 km.  
The yacht then turns to sail on a bearing of  $270^\circ$ .  
Calculate the distance the yacht sails in this direction until it is due South of its starting position.  
[4]



*Diagram not drawn to scale*

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13. (a) Solve the simultaneous equations below using an algebraic method.  
Show all your working.

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$$\begin{aligned}5x + 2y &= -5 \\4x + 3y &= 3\end{aligned}$$

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- (b) Solve the following quadratic equation.  
Give your answers correct to two decimal places.

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$$5x^2 + 3x - 7 = 0$$

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14. A company produces suitcases with dimensions 55 cm by 40 cm by 20 cm.



The company has been asked to produce a new, smaller suitcase.

- The new suitcase must be **similar** to the original suitcase, with dimensions in the same proportions.
- The volume of the new smaller suitcase should be **half** the volume of the original suitcase.

Find the dimensions of the new smaller suitcase.

Give your dimensions correct to an appropriate degree of accuracy.

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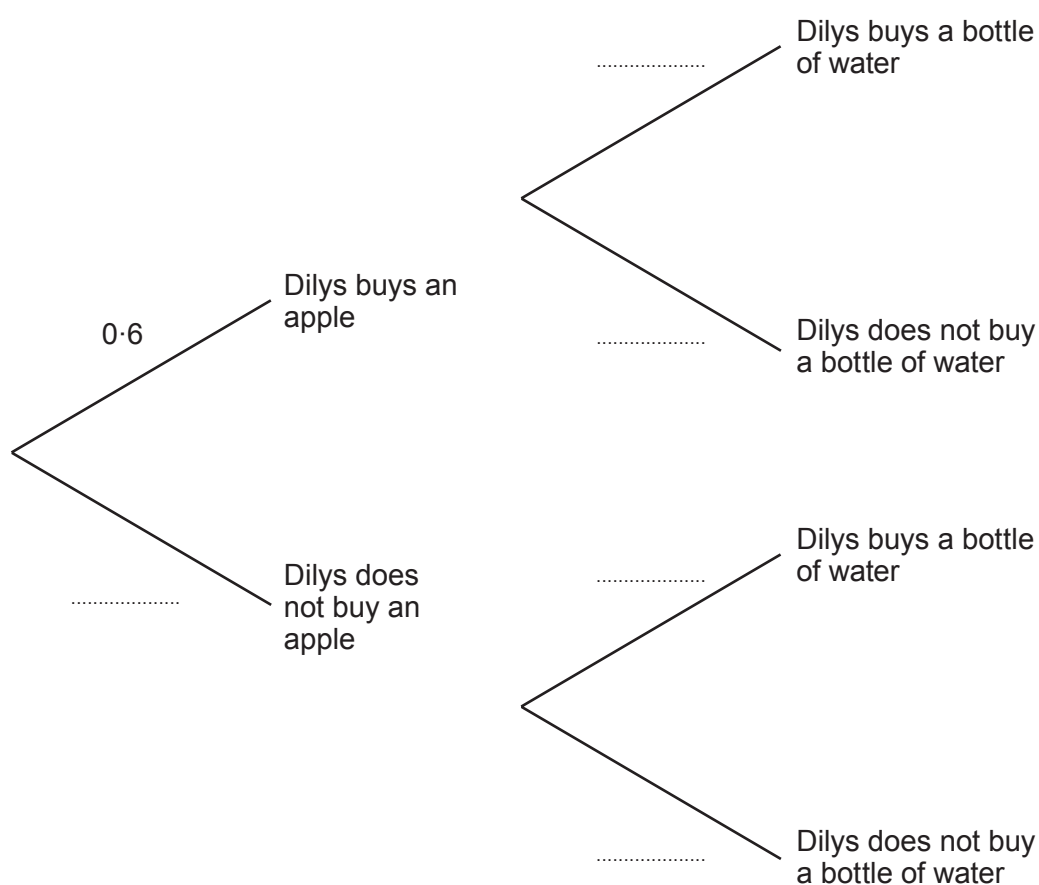
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15. The probability of Dilys buying a bottle of water is independent of her buying an apple. The probability that Dilys buys an apple **and** a bottle of water is 0.18.

(a) Complete the tree diagram.

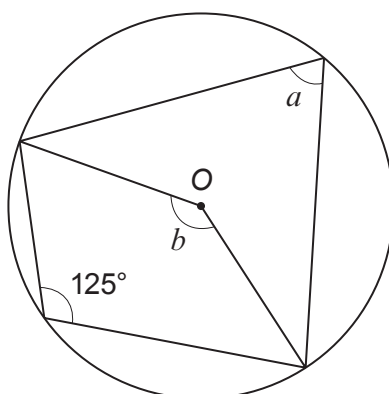
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(b) Find the probability that Dilys does not buy an apple and does not buy a bottle of water.

[2]

16. (a) The diagram below shows a circle with centre  $O$ .



*Diagram not drawn to scale*

Calculate the sizes of angles  $a$  and  $b$ .

[3]

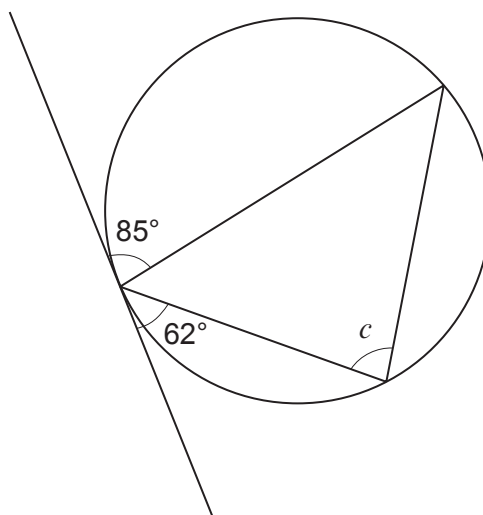
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$$a = \text{.....}^\circ \qquad b = \text{.....}^\circ$$

- (b) The diagram shows a tangent to a circle.  
The vertices of the triangle shown all lie on the circumference of the circle.



*Diagram not drawn to scale*

Giving a reason for your answer, calculate the size of angle  $c$ .

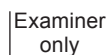
[2]

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$$c = \text{.....}^\circ$$

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