

Surname
Other Names

Centre Number

Candidate Number
0



**GCSE**

4370/06

**MATHEMATICS – LINEAR  
PAPER 2  
HIGHER TIER**

A.M. MONDAY, 17 June 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. Do not use gel pen or correction fluid.

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.

If you run out of space, use the continuation page at the back of the booklet, taking care to number the question(s) correctly.

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 3(b)(ii).

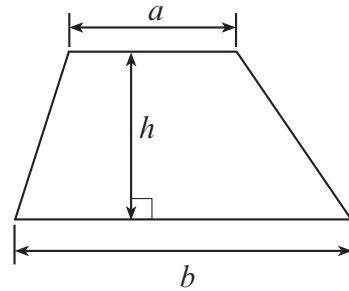
For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1	3	
2	2	
3	14	
4	8	
5	7	
6	3	
7	4	
8	7	
9	3	
10	5	
11	5	
12	4	
13	7	
14	5	
15	6	
16	1	
17	6	
18	2	
19	8	
<b>TOTAL MARK</b>		



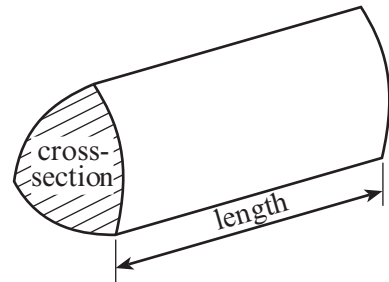
J U N 1 3 4 3 7 0 0 6 0 1

### Formula List

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

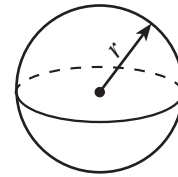


**Volume of prism** = area of cross-section  $\times$  length



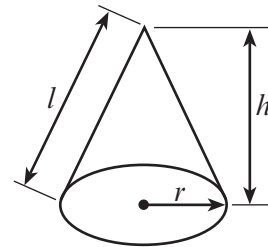
**Volume of sphere** =  $\frac{4}{3}\pi r^3$

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



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

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

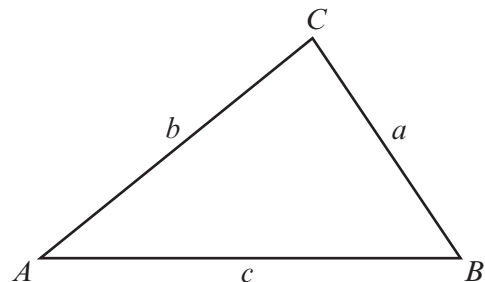


**In any triangle ABC**

**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. The table below shows the shoe sizes of 20 people.

Shoe size	Number of people
38	3
39	9
40	5
41	3

Calculate the mean shoe size.

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[3]

2. A fair coin and a fair six-sided dice are thrown together.  
Calculate the probability of obtaining a head and a two.

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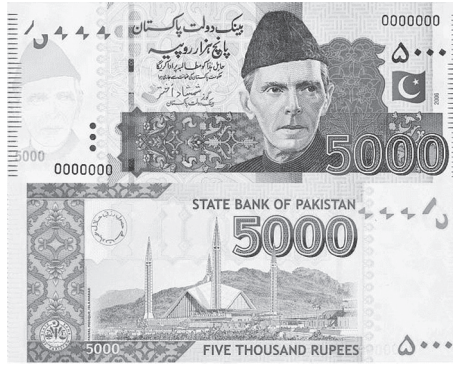
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[2]



3. Miriam is planning a holiday in Pakistan.

(a) Miriam went to an exchange bureau to get some Pakistan rupees for her holiday.



She exchanged £540 for 85 000 Pakistan rupees.  
Complete the statement below, giving your answer correct to two decimal places.

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**'Exchange rate: £1 buys ..... Pakistan rupees'**

[3]

(b) Miriam knows that when it is 1p.m. in London it is 6p.m. local time in Karachi, Pakistan. Miriam is booked onto a flight leaving London on Tuesday at 13:50. The flight time is 7 hours 51 minutes.

(i) On which day and at what local time should Miriam land in Karachi?

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Day ..... Landing time .....

[4]



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

Miriam's flight actually arrived 7 hours 45 minutes after departure.  
The aeroplane flying speed between London and Karachi was 434 knots.  
Given that 1 knot is 1.85 km/h, calculate the flying distance between London and Karachi.  
Give your answer in kilometres.

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4. Across the world, temperatures are measured using different units.  
All the unit scales are uniform.

Approximate conversions are often used to give a reading in more than one unit in scientific reports.

Use the information given below to complete the tables.

(a)

degrees Celsius	degrees Fahrenheit
20	68
30	86
40	104
50	.....
60	140
70	158

[1]

(b)

kelvin	degrees Celsius
0	.....
100	.....
200	-73.15
300	26.85
400	126.85
500	226.85

[2]



(c)

kelvin	degrees Celsius	degrees Fahrenheit
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5. (a) Solve  $8x - 11 = 3x + 29$ .

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(b) Factorise  $7x + 49$ .

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(c) Factorise  $x^2 - 10x$ .

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(d) Expand  $2x(x + 6)$ .

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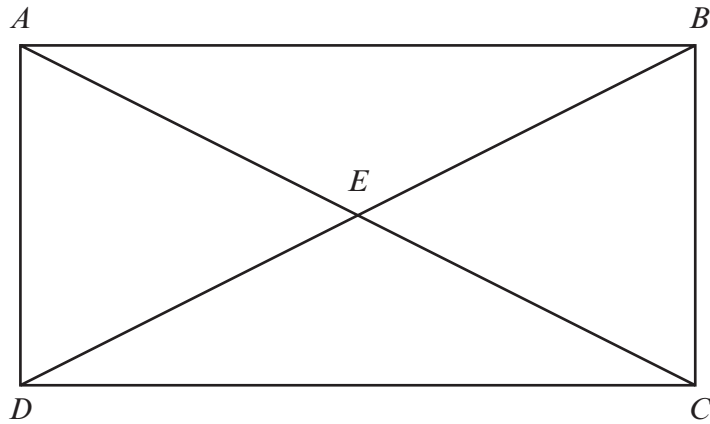
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[2]





6. The diagram shows a rectangle  $ABCD$ .



*Diagram not drawn to scale*

Select 3 **different** pairs of congruent triangles shown in the diagram above and then complete the sentences below for your 3 selections.

Triangle ..... is congruent to triangle .....

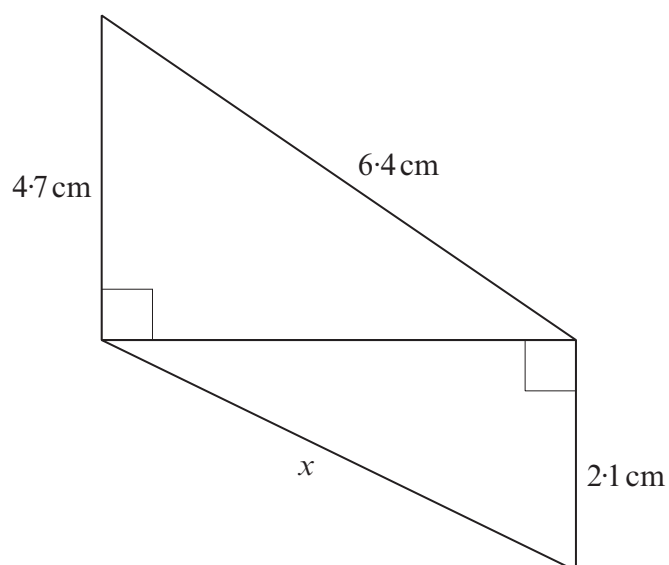
Triangle ..... is congruent to triangle .....

Triangle ..... is congruent to triangle .....

[3]



7.



*Diagram not drawn to scale*

Calculate the length of the side marked  $x$ .

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[4]



- 8. A factory production line packs buttons into bags.  
 There are exactly 80 buttons packed into each bag.  
 There is a mixture of different coloured buttons in each bag.  
 A total of 600 bags of buttons were packed in a day.

The first 100 bags were checked and it was found that a total of 1200 red buttons had been used.  
 In the 600 bags of buttons, it was found that the relative frequency of red buttons packed was 40%.

Calculate the relative frequency of red buttons packed in the final 500 bags.

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[7]



9. On the squared paper provided, draw the region which satisfies all of the following inequalities.

$$\begin{aligned} y &\leq 8 \\ x + y &\geq 2 \\ y &\geq 2x - 4 \end{aligned}$$

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

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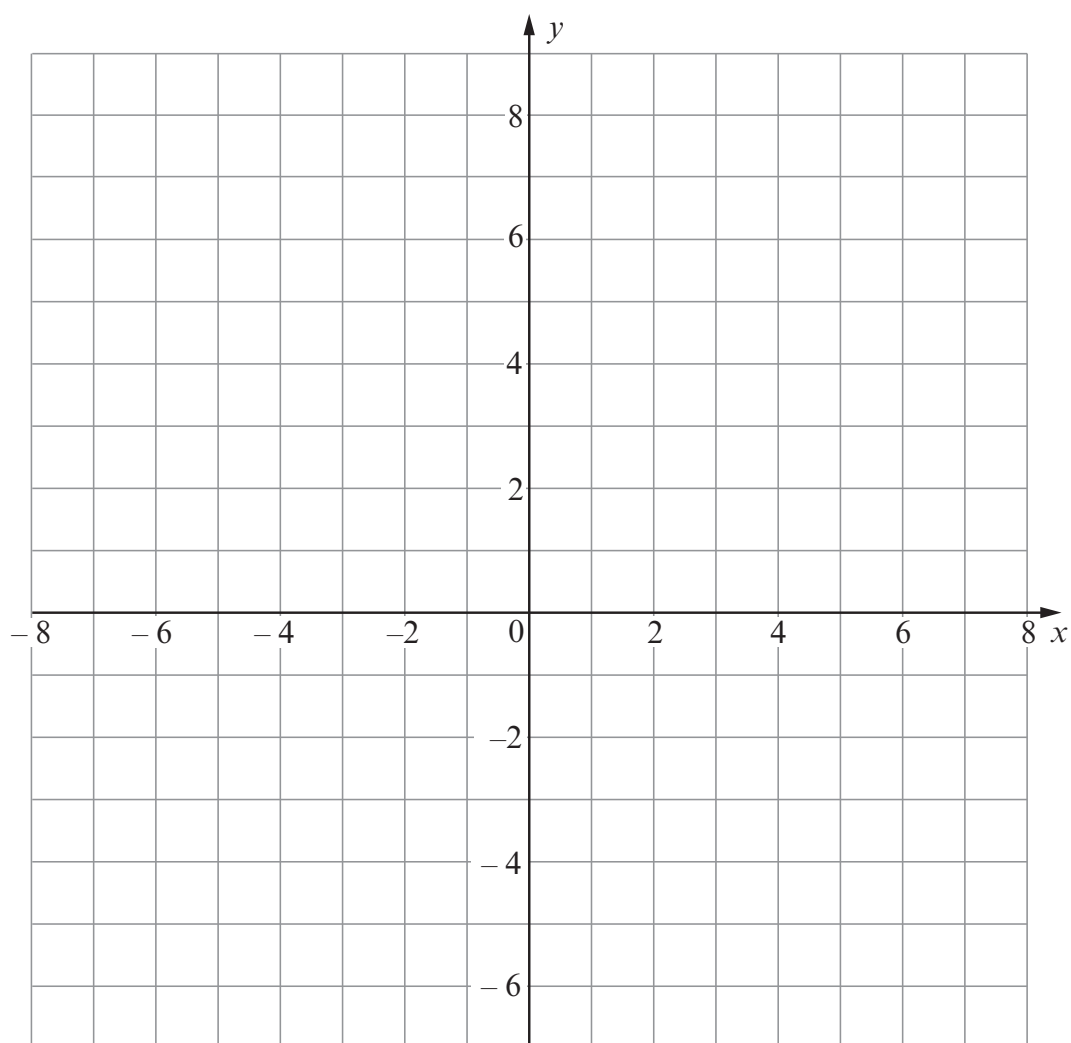
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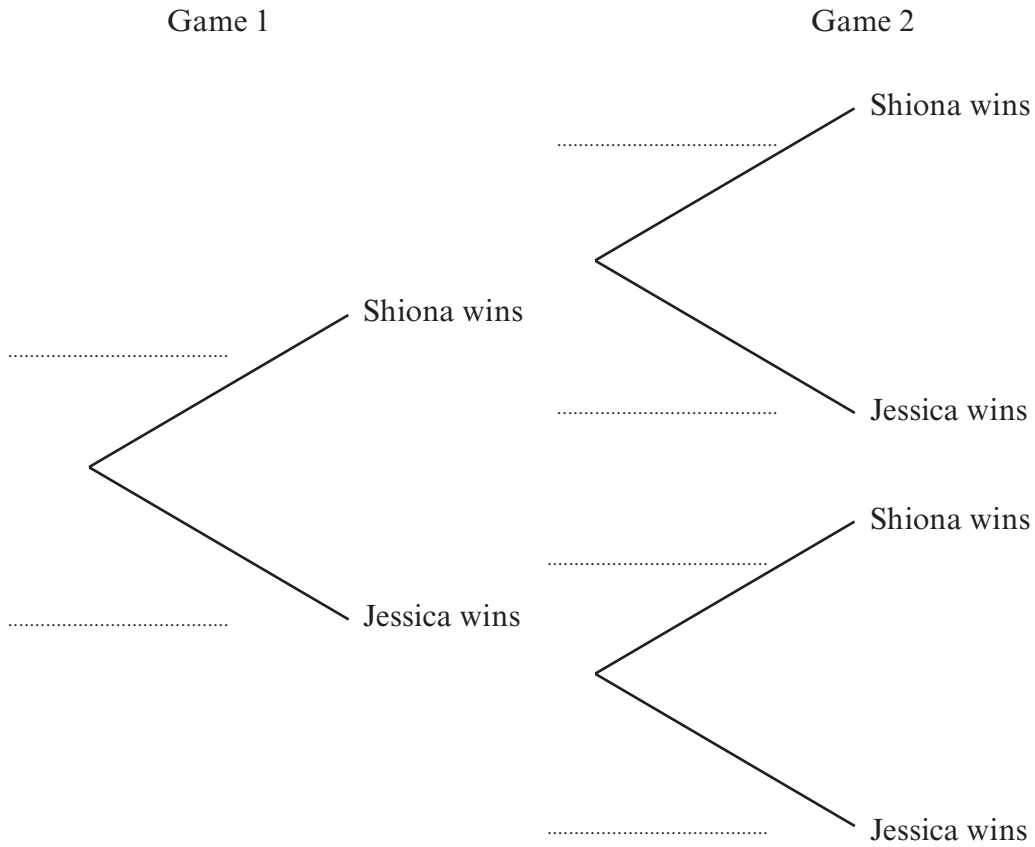


[3]



10. Whenever Shiona and Jessica play a game of 'Jewels' the probability that Shiona wins is 0.3.

(a) Complete the following tree diagram to show the probabilities of what can happen when Shiona and Jessica play two games of 'Jewels'.



[2]

(b) Calculate the probability that Shiona wins exactly one game.

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[3]



11. City planners need to know the difference in height between a building on one side of a road and a building on the other side of the road.  
The buildings are vertical and directly opposite each other.

The horizontal road is 20 m wide.

**From the centre of the road** between the buildings, the angle of elevation of

- the top of the building on one side is  $72^\circ$ ,
- the top of the building on the other side is  $38^\circ$ .

Calculate the difference in the heights of the buildings.

*Space for diagram.*

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12. Show that  $(4x - 1)(6x + 5) - (8x - 1)(3x + 5)$  is identical to  $-23x$ .

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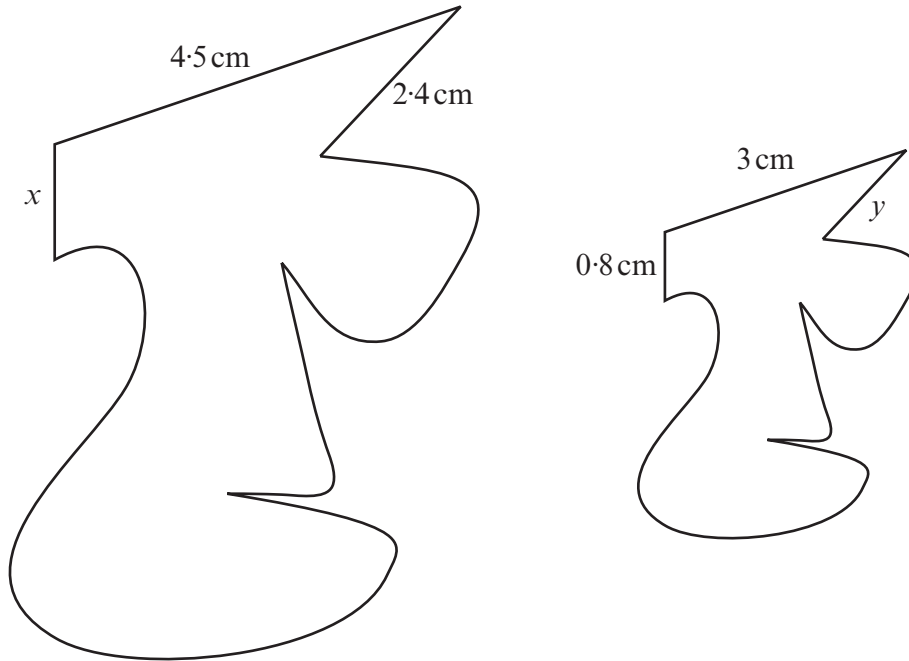
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[4]



13. Dewi's company is planning a new logo.  
The diagram shows two similar versions of the planned logo.



*Diagram not drawn to scale*

- (a) Calculate the lengths of the sides marked  $x$  and  $y$ .

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$x = \dots\dots\dots \text{ cm}$

$y = \dots\dots\dots \text{ cm}$

[4]





(b) The smaller of the two versions of the logo costs £3.40 to paint with metallic gold paint. Calculate the cost of painting the larger version of the logo with the same metallic gold paint.

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14.



In the UK, some soft drinks are sold in cans.  
75% of all these cans are made of aluminium.  
In 2008, 5 billion aluminium cans were sold.

Given that 1 billion is 1000 million, calculate how many of the cans that were sold in 2008 were **not** made of aluminium.  
Give your answer in standard form correct to two significant figures.

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15. (a) By factorising, solve the following quadratic equation.

$$8x^2 + 18x - 5 = 0$$

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- (b) Use the quadratic formula to solve the following quadratic equation, giving your answers correct to 2 decimal places.

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

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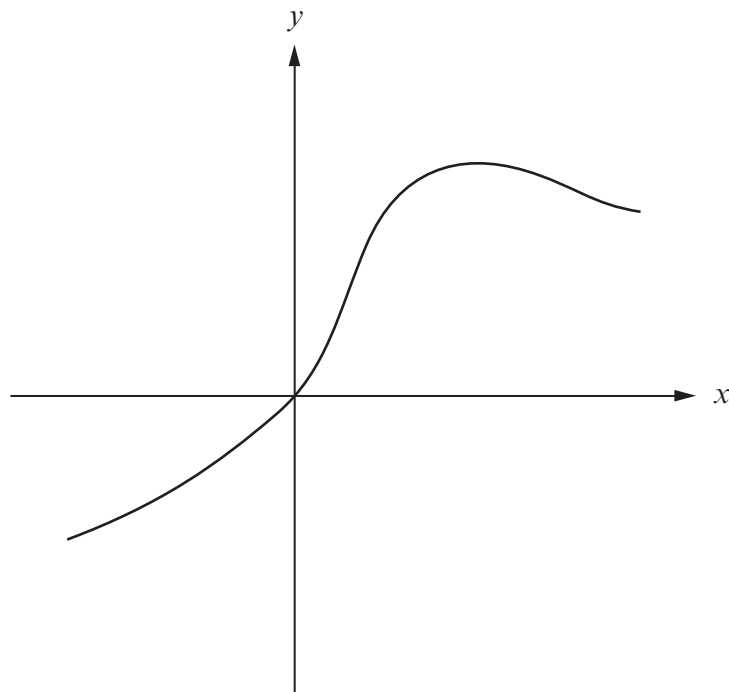
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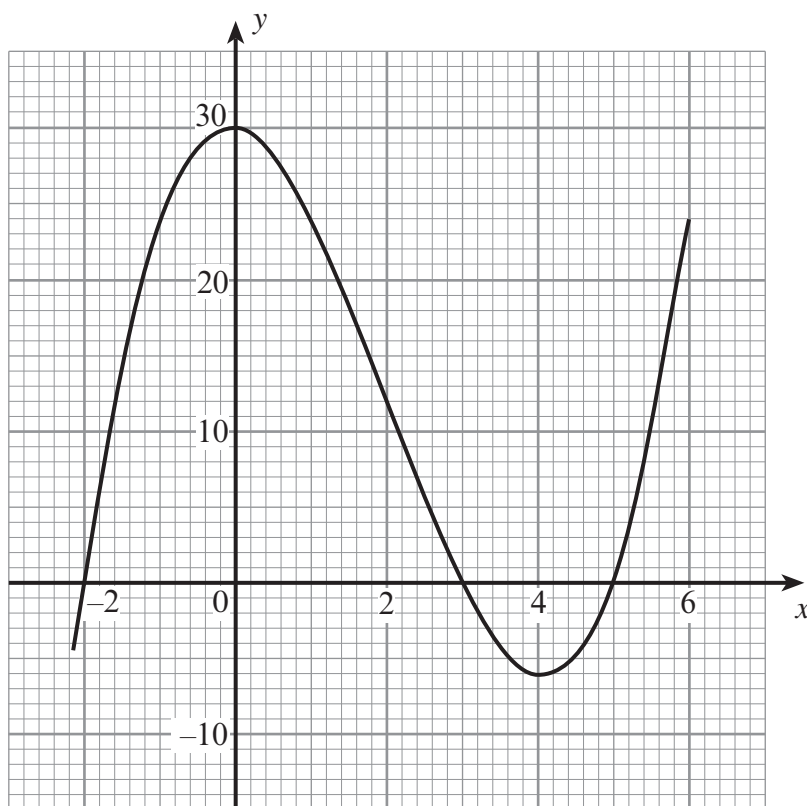
16. The diagram shows a sketch of  $y = f(x)$ .  
On the same diagram, sketch the curve  $y = -f(x)$ .



[1]



17. The graph of the equation  $y = x^3 - 6x^2 - x + 30$  is shown on the graph paper below.



Use the graph above to answer the following questions.

(a) Solve  $x^3 - 6x^2 - x + 30 = 0$ .

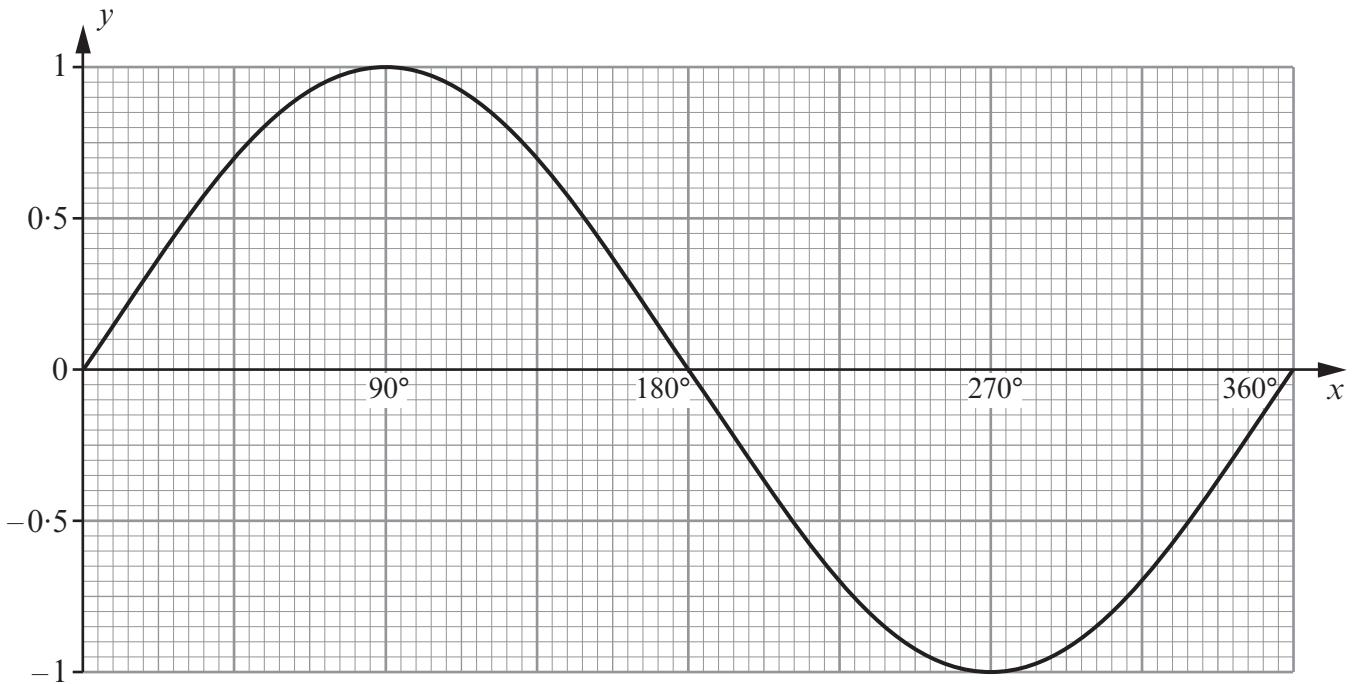
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(b) By drawing a suitable straight line, solve the equation  $x^3 - 6x^2 - x + 30 = -5x + 10$ .

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18. The diagram below shows the graph of  $y = \sin x$  for values of  $x$  from  $0^\circ$  to  $360^\circ$ .



Find all solutions of the following equation in the range  $0^\circ$  to  $360^\circ$ .

$$\sin x = -0.4$$

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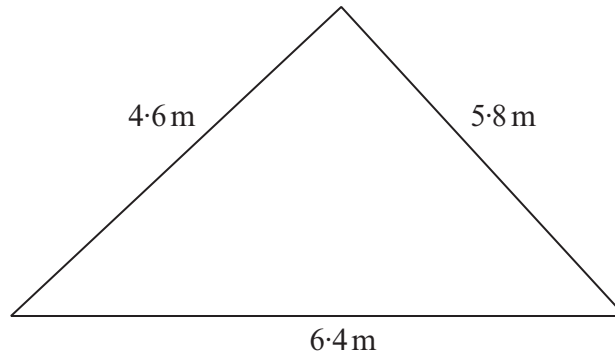
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19. A triangular flowerbed in a park is being prepared for planting bulbs. The gardener is going to lay compost over all the flowerbed to a depth of 12 cm.



*Diagram not drawn to scale*

Calculate the volume of compost required.

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