

Candidate Name	Centre Number	Candidate Number
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GCSE

179/01

**ADDITIONAL MATHEMATICS
PAPER 1**

A.M. THURSDAY, 24 June 2010

1½ hours

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

INSTRUCTIONS TO CANDIDATES

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.

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

2. (a) Use the method of completing the square to find the least value of $x^2 + 20x + 3$.

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[3]

(b) Use the method of completing the square to prove that the solutions of the quadratic equation $x^2 + 2fx + h = 0$ are

$$x = -f + \sqrt{f^2 - h} \quad \text{and} \quad x = -f - \sqrt{f^2 - h} .$$

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[5]

3. Find $\frac{dy}{dx}$ for **each** of the following.

(a) $y = 6x^4 + 3x - 5.$

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(b) $y = x^{-8}.$

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[1]

(c) $y = x^{\frac{3}{5}}.$

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[1]

4. Harry always has lunch and dinner. He likes Italian food.
The probability that Harry has pasta for lunch is 0.7.
The probability that Harry has pasta for lunch and has pizza for dinner is 0.56.
Given that the events “Harry has pasta for lunch” and “Harry has pizza for dinner” are independent, find

(a) the probability that Harry has pizza for dinner,

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(b) the probability that Harry does not have pasta for lunch and does not have pizza for dinner.

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6. (a) Solve $\frac{x}{2}(x+6) = -4$.

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(b) Megan knows that $x = y + 5$. She also knows that the sum of x and y is equal to the product of x and y . Using an algebraic method, show that x and y are not whole numbers.

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7. The following speed limit sign in miles per hour is used in the UK.



Some years ago the following proposals were made.

- All new speed limits in the UK should be in kilometres per hour.
- All numbers on new road signs should be multiples of five.
- Each new speed limit should be lower than the corresponding current speed limit.
- The reduction in the speed limit should be as small as possible.

For the road sign above find

(a) the number on the new road sign,

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(b) the percentage decrease in the speed limit.

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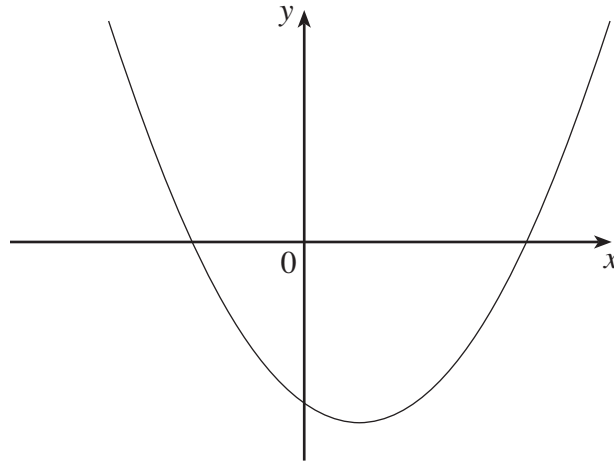
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[2]

9. The diagram shows a sketch of the graph $y = f(x)$.
The graph has a minimum point at $(1, -3)$.



- (a) Without sketching a curve, write down the coordinates of the minimum point of $y = f(x) + 5$.

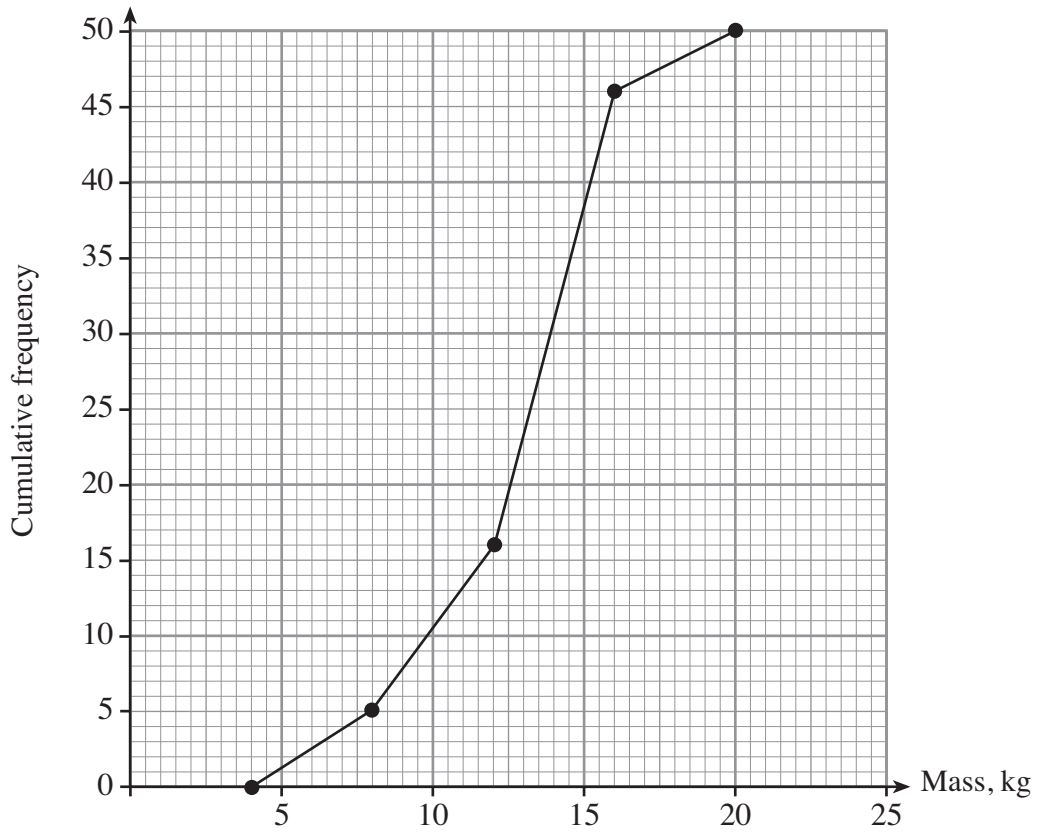
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[2]

- (b) On the same axes sketch the graph of $y = -f(x)$ and hence write down the coordinates of the maximum point of $y = -f(x)$.

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[3]

10. The total mass of the beans produced by each of 50 plants was measured. The cumulative frequency diagram below shows the distribution of the masses.

Examiner only



(a) Complete the grouped frequency table of the mass of beans on each plant.

Mass, x kg	$0 < x \leq 4$	$4 < x \leq 8$	$8 < x \leq 12$	$12 < x \leq 16$	$16 < x \leq 20$
Frequency	0				4

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- (b) The beans produced by another 50 plants have the same median but a greater inter-quartile range. Describe how the cumulative frequency diagram will differ from the diagram given above.

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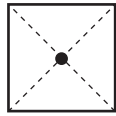
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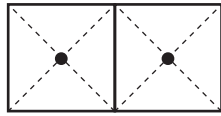
[1]

Turn over.

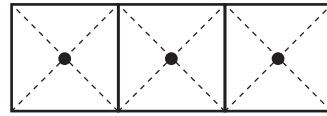
11. (a) An artist makes a sequence of patterns. He uses three types of metal pieces called rods, springs and bobs. He welds them together to make patterns.



Pattern 1



Pattern 2



Pattern 3

In Pattern 2 there are 7 rods, 8 springs and 2 bobs.

In Pattern n there are n bobs.

- (i) How many springs are there in Pattern n ?

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- (ii) How many rods are there in Pattern n ?

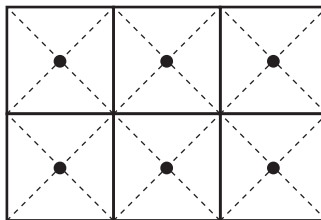
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- (b) The artist now changes his design to make new patterns with greater widths.

The pattern below is called Pattern 3 by 2.



In Pattern x by y there are xy bobs.

- (i) How many springs are there in Pattern x by y ?

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- (ii) How many rods are there in Pattern x by y ?

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[4]

12.

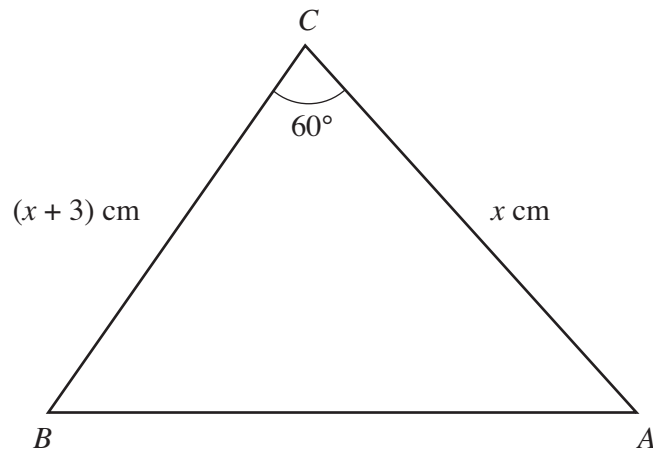


Diagram not drawn to scale.

You are given that the area of the triangle is $\sqrt{300} \text{ cm}^2$.

(a) Show that $x^2 + 3x - 40 = 0$.

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(b) Calculate the length of AB .

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