5.9 Drawing Quadratic Graphs: 30-minute Pack

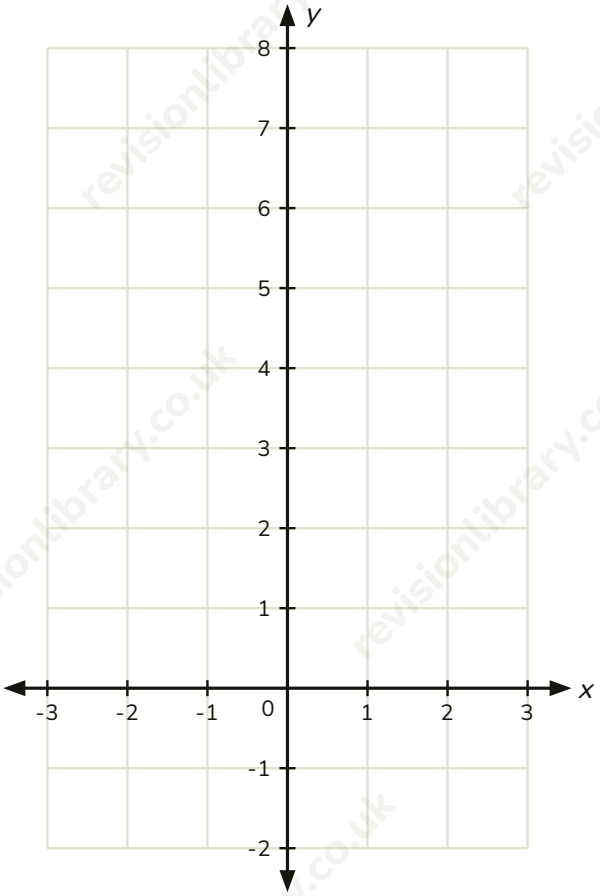
EDEXCEL 1MA1 · Calculator allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 The graph of $y = x^2 - 2$ is to be drawn for $-3 \leq x \leq 3$.

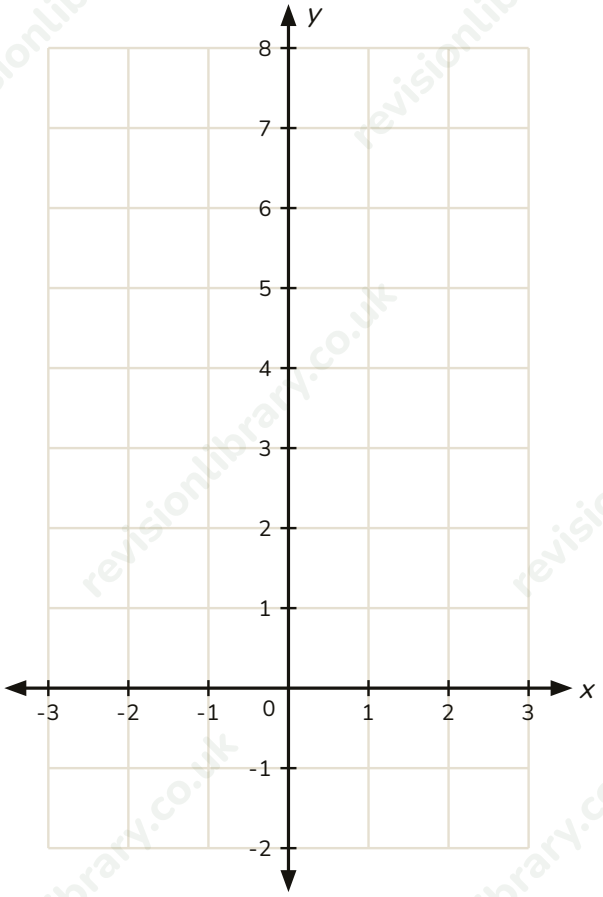


(a) Complete the table of values for $y = x^2 - 2$. **(2)**

x	-3	-2	-1	0	1	2	3
y	_	_	_	_	_	_	_

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(b) On the grid, plot the points from your table and join them with a smooth curve. **(2)**



(c) Use your graph to find an estimate for the value of y when x = 1.5. **(1)**

(d) Use your graph to find estimates for the values of x when y = 5. **(2)**

(Total for Question 1 is 7 marks)

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2 Write down the coordinates of the turning point of the graph of $y = x^2$.

(Total for Question 2 is 1 mark)

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3 This question has two parts.

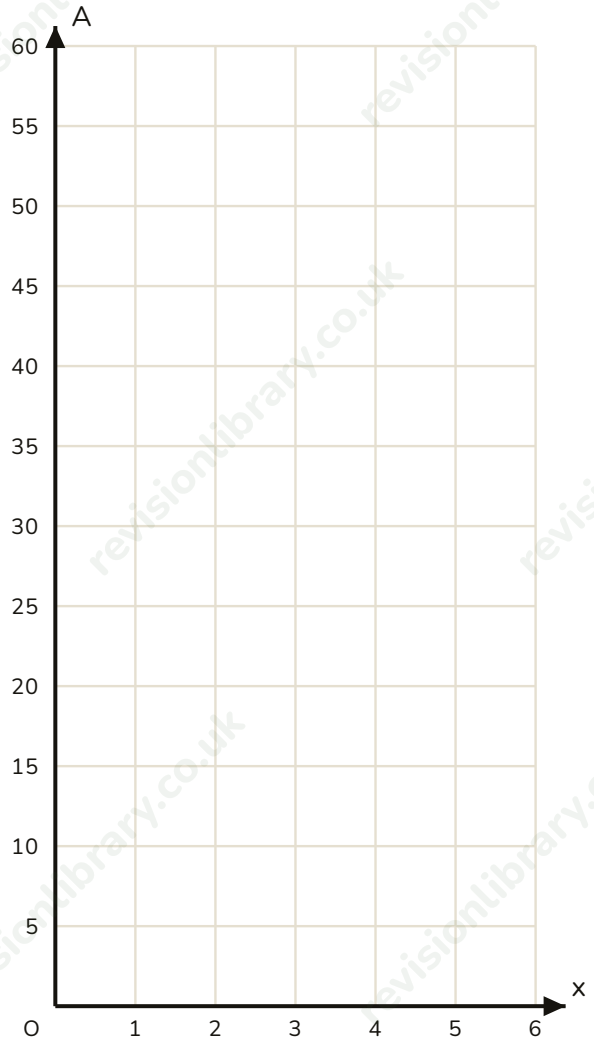
(a) Explain how the graph of $y = (x - 1)^2 - 2$ is shifted from $y = x^2$. **(1)**

(b) State the coordinates of the vertex. **(3)**

(Total for Question 3 is 4 marks)

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4 A rectangular vegetable patch has width x metres and length (x + 3) metres. The area of the patch, A m^2, is given by A = x(x + 3).

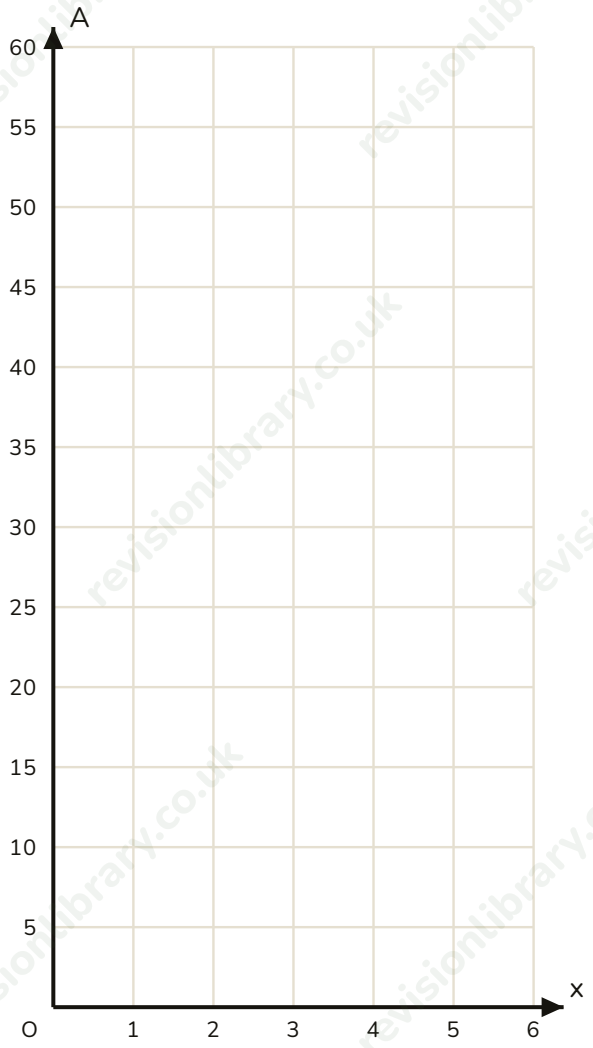


(a) Complete the table of values for A = x(x + 3), for $1 \leq x \leq 6$. **(2)**

x	1	2	3	4	5	6
A	_	_	_	_	_	_

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(b) Draw the graph of $A = x(x + 3)$ for $1 \leq x \leq 6$. **(2)**



(c) The vegetable patch needs to have an area of 40 m². Use your graph to find the value of x. **(2)**

(Total for Question 4 is 6 marks)

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5 Sketch the graph of $y = x^2 - 4$. On your sketch, show where the graph meets the x-axis.

(a) Find the x-intercepts (solutions) of $x^2 - 4 = 0$. **(2)**

(b) Sketch the parabola and mark the x-intercepts on the x-axis and the vertex. **(3)**

(Total for Question 5 is 5 marks)

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Mark scheme · 5.9 Drawing Quadratic Graphs: 30-minute Pack

Question 1

(a) at least 5 of the 7 y-values correct **B1**

(a) all 7 y-values correct **B1**

(a) Answer: 7, 2, -1, -2, -1, 2, 7

(b) all points plotted correctly ft from table (± 1 small square) **B1**

(b) smooth u-shaped curve drawn through all points, not a series of straight lines **B1**

(b) Answer: Smooth u-shaped parabola through the 7 points, minimum point at (0,-2)

(c) answer in the range 0.1 to 0.4, ft from candidate's graph **B1**

(c) Answer: y = awrt 0.25 (accept 0.1 to 0.4)

(d) x = awrt 2.6 (range 2.5 to 2.7), ft from candidate's graph **B1**

(d) x = awrt -2.6 (range -2.7 to -2.5), ft from candidate's graph **B1**

(d) Answer: x = awrt 2.6 or x = awrt -2.6

Question 2

(0, 0) **B1**

Answer: (0, 0)

Question 3

(a) shift right 1 and down 2 oe **B1**

(a) Answer: Shifted right 1 and down 2.

(b) identify h = 1 and k = -2 or show (1, -2) **M1**

(b) vertex (1, -2) cao **A1**

(b) reason: vertex from completing square/form sign applied oe **A1**

(b) Answer: (1, -2)

Question 4

(a) at least 4 of the 6 A-values correct **B1**

(a) all 6 A-values correct **B1**

(a) Answer: 4, 10, 18, 28, 40, 54

(b) all points plotted correctly ft from table **B1**

(b) smooth increasing curve drawn through all points **B1**

(b) Answer: Smooth increasing curve (part of a parabola) through the 6 points

(c) reads a horizontal line from A = 40 to the curve, ft from candidate's graph **B1**

(c) x = 5 (accept 4.8 to 5.2) **B1**

(c) Answer: x = 5 (metres)

Question 5

(a) method: factorise or take square root, show $x^2 = 4$ **M1**

(a) x = 2 and x = -2 cao **A1**

(a) Answer: x = 2 and x = -2

(b) correct U-shape sketched with symmetry and intercepts marked at -2 and 2 **M1**

(b) vertex at (0, -4) indicated **A1**

(b) curve passes through intercepts and has correct vertical position **A1**

(b) Answer: Sketch with x-intercepts at (-2,0) and (2,0) and vertex at (0,-4).

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