SKETCHING QUADRATIC GRAPHS

GRADE 8

AtoZrevision

Examination practice questions

You should have:

A ruler, protractor, compasses, a pen, pencil, eraser, calculator.
For some questions, you may need tracing paper.

Instructions

- Use **black** ink or ball-point pen.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- **Calculators may be used.**

Information

- The marks for each question are shown in brackets.
- If the number of marks for two similar questions isn't the same, this is likely due to them being modelled on different specifications. In this case, it is worth considering both mark schemes.
- Use the number of marks for each question as a guide as to how much time to spend on each question. As a rough guide, you can multiply the number of marks by 1.2 to see how many minutes you should spend on a question.
- Questions will generally get more challenging as the document progresses. Some of the latter questions will go beyond the core grade level for this topic.

Advice

- Read each question carefully before you start to answer it.
- Don't forget to have fun.
- Check your answers at the end.

Q1. AtoZrevision.com

The curve C has equation $y = x^2 + 5x + 6$ Y INTERCEPT

Using the axes below, sketch the curve C.
On your sketch show clearly

(i) the exact coordinates of any points of intersection of C with the coordinate axes,
(ii) the coordinates of the turning point.

B1

$(x+3)(x+2)$ B1

$x = -3 \quad x = -2$

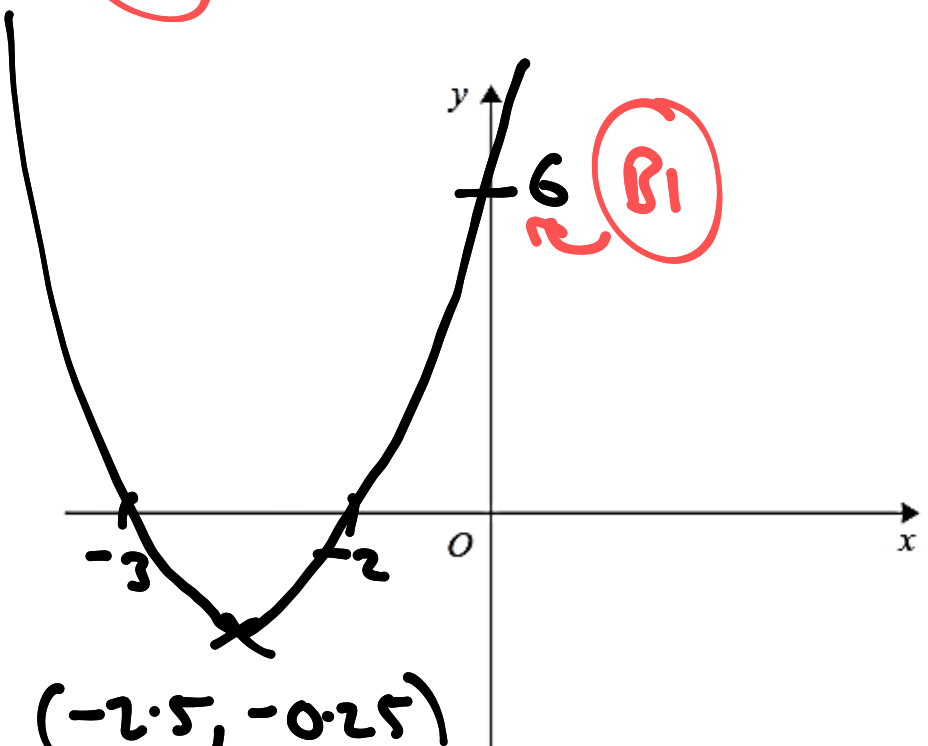
B1

$(x+2.5)^2 - 6.25 + 6$

$(x+2.5)^2 - 0.25$

$(-2.5, -0.25)$

SHAPE B1



B1

$(-2.5, -0.25)$

B1 CORRECT INTERCEPTS

(6 marks)

The curve C has equation $y = x^2 + 7x + 12$ → 4 INTERCEPT

Using the axes below, sketch the curve C.
On your sketch show clearly

(i) the exact coordinates of any points of intersection of C with the coordinate axes,
(ii) the coordinates of the turning point.

$(x+3)(x+4)$ B1

$x = -3$

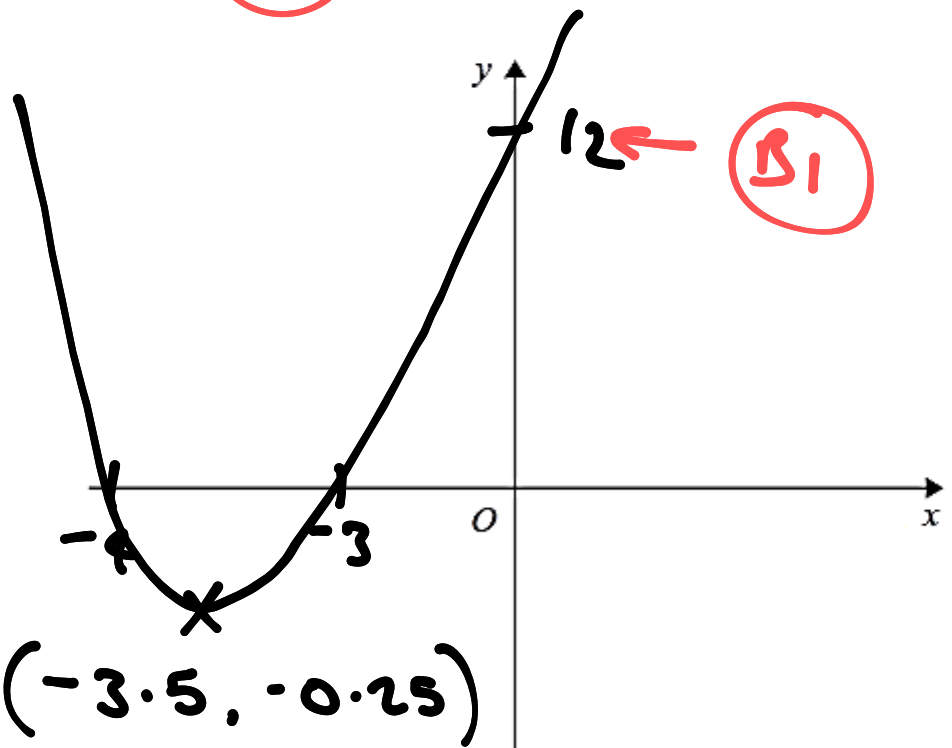
$x = -4$ B1

$(x+3.5)^2 - 12.25 + 12$

$(x+3.5)^2 - 0.25$ B1

$(-3.5, -0.25)$

SHAPE B1



B1 CORRECT INTERCEPTS

((6 marks)

The curve C has equation $y = x^2 - 6x + 4$

4 INTERCEPT

Using the axes below, sketch the curve C.
On your sketch show clearly

(i) the exact coordinates of any points of intersection of C with the coordinate axes,
(ii) the coordinates of the turning point.

USING QUADRATIC FORMULA:

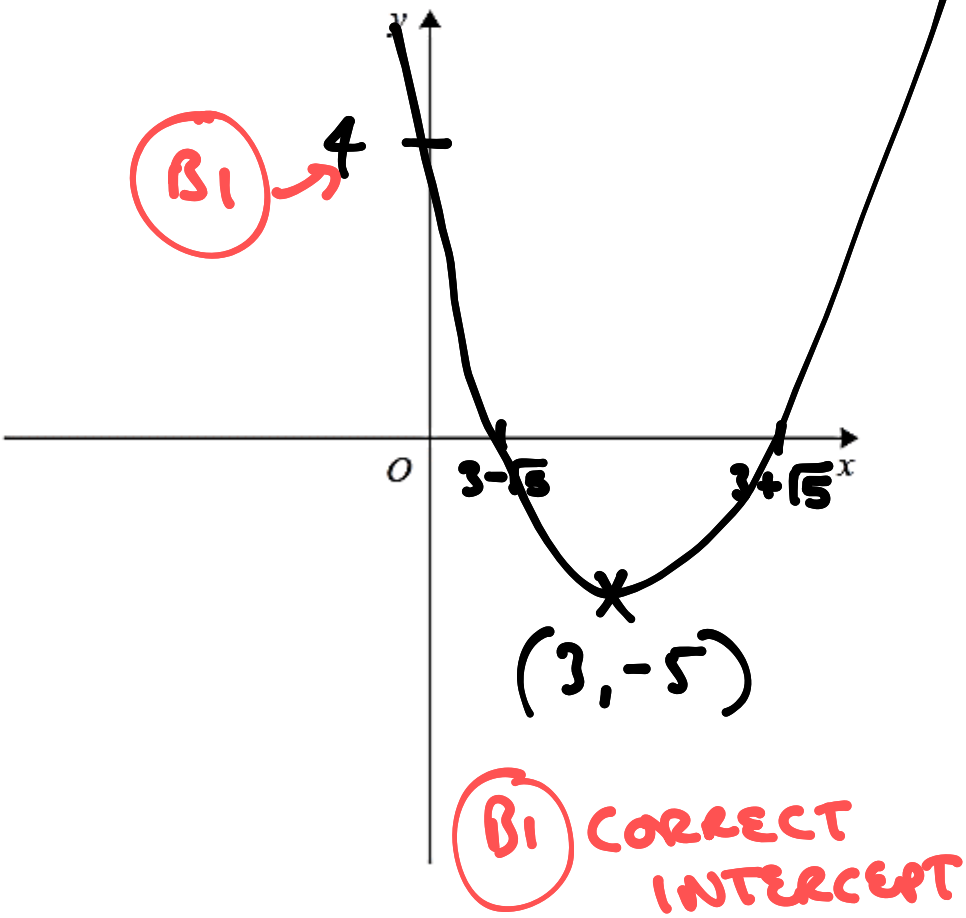
$x = 3 + \sqrt{5}$ B1

$x = 3 - \sqrt{5}$ B1

$(x-3)^2 - 9 + 4$

$(x-3)^2 - 5$ B1

$(3, -5)$



B1 SHAPE

B1 4

B1 CORRECT INTERCEPTS

(6 marks)

Q4. AtoZrevision.com

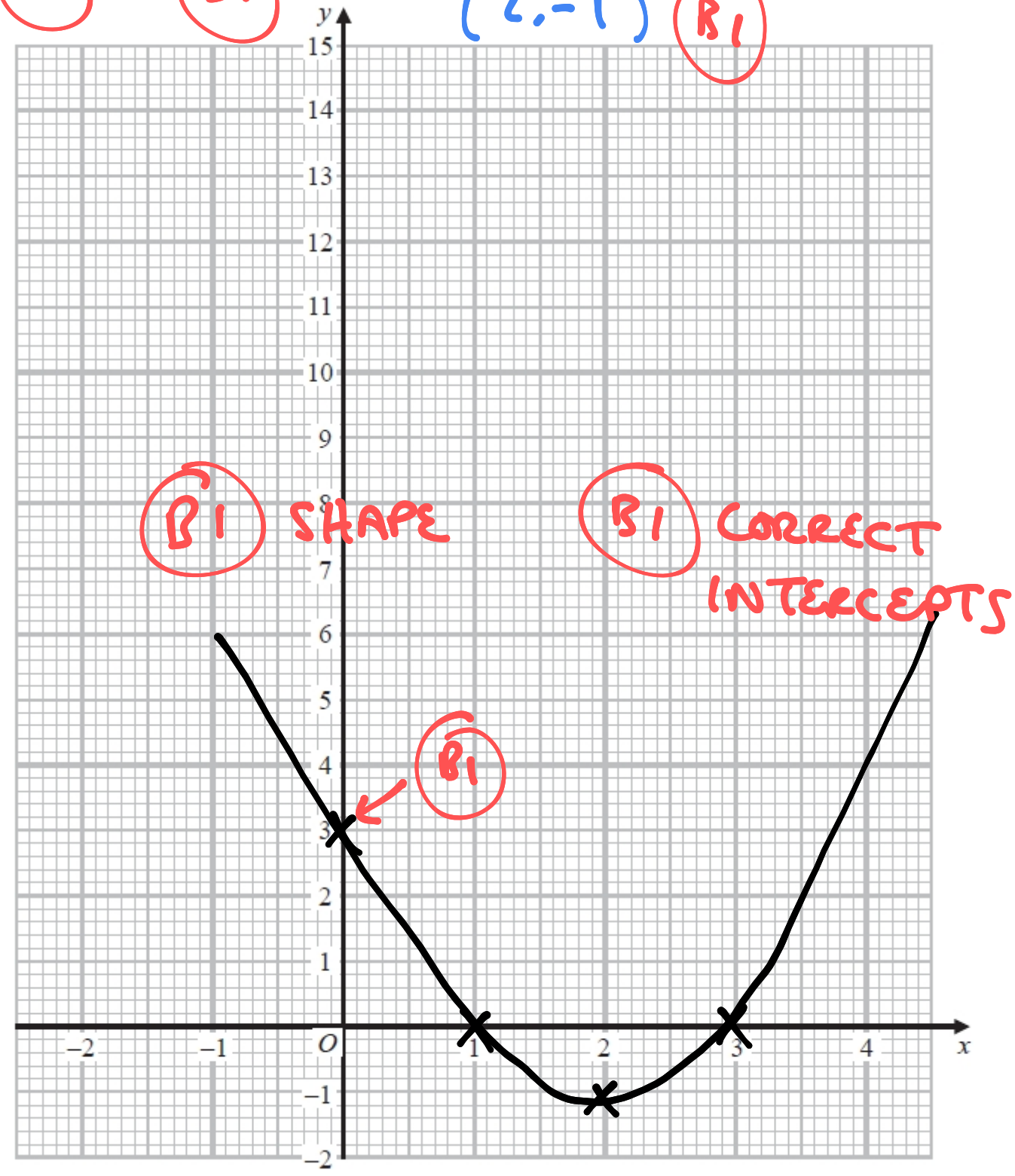
On the grid, draw the graph of $y = x^2 - 4x + 3$ for values of x from –2 to 4

$(x-3)(x-1)$ → y INTERCEPT

$x = 3$ B1 $x = 1$ B1

$(x-2)^2 - 4 + 3 - 1$

$(2, -1)$ B1



B1 SHAPE

B1 CORRECT INTERCEPTS

B1

(6 marks)

On the grid, draw the graph of $y = x^2 + 2x - 3$ for values of x from −4 to 2

4 INTERCEPT

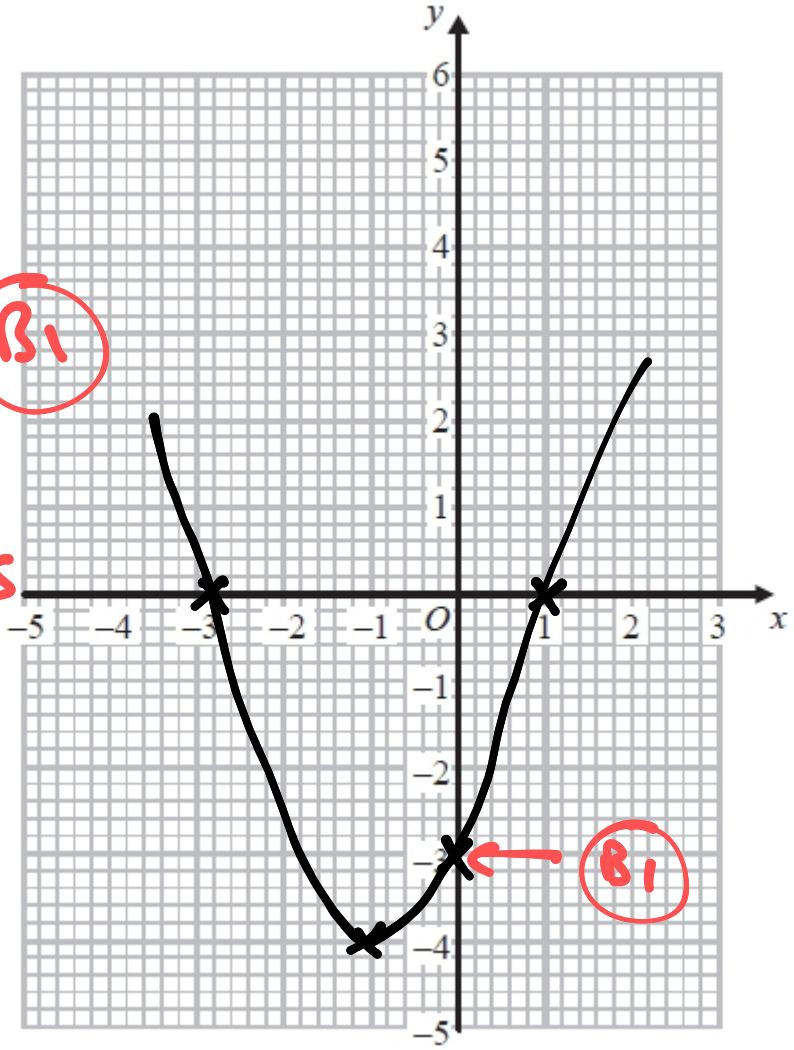
$(x-1)(x+3)$

$x = -3$ B1

$x = 1$ B1

$(x+1)^2 - 1 - 3 - 4$

$(-1, -4)$ B1



SHAPE B1

CORRECT INTERCEPTS B1

B1

(6 marks)

On the grid, draw the graph of $y = x^2 - 5x + 6$ for $0 \leq x \leq 5$

y INTERCEPT

$(x-3)(x-2)$

$(x-2.5)^2 - 6.25 + 6$

-0.25

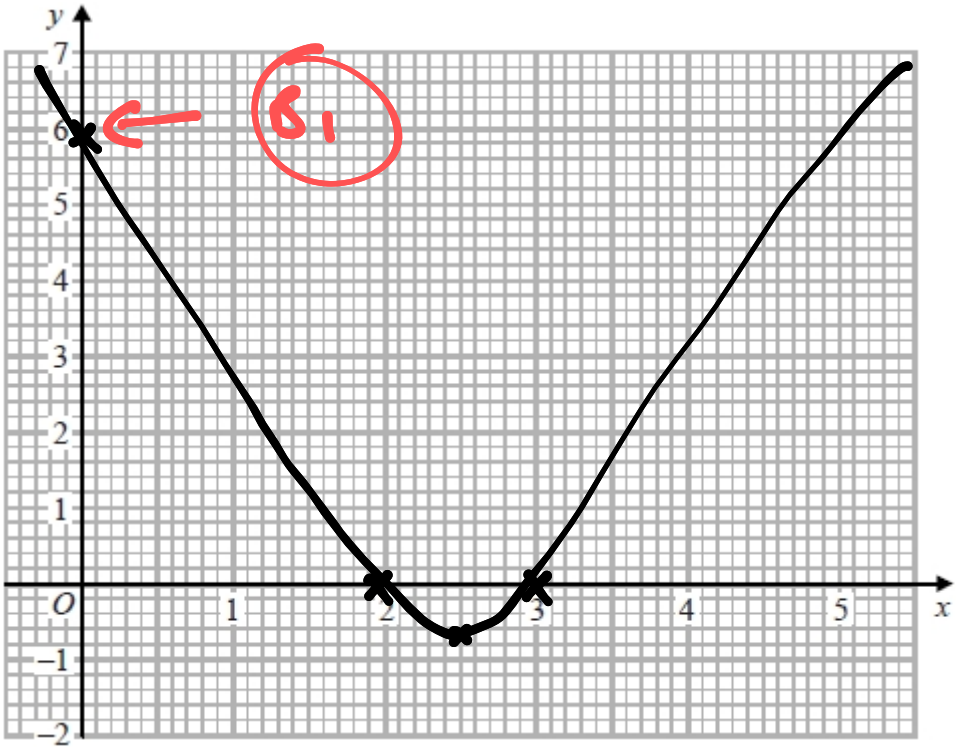
$x = 3$ B1

$x = 2$ B1

$(2.5, -0.25)$ B1

B1 SHAPE

B1 CORRECT INTERCEPTS



(6 marks)

On the grid, draw the graph of $y = x^2 - 4x + 2$ for values of x from −2 to 5

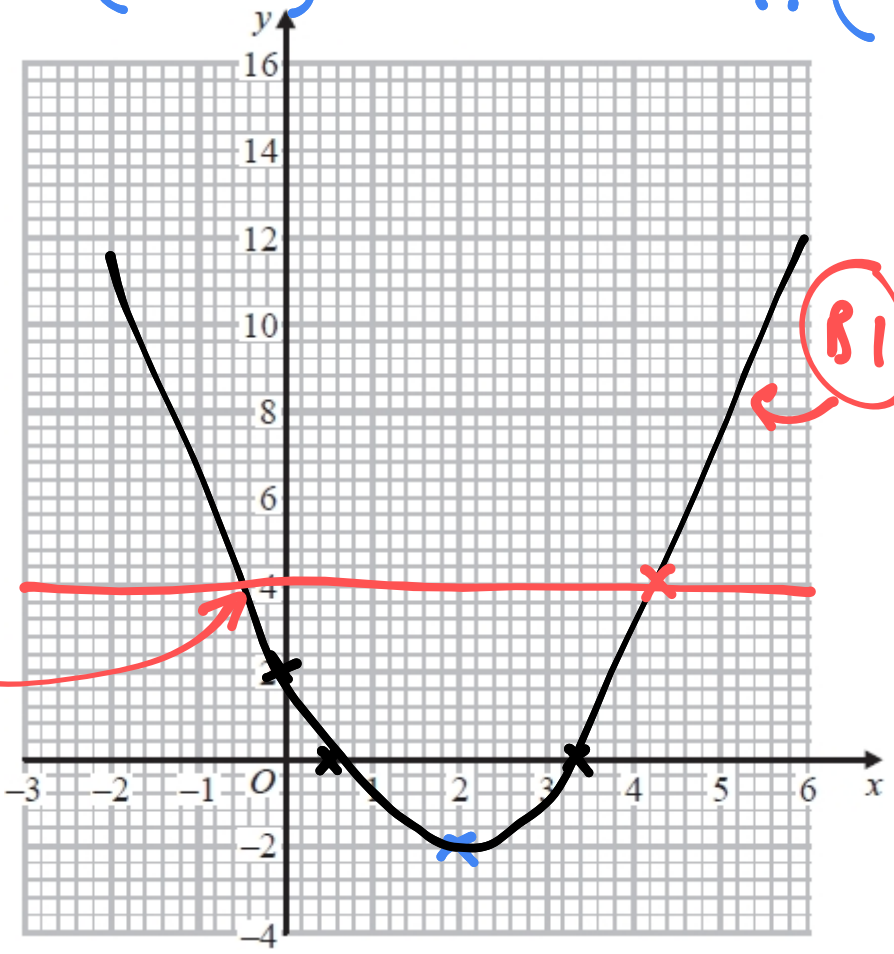
$$x = \frac{--4 \pm \sqrt{16 - 4 \times 1 \times 2}}{2 \times 1}$$ M1

A1 $x = 0.586$

$x = 3.414$ A1

y INTERCEPT = 2 M1

MIN: $(x-2)^2 = 4 + 2 - 2$ M1 ∴ (2, −2) A1



B1

NOT VALID

(6)

The point $P(k, 4)$ where $k > 0$ lies on the graph of $y = x^2 - 4x + 2$

(c) Use your graph to find an estimate for the value of k.

4.4 = k

.....

(1)

On the grid below, draw the graph of $y = x^2 - x - 4$ for values of x from −3 to 3

$$x = \frac{-(-1) \pm \sqrt{1-(4\times1\times-4)}}{2\times1}$$ M1

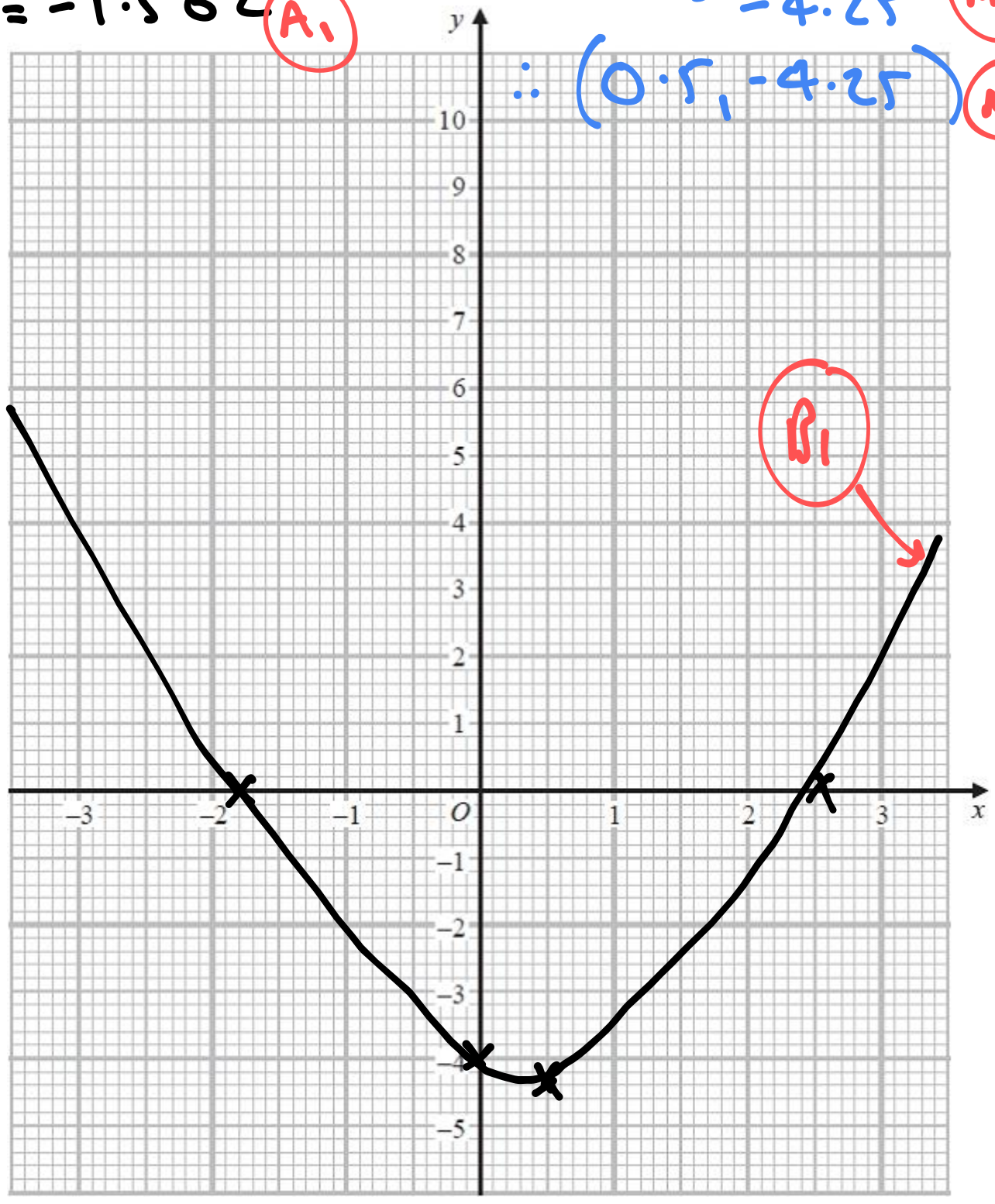
$x = 2.562$ A1

$x = -1.562$ A1

y INTERCEPT: (0, −4) M1

MIN: $(x-0.5)^2 - 0.25 - 4$ -4.25 M1

$\therefore (0.5, -4.25)$ M1



B1

(6 marks)

On the grid, draw the graph of $y = x^2 - 3x - 1$ for all values of x from -2 to 4

$$x = \frac{--3 \pm \sqrt{9 - (4 \times 1 \times -1)}}{2 \times 1}$$ M1

$x = -0.303$ A1

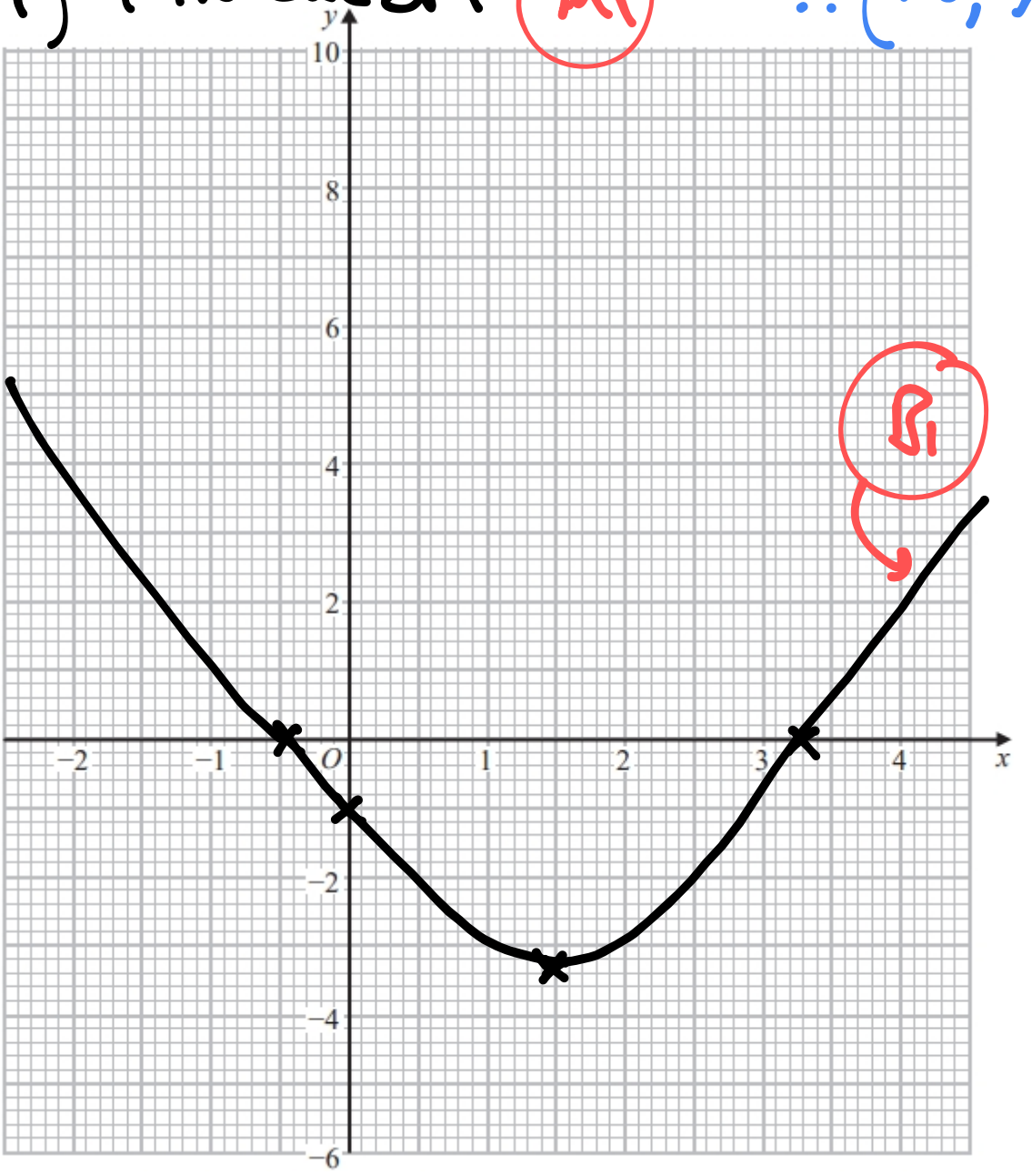
$x = 3.303$ A1

MIN: $(x - 1.5)^2 - 2.25 - 1$ M1

-3.25

$\therefore (1.5, -3.25)$

$(0, -1)$ Y INTERCEPT M1



B1

(6 marks)

The curve C has equation $y = 2x^2 + 7x + 5$

Using the axes below, sketch the curve C.
On your sketch show clearly

(i) the exact coordinates of any points of intersection of C with the coordinate axes,
(ii) the coordinates of the turning point.

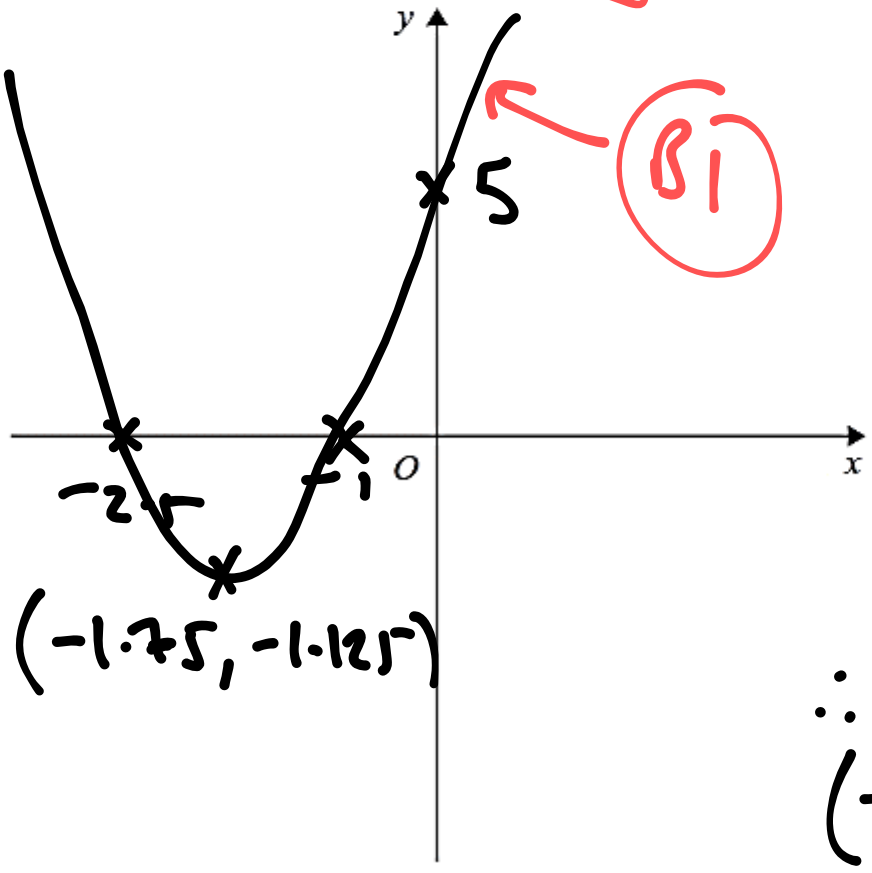
$y = (2x+5)(x+1)$ M1

$x = -2.5 \quad x = -1$ A1

y INTERCEPT: $(0, 5)$ M1

MIN: $2\left[x^2 + 3.5x\right] + 5$

$2\left[(x+1.75)^2 - 3.0625\right]$ M1



B1

A1

$\therefore$ MIN $(-1.75, -1.125)$

$2(x+1.75)^2 - 6.125 + 5$

-1.125

(6 marks)

The curve C has equation $y = 6x^2 - x - 5$

Using the axes below, sketch the curve C.
On your sketch show clearly

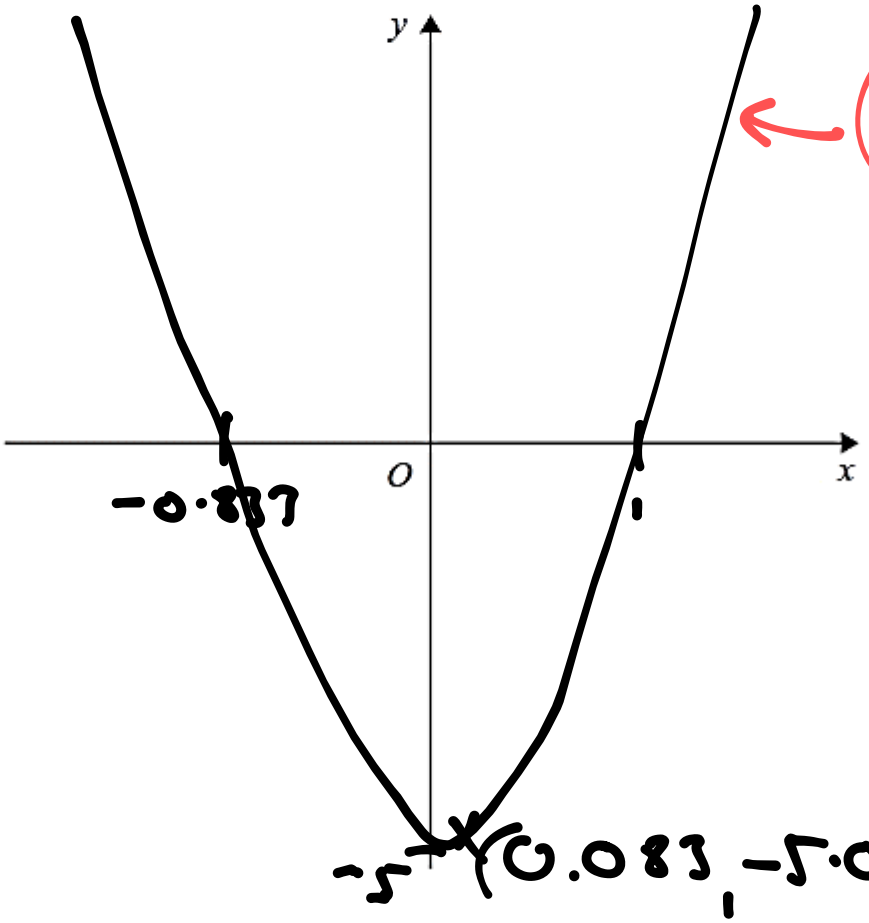
(i) the exact coordinates of any points of intersection of C with the coordinate axes,
(ii) the coordinates of the turning point.

$$x = \frac{1 \pm \sqrt{1 - 4 \times 6 \times -5}}{2 \times 6}$$ M1

$x = -0.833$ $x = 1$ A1 4 INTERCEPT M1 $(0, -5)$

MIN: $6\left(x - \frac{1}{12}\right)^2 - \frac{121}{24}$ M1

$\therefore \left(\frac{1}{12}, -\frac{121}{24}\right)$ A1



B1

(6 marks)

The curve C has equation $y = -8x^2 + 74x - 18$

Using the axes below, sketch the curve C.
On your sketch show clearly

(i) the exact coordinates of any points of intersection of C with the coordinate axes,
(ii) the coordinates of the turning point.

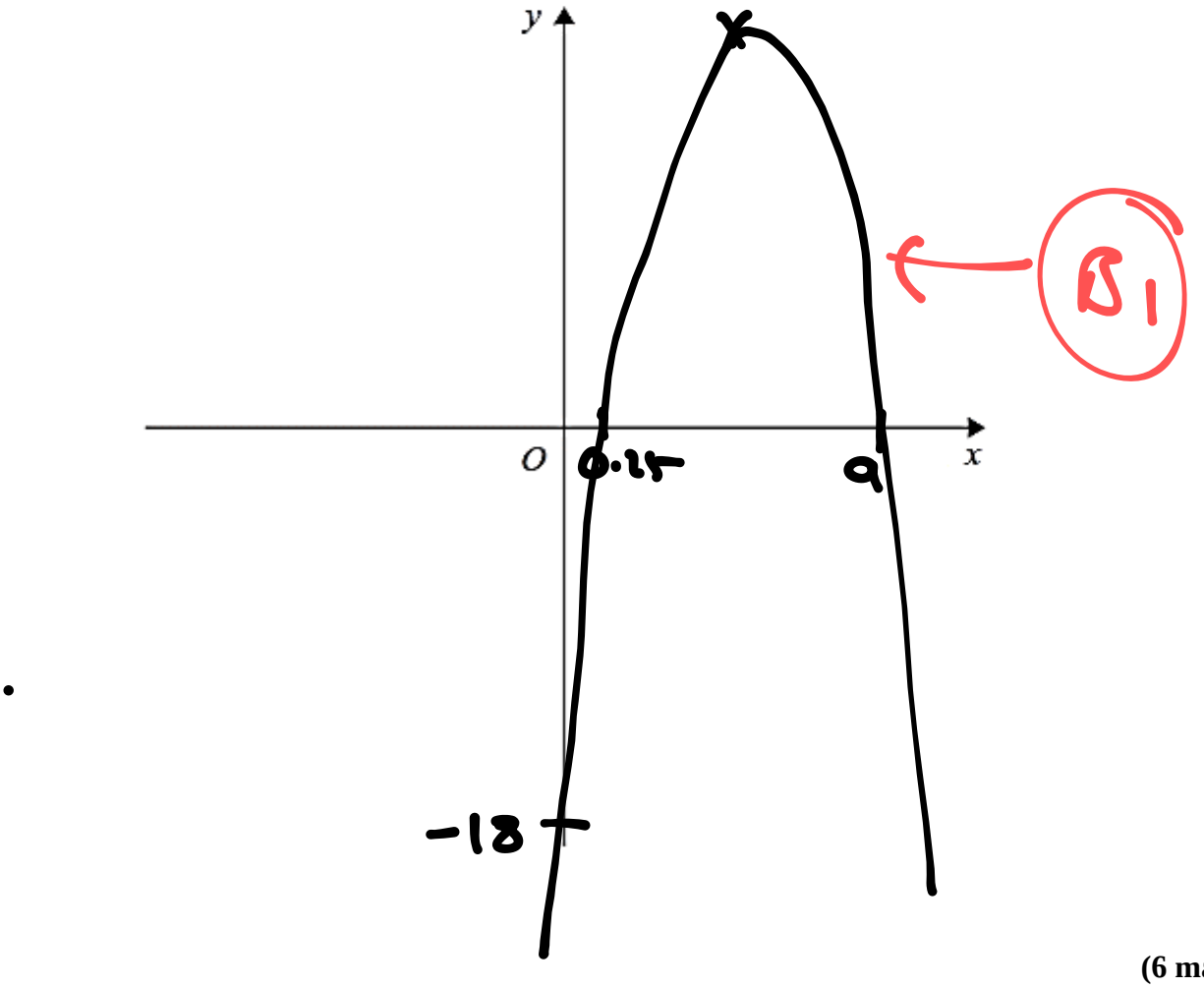
$$x = \frac{-74 \pm \sqrt{74^2 - (4 \times -8 \times -18)}}{2 \times -8}$$ M1

A1

$x = 9$ $x = 0.25$ Y INTERCEPT: $(0, -18)$ A1

MIN: $-8\left(x - \frac{37}{8}\right)^2 + \frac{1225}{8}$ M1

A1 $(4.625, 153.125)$



B1

(6 marks)

Q13. AtoZrevision.com

The curve C has equation $y = -10x^2 - 65x - 75$

Using the axes below, sketch the curve C.
On your sketch show clearly

(i) the exact coordinates of any points of intersection of C with the coordinate axes.
(ii) the coordinates of the turning point.

$$x = \frac{65 \pm \sqrt{(-65)^2 - (4 \times -10 \times -75}}{2 \times -10}$$ M1

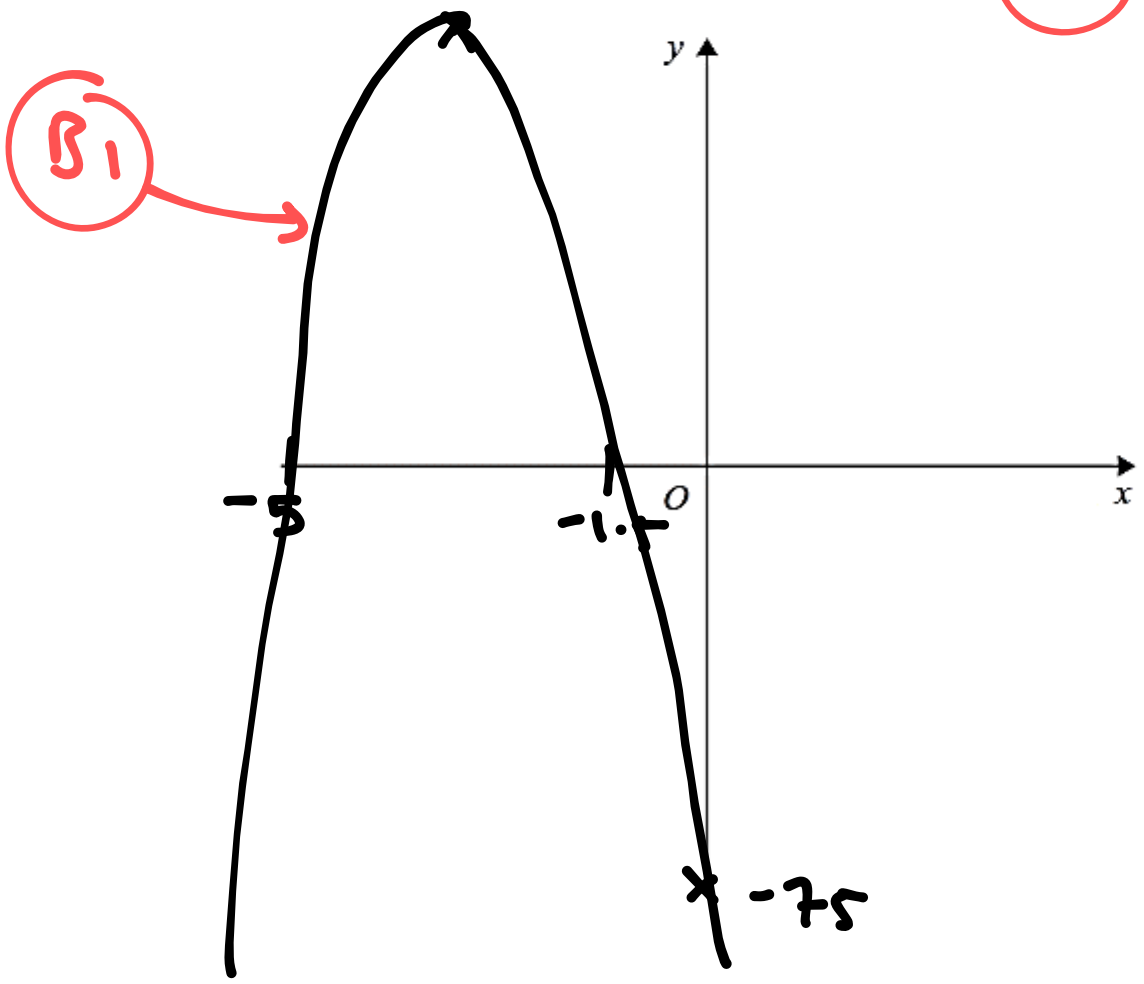
$x = -1.5$

$x = -5$ A1

MIN: $-10\left(x + \frac{13}{4}\right)^2 + \frac{245}{8}$ M1

$\therefore (-3.25, 30.625)$ M1

y INTERCEPT: $(0, -75)$ M1



B1

(6 marks)