GRAPHS OF POLYNOMIALS

DATE OF SOLUTIONS: 15/05/2018
MAXIMUM MARK: 49

SOLUTIONS

GCSE (+ IGCSE) EXAM QUESTION PRACTICE

1. [Edexcel, 2016] — Graphs of Polynomials **[4 Marks]**

(a) Complete the table of values for $y = x^2 - 4x + 2$

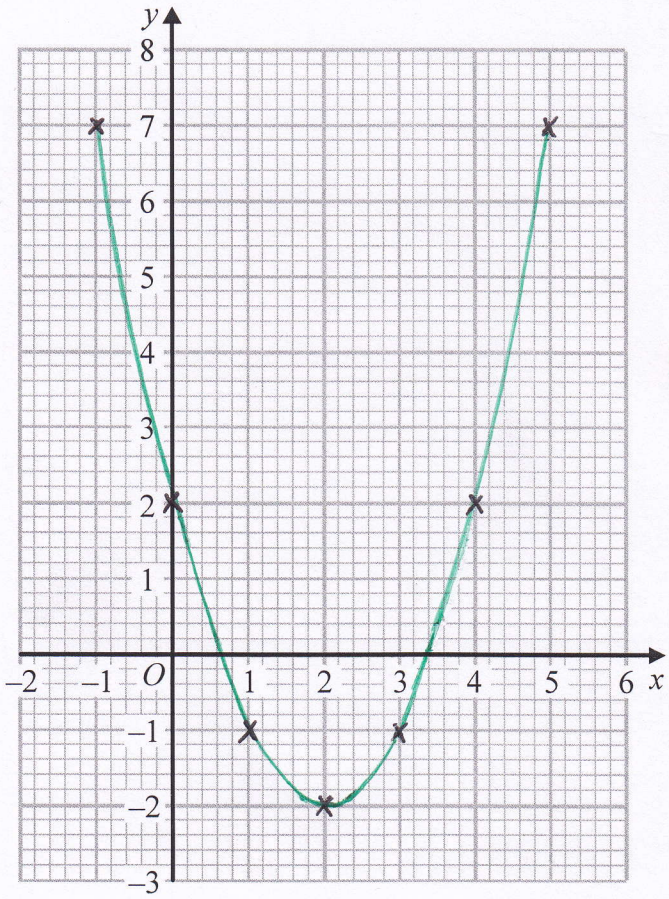
x	(−1)	0	1	2	3	4	5
y	7	2	−1	−2	−1	2	7

A2 [FOR Y-VALUES]

$y = (-1)^2 - 4(-1) + 2$ ETC

(2)

(b) On the grid, draw the graph of $y = x^2 - 4x + 2$ for all values of x from −1 to 5



B1 [POINTS]

B1 ['SMOOTH' CURVE]

(2)

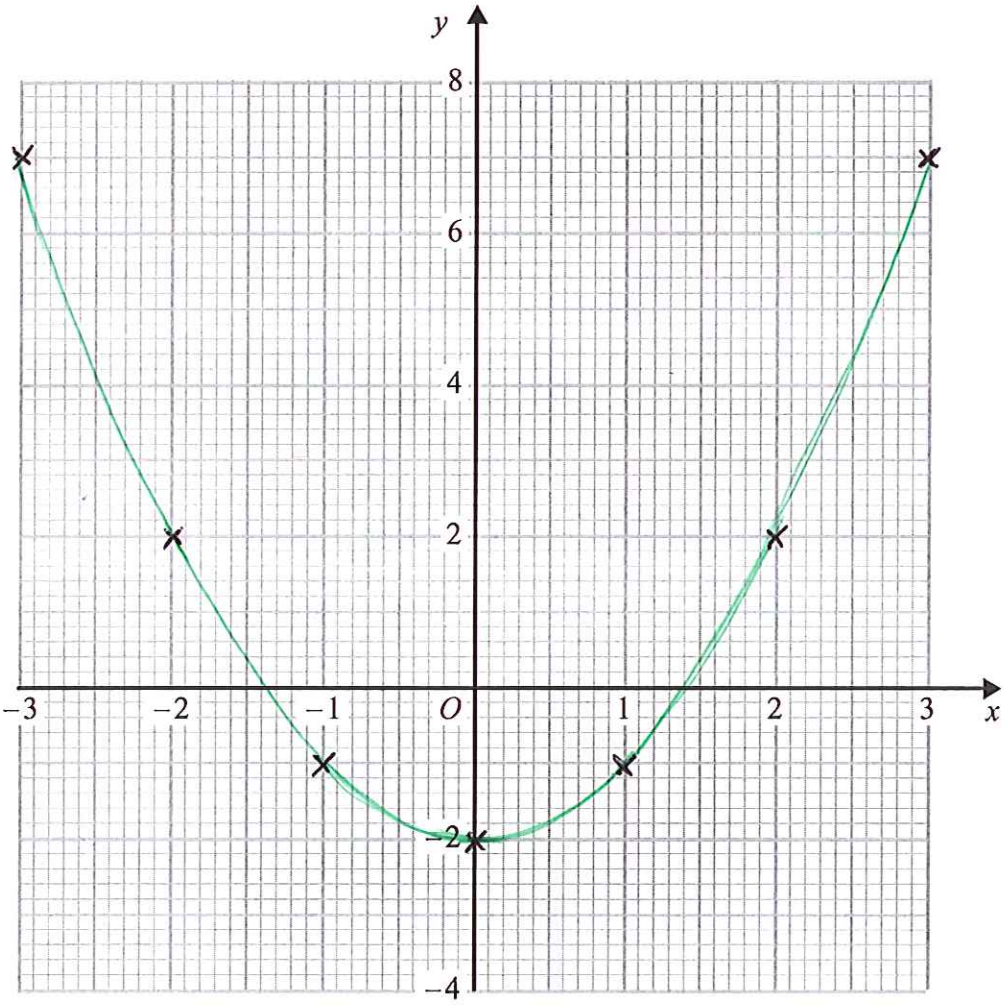
(a) Complete the table of values for $y = x^2 - 2$

$y = (-3)^2 - 2$ ETC

x	−3	−2	−1	0	1	2	3
y	7	2	−1	-2	−1	2	7

(2)

(b) On the grid, draw the graph of $y = x^2 - 2$



(2)

3. [Edexcel, 2013] Graphs of Polynomials **[4 Marks]**

For $y = x^3 - 6x^2 + 20$

(a) (i) show that $y = 4$ when $x = 2$

$y = (2)^3 - 6\times(2)^2 + 20$ M1

$= 8 - 6\times4 + 20 = 4$

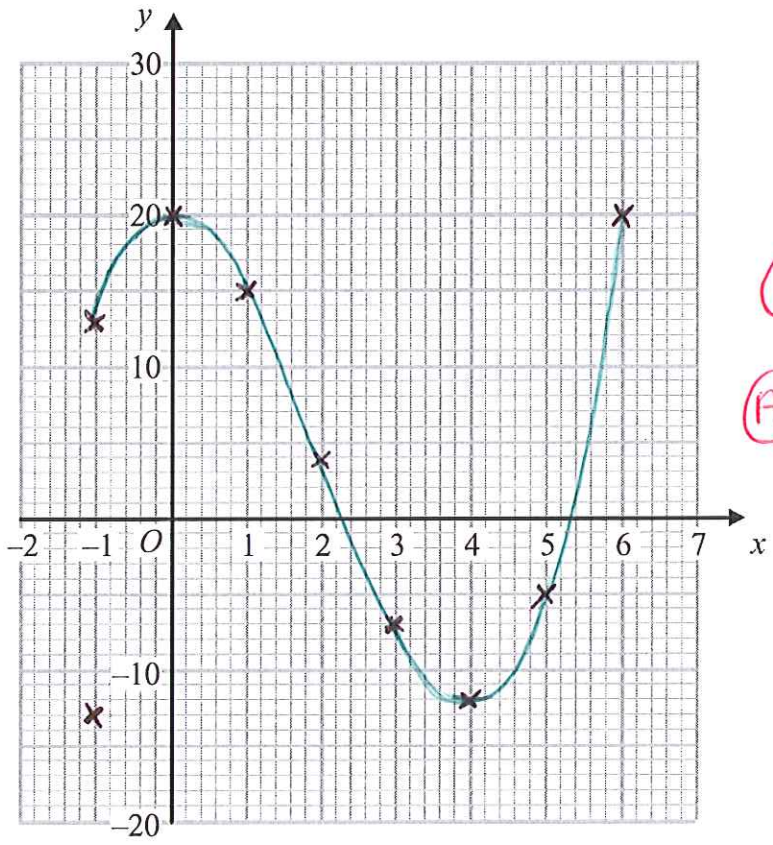
(ii) complete the table of values

x	−1	0	1	2	3	4	5	6
y	13	20	15	4	−7	−12	−5	20

A1

(2)

(b) On the grid, draw the graph of $y = x^3 - 6x^2 + 20$ for values of x from −1 to 6



A1 POINTS

A1 SMOOTH CURVE

4. [Edexcel, 2009] Graphs of Polynomials **[4 Marks]**

(a) Complete the table of values for $y = x^3 - 3x^2 + 12$

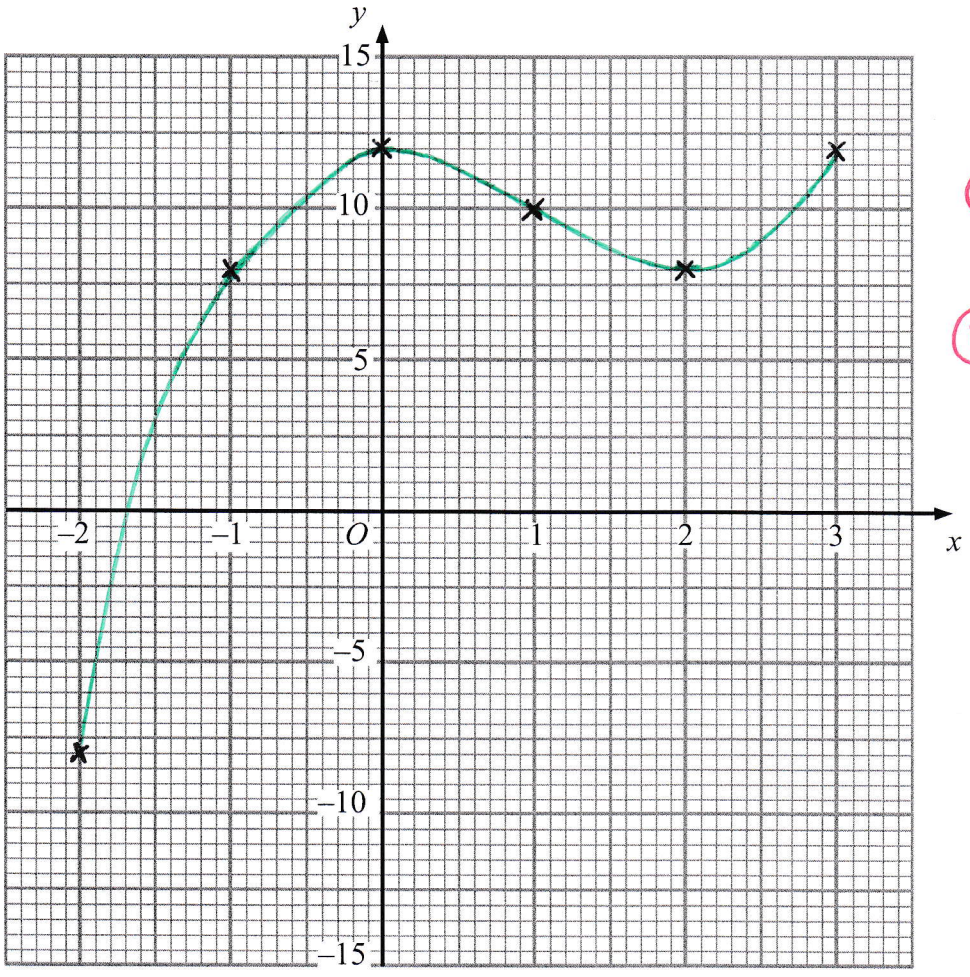
$y = (-2)^3 - 3(-2)^2 + 12$ ETC.

x	(-2)	-1	0	1	2	3
y	-8	8	12	10	8	12

(2)

A2 [Y-VALUES]

(b) On the grid, draw the graph of $y = x^3 - 3x^2 + 12$



B1 [POINTS]

B1 ['SMOOTH' CURVE]

(2)

5. [Edexcel, 2006] Graphs of Polynomials **[4 Marks]**

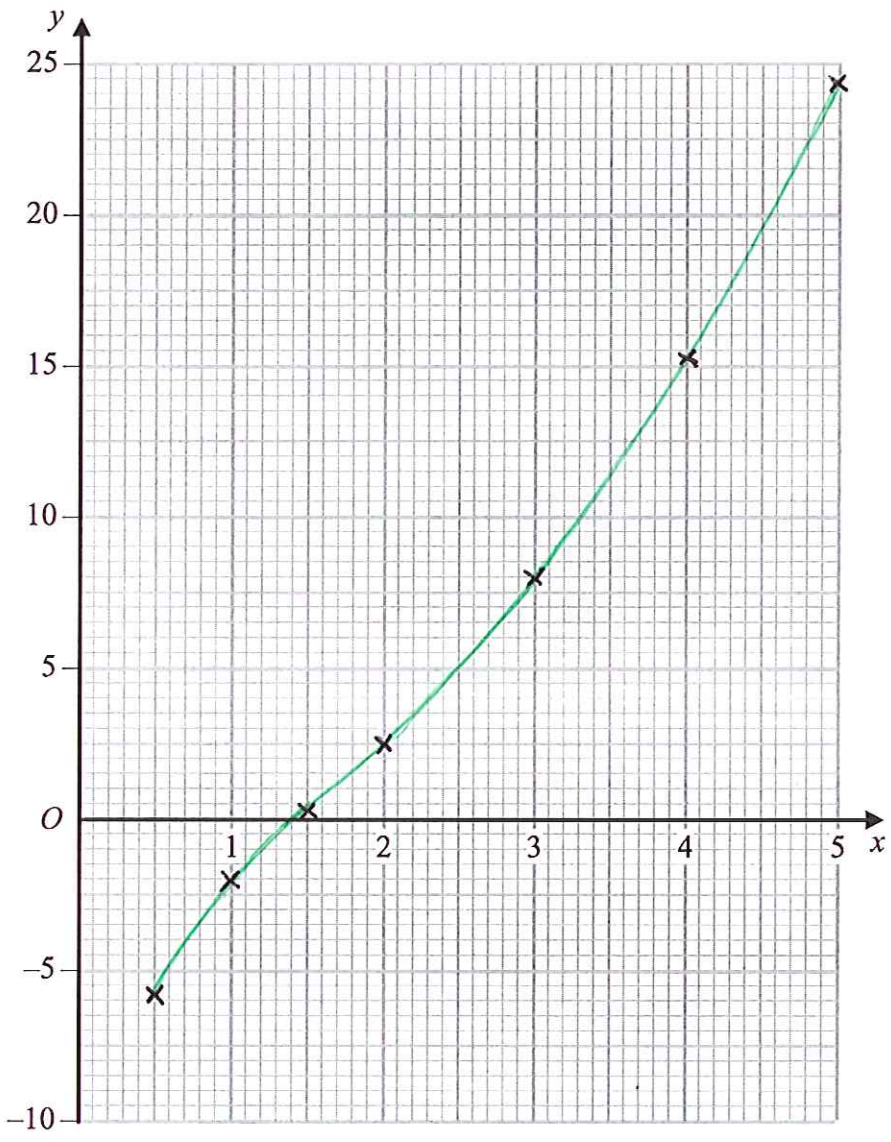
(a) Complete the table of values for $y = x^2 - \frac{3}{x}$

$y = (0.5)^2 - \frac{3}{(0.5)}$ ETC

x	0.5	1	1.5	2	3	4	5
y	−5.75	−2	0.25	2.5	8	15.25	24.4

(2)

(b) On the grid, draw the graph of $y = x^2 - \frac{3}{x}$ for $0.5 \leqslant x \leqslant 5$



(2)

(a) Complete the table of values for $y = x + \frac{1}{x^2}$

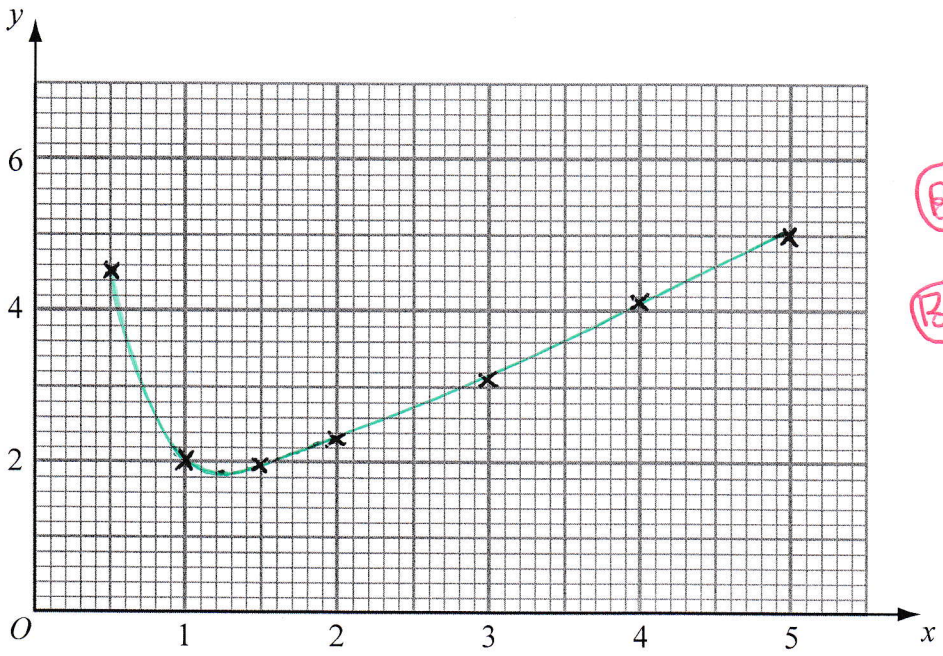
$y = (0.5) + \frac{1}{(0.5)^2}$ ETC.

x	(0.5)	1	1.5	2	3	4	5
y	4.5	2	1.94	2.3	3.1	4.1	5.0

(2)

A2 [4-VALUES]

(b) On the grid, draw the graph of $y = x + \frac{1}{x^2}$ for $0.5 \leqslant x \leqslant 5$



B1 [POINTS]

B1 ['SMOOTH' CURVE]

(2)

(a) Complete the table of values for $y = \frac{1}{2}\left(x + \frac{9}{x}\right)$

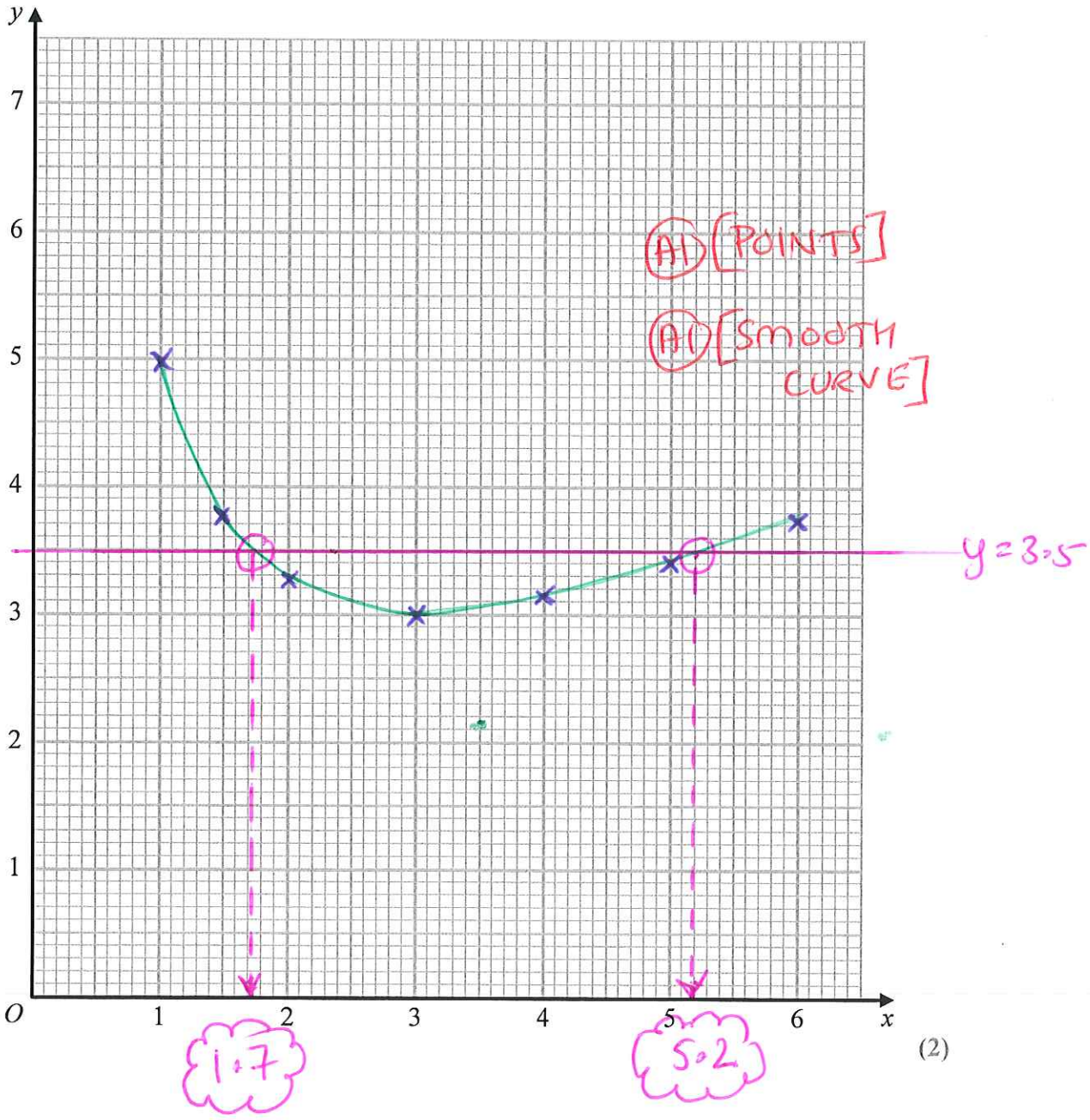
$$y = 0.5 \times \left[(1.5) + \frac{9}{(1.5)}\right]$$

x	1	1.5	2	3	4	5	6
y	5	3.75	3.25	3	3.125	3.4	3.75

A2

(2)

(b) Draw the graph of $y = \frac{1}{2}\left(x + \frac{9}{x}\right)$ for values of x from 1 to 6



(2)

8. [Edexcel, 2004] Graphs of Polynomials **[4 Marks]**

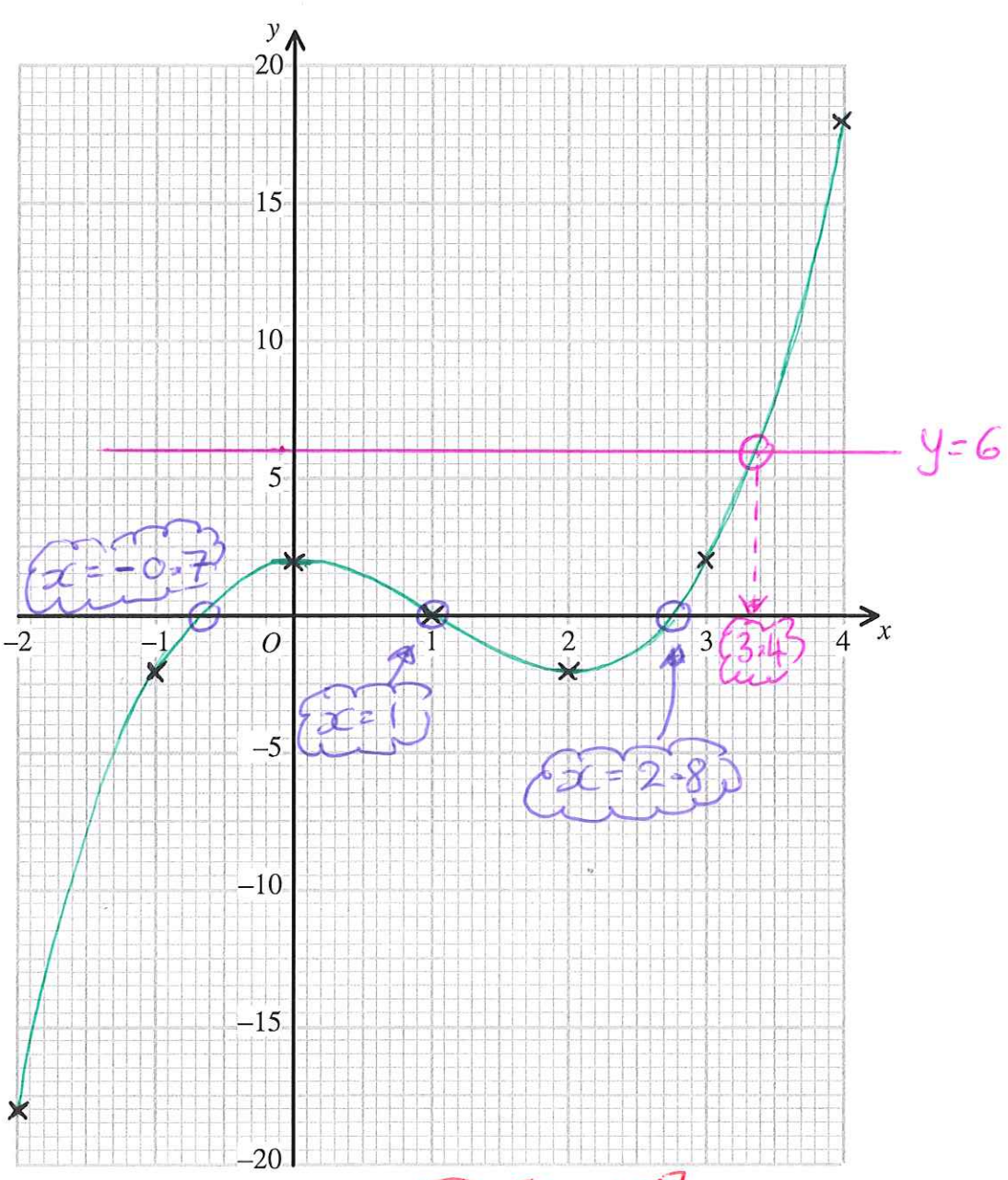
(a) Complete the table of values for $y = x^3 - 3x^2 + 2$

$y = (-2)^3 - 3(-2)^2 + 2$ ETC.

x	–2	–1	0	1	2	3	4
y	−18	–2	2	0	−2	2	18

B2 [-1 eeo] **(2)**

(b) On the grid, draw the graph of $y = x^3 - 3x^2 + 2$



B1 [POINTS]

B1 [CURVE]

(2)

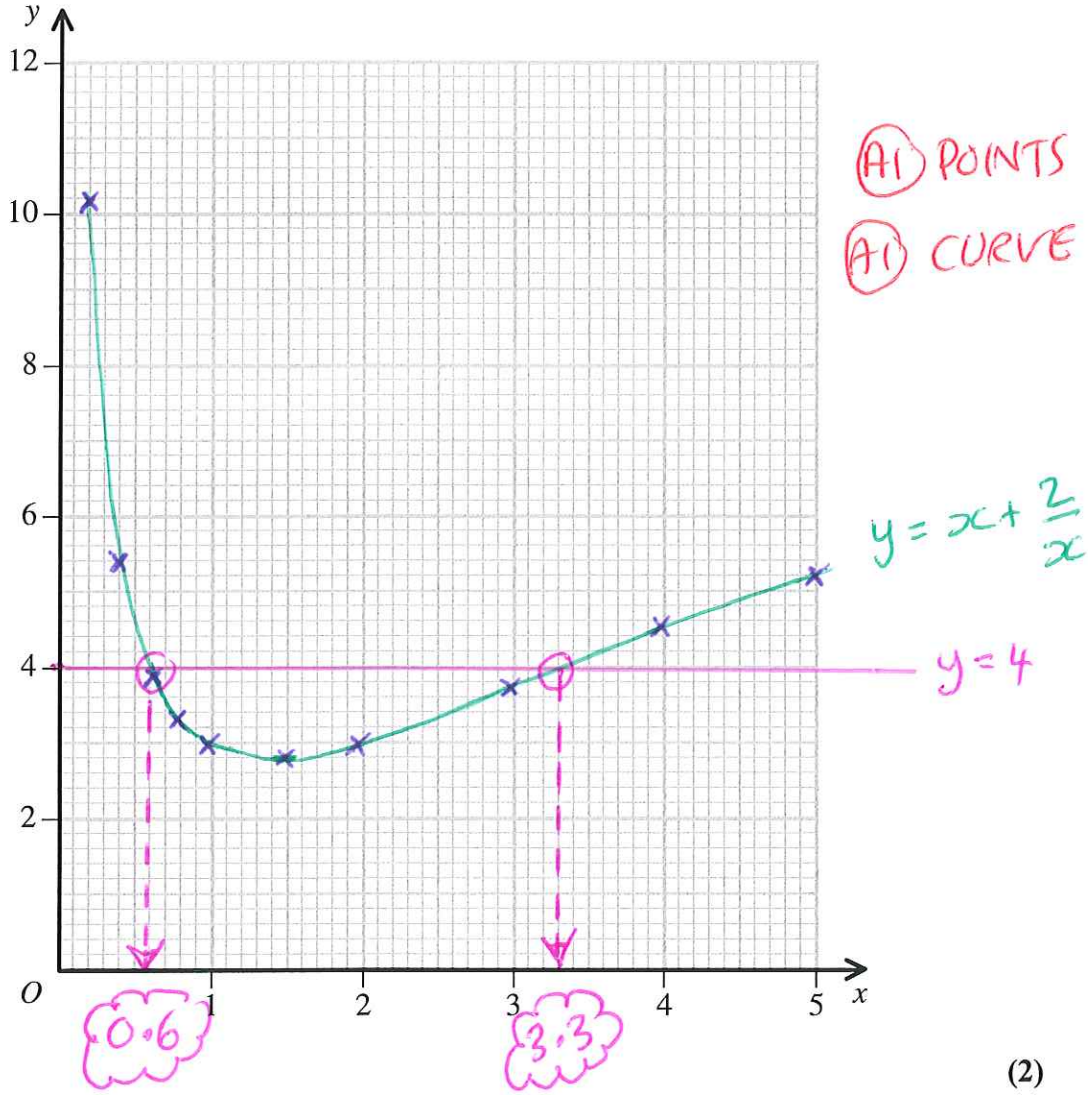
9. [Edexcel, 2004] Graphs of Polynomials **[4 Marks]**

(a) Complete the table of values for $y = x + \frac{2}{x}$ $y = (0.4) + \frac{2}{(0.4)}$ ETC

x	0.2	0.4	0.6	0.8	1	1.5	2	3	4	5
y	10.2	5.4	3.9	3.3	3	2.8	3	3.7	4.5	5.2

A2 [-1 eeo] **(2)**

(b) On the grid, draw the graph of $y = x + \frac{2}{x}$ for $0.2 \leq x \leq 5$



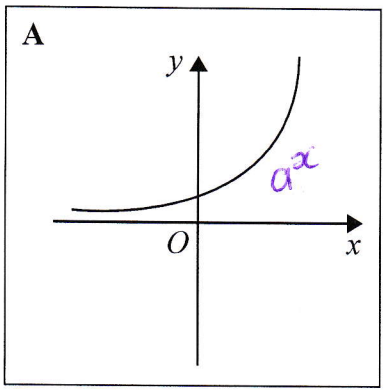
A1 POINTS
A1 CURVE

(2)

10. [Edexcel, 2017] Graphs of Polynomials **[3 Marks]**

Here are some graphs.

A



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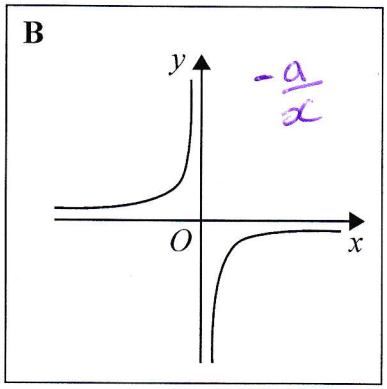

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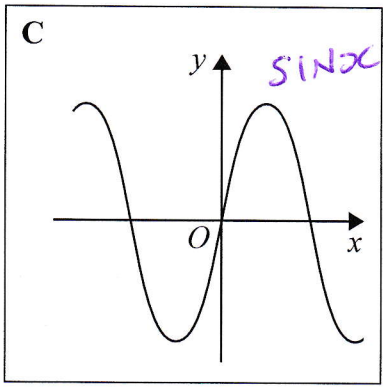

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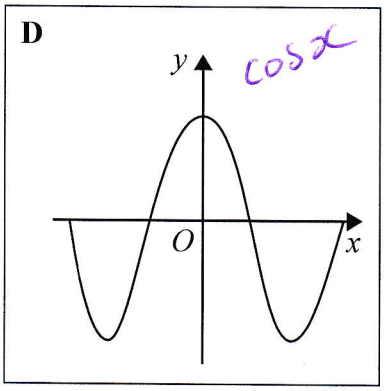

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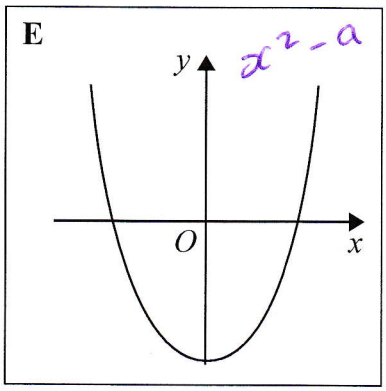

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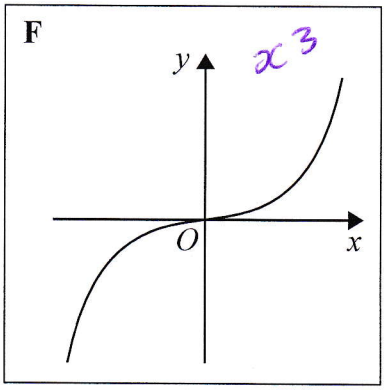

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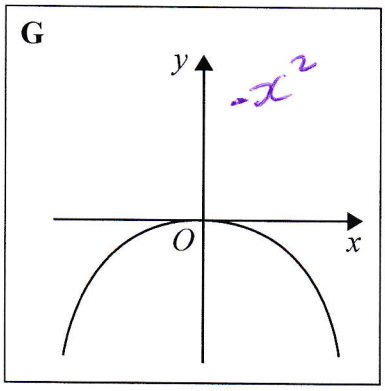

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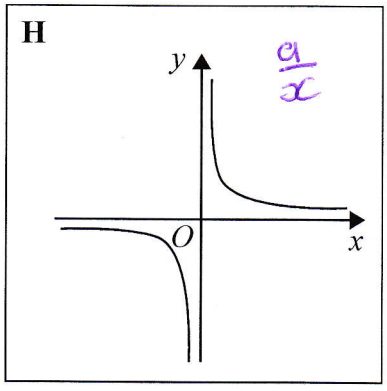

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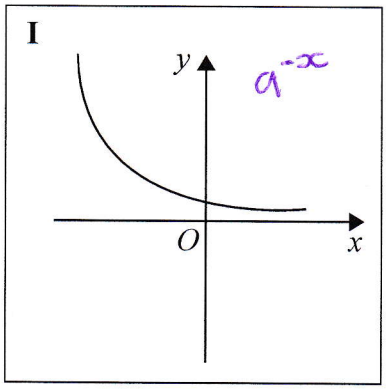


In the table below, match each equation with the letter of its graph.

Equation	Graph
$y = \sin x$	C
$y = x^3 + 4x$	F
$y = 2^x$	A
$y = \frac{4}{x}$	H

B1 B1 B1 B1

11. [Edexcel, 2016] Graphs of Polynomials **[5 Marks]**

(a) Complete the table of values for $y = x^2 - 4x + 2$

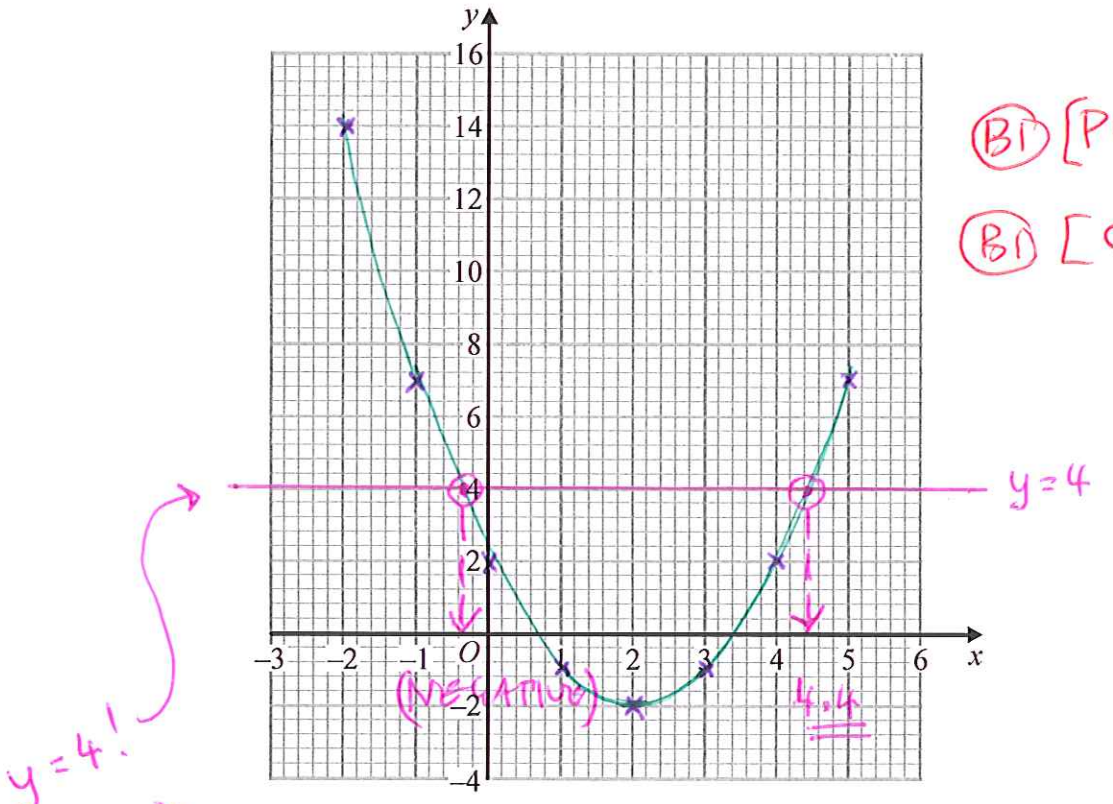
$y = (-1)^2 - 4(-1) + 2$

x	−2	−1	0	1	2	3	4	5
y	14	7	2	−1	−2	−1	2	7

A1 A1

(2)

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



B1 [POINTS]

B1 [CURVE]

y = 4!

(2)

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 A1

(1)

12. [Edexcel, 2013] Graphs of Polynomials **[5 Marks]**

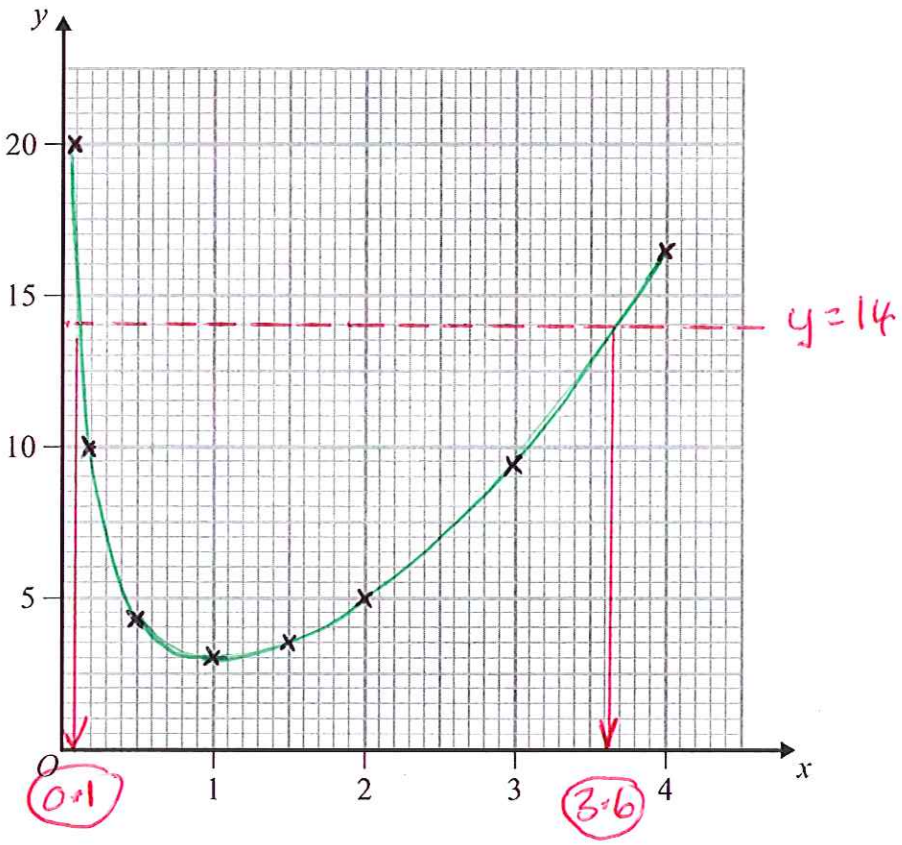
(a) Complete the table of values for $y = x^2 + \frac{2}{x}$

$y = (0.1)^2 + \frac{2}{(0.1)}$ ETC

x	0.1	0.2	0.5	1	1.5	2	3	4
y	20.01	10.04	4.25	3	3.58	5	9.67	16.5

(1)

(b) On the grid, draw the graph of $y = x^2 + \frac{2}{x}$ for $0.1 \leqslant x \leqslant 4$



(2)

(c) Use your graph to find estimates for the solutions of $x^2 + \frac{2}{x} = 14$ in the interval $0.1 \leqslant x \leqslant 4$

Give your estimates correct to 1 decimal place.

$x = 0.1$ AND $x = 3.6$

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Sometimes a method used in these solutions might be unfamiliar to You. If You are able to use a different method to obtain the correct answer then You should consider to keep using your existing method and not change to the method that is used here. However, the choice of method is always up to You and it is often useful if You know more than one method to solve a particular type of problem.

Within these solutions there is an indication of where marks **might** be awarded for each question. B marks, M marks and A marks have been used in a similar, but **not identical**, way that an exam board uses these marks within their mark schemes. This slight difference in the use of these marking symbols has been done for simplicity and convenience. Sometimes B marks, M marks and A marks have been interchanged, when compared to an examiners' mark scheme and sometimes the marks have been awarded for different aspects of a solution when compared to an examiners' mark scheme.

B1 – This is an unconditional accuracy mark (the specific number, word or phrase must be seen. This type of mark cannot be given as a result of 'follow through').

M1 – This is a method mark. Method marks have been shown in places where they might be awarded for the method that is shown. If You use a different method to get a correct answer, then the same number of method marks would be awarded but it is not practical to show all possible methods, and the way in which marks might be awarded for their use, within these particular solutions. When appropriate, You should seek clarity and download the relevant examiner mark scheme from the exam board's web site.

A1 – These are accuracy marks. Accuracy marks are typically awarded after method marks. If the correct answer is obtained, then You should normally (but not always) expect to be awarded all of the method marks (provided that You have shown a method) and all of the accuracy marks.

Note that some questions contain the words 'show that', 'show your working out', or similar. These questions require working out to be shown. Failure to show sufficient working out is likely to result in no marks being awarded, even if the final answer is correct.

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