

Equations, inequalities and polynomials

6 questions · 33 marks

Answer all questions. The marks available are shown against each part. Every question is taken unaltered from a past paper; the source is noted beneath it.

1. $x^2 + bx + c$ and $x^2 + dx + e$ have a common factor $(x + 2)$ 4 marks

Show that $2(d - b) = e - c$

Fully justify your answer.

[4 marks]

— AQA 7357/2 Maths · June 2019 · Paper 2, Question 4

2. The displacement, r metres, of a particle at time t seconds is 3 marks

$$r = 6t - 2t^2$$

- (a) Find the value of r when $t = 4$

[1 mark]

- (b) Determine the range of values of t for which the displacement is positive.

[2 marks]

[illegible]

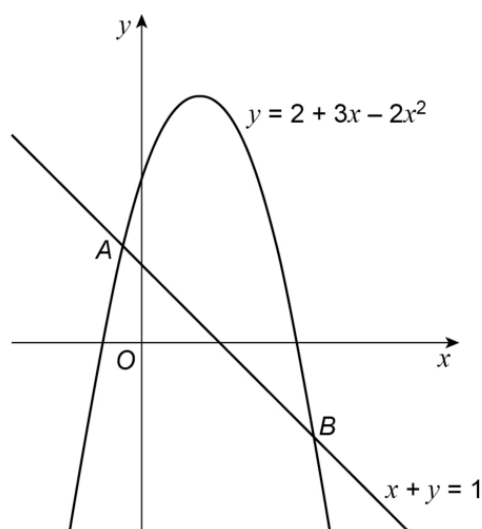
— AQA 7357/2 Maths · June 2024 · Paper 2, Question 14

3. The graphs with equations

5 marks

$$y = 2 + 3x - 2x^2 \text{ and } x + y = 1$$

are shown in the diagram below.



The graphs intersect at the points A and B

(a)

On the diagram above, shade and label the region, R , that is satisfied by the inequalities

$$0 \leq y \leq 2 + 3x - 2x^2$$

and

$$x + y \geq 1$$

[2 marks]

(b)

Find the exact coordinates of A

[3 marks]

[illegible]

— AQA 7357/3 Maths · June 2024 · Paper 3, Question 7

4.

(a)

It is given that

6 marks

$$P(x) = 4x^3 + 8x^2 + 11x + 4$$

Use the factor theorem to show that $(2x + 1)$ is a factor of $P(x)$

[2 marks]

(b)

Express $P(x)$ in the form

$$P(x) = (2x + 1)(ax^2 + bx + c)$$

where a , b and c are constants to be found.

[2 marks]

(c)

Given that n is a positive integer, use your answer to part (b) to explain why $4n^3 + 8n^2 + 11n + 4$ is **never** prime.

[2 marks]

[illegible]

— AQA 7357/1 Maths · June 2024 · Paper 1, Question 13

5.

$$p(x) = 4x^3 - 15x^2 - 48x - 36$$

7 marks

(a)

Use the factor theorem to prove that $x - 6$ is a factor of $p(x)$.

[2 marks]

[illegible]

(b)(i)Prove that the graph of $y = p(x)$ intersects the x -axis at exactly one point.**[4 marks]**

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(b)(ii)

State the coordinates of this point of intersection.

[1 mark]

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— AQA 7357/3 Maths · June 2020 · Paper 3, Question 4

6.**(a)**

Given that

8 marks

$$P(x) = 125x^3 + 150x^2 + 55x + 6$$

use the factor theorem to prove that $(5x + 1)$ is a factor of $P(x)$.**[2 marks]**

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(b)Factorise $P(x)$ completely.**[3 marks]****(c)**Hence, prove that $250n^3 + 300n^2 + 110n + 12$ is a multiple of 12 when n is a positive whole number.**[3 marks]**

— AQA 7357/1 Maths · 2021 · Paper 1, Question 13