1.11 Pure: Algebra and Functions Depth: 30-minute Pack

Total Marks

EDEXCEL 9MA0 · Calculator allowed · about 30 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Fully factorise $x^2 - 5x + 6$.

(Total for Question 1 is 1 mark)

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2 $g(x) = x^3 + ax^2 + bx - 12$, where a and b are constants. $(x - 1)$ and $(x + 3)$ are both factors of $g(x)$.

(a) Show that $a + b = 11$, form a second equation connecting a and b, and hence find the values of a and b. **(5)**

(b) Fully factorise $g(x)$. **(3)**

(c) Hence write down all the roots of $g(x) = 0$. **(2)**

(Total for Question 2 is 10 marks)

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3 $h(x) = |2x - 5| - 3$.

(a) Solve $h(x) = 4$. **(4)**

(b) Solve $h(x) \leq 2$, giving your answer in set notation. **(4)**

(c) State the coordinates of the vertex of $y = h(x)$, and the coordinates of the points where the graph crosses the coordinate axes. **(3)**

(Total for Question 3 is 11 marks)

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4 $f(x) = x^3 - 3x^2 + 4$. Use the factor theorem to state whether $(x - 2)$ is a factor of $f(x)$.

(Total for Question 4 is 1 mark)

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5 $f(x) = x^3 + x^2 - 10x + 8$. Show that $(x - 2)$ is a factor of $f(x)$.

(Total for Question 5 is 2 marks)

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Mark scheme · 1.11 Pure: Algebra and Functions Depth: 30-minute Pack

Question 1

(x-2)(x-3) cao	**B1**

Answer: (x-2)(x-3)

Question 2

(a) uses g(1) = 0 to form a + b = 11 oe (1 + a + b - 12 = 0)	**M1**
(a) uses g(-3) = 0 to form 3a - b = 13 oe (-27 + 9a - 3b - 12 = 0)	**M1**
(a) solves the simultaneous equations	**M1**
(a) a = 6	**A1**
(a) b = 5	**A1**

(a) Answer: a = 6, b = 5

(b) divides g(x) = $x^3 + 6x^2 + 5x - 12$ by (x - 1)(x + 3) = $x^2 + 2x - 3$	**M1**
(b) third factor (x + 4) obtained	**A1**
(b) g(x) = (x - 1)(x + 3)(x + 4) oe	**A1**

(b) Answer: g(x) = (x - 1)(x + 3)(x + 4)

(c) x = 1 and x = -3 stated	**B1**
(c) x = -4 stated, all three roots oe	**B1**

(c) Answer: x = 1, x = -3, x = -4

Question 3

(a) forms |2x - 5| = 7	**M1**
(a) sets up two linear equations 2x-5=7 and 2x-5=-7	**M1**
(a) x = 6	**A1**
(a) x = -1 oe	**A1**

(a) Answer: x = 6 or x = -1

(b) forms |2x - 5| ≤ 5	**M1**
(b) forms the compound inequality -5 ≤ 2x-5 ≤ 5	**M1**
(b) 0 ≤ x ≤ 5 oe	**A1**
(b) correct set notation {x : 0 ≤ x ≤ 5} oe	**A1**

(b) Answer: {x : 0 ≤ x ≤ 5}

(c) vertex (2.5, -3) oe	**B1**
(c) y-intercept (0, 2)	**B1**
(c) x-intercepts (1, 0) and (4, 0)	**B1**

(c) Answer: Vertex (2.5, -3); y-intercept (0, 2); x-intercepts (1, 0) and (4, 0)

Question 4

f(2) = 0, so (x-2) is a factor	**B1**

Answer: Yes, (x-2) is a factor

Question 5

substitutes x = 2 into f(x)	**M1**
f(2) = 0, so (x-2) is a factor, cso	**A1**

Answer: f(2) = 0, so (x-2) is a factor

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