5.8 Solving Quadratics: 30-minute Pack

EDEXCEL 1MA1 · Calculator allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Work out the values of x.

$x^2 - 5x = 0$

(Total for Question 1 is 2 marks)

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2 Solve the equation.

$3x^2 - 12 = 0$

(Total for Question 2 is 3 marks)

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3 A rectangular shed has length 4x metres and width (x + 2) metres. The area of the shed is 96 m^2.

Work out the value of x and then find the actual length and width of the shed.

(Total for Question 3 is 6 marks)

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4 Solve the equation $2x^2 - x - 6 = 0$.

(Total for Question 4 is 3 marks)

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5 A rectangle has sides of length $x + 4$ and $x + 2$. The area is 168 cm². Find the dimensions of the rectangle (give the positive solution for x).

Diagram NOT accurately drawn

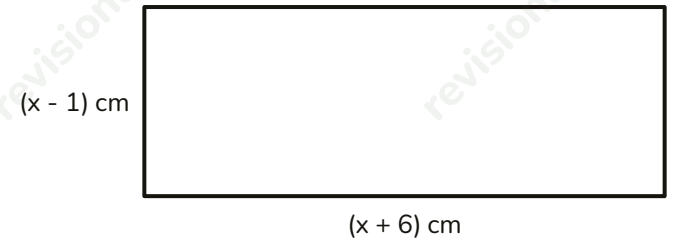


(Total for Question 5 is 3 marks)

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6 A rectangle has length (x + 6) cm and width (x - 1) cm. The area of the rectangle is 44 cm².

Diagram NOT accurately drawn



(a) Show that $x^2 + 5x - 50 = 0$ **(2)**

(b) Solve the equation to find the value of x, given that $x > 0$ **(2)**

(c) Hence find the width of the rectangle **(1)**

(Total for Question 6 is 5 marks)

7 A firework is launched from a platform. Its height above the ground, h metres, after t seconds is modelled by $h = -5t^2 + 25t + 2$. Find the times at which the firework is at a height of 22 metres.

(Total for Question 7 is 5 marks)

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Mark scheme · 5.8 Solving Quadratics: 30-minute Pack

Question 1

factorise to x(x - 5) = 0 or equivalent	**M1**
x = 0 and x = 5 cao	**A1**

Answer: x = 0 and x = 5

Question 2

rearrange to $3x^2 = 12$ and divide to $x^2 = 4$ or equivalent	**M1**
x = 2 cao	**A1**
x = -2 cao	**A1**

Answer: x = 2 and x = -2

Question 3

form equation 4x(x + 2) = 96 or equivalent	**M1**
simplify to $4x^2 + 8x - 96 = 0$ and divide by 4 to get $x^2 + 2x - 24 = 0$	**M1**
factorise to (x + 6)(x - 4) = 0 or equivalent	**M1**
x = 4 cao	**A1**
x = -6 cao	**A1**
state length = 16 m and width = 6 m for the positive solution	**A1**

Answer: x = 4 (discard x = -6). Length = 4x = 16 m, width = x + 2 = 6 m. Working: $4x(x + 2) = 96$ -> $x^2 + 2x - 24 = 0$ -> (x + 6)(x - 4) = 0.

Question 4

correct factorisation or rearrangement shown, e.g. $2x^2$ +3x -4x -6 or (2x +3)(x -2)	**M1**
obtain factors (2x +3)(x -2) oe	**M1**
x = 2 or x = -3/2 cao	**A1**

Answer: x = 2 or x = -3/2

Question 5

form equation (x + 4)(x + 2) = 168 and expand to $x^2 + 6x + 8 = 168$	**M1**
rearrange to $x^2 + 6x - 160 = 0$ and solve by factorisation or formula to get x = 10 or x = -16	**M1**
positive solution x = 10 giving dimensions 14 cm and 12 cm cao	**A1**

Answer: Dimensions are 14 cm by 12 cm (x = 10)

Question 6

(a) expands (x + 6)(x - 1) to obtain $x^2 + 5x - 6$	**M1**
(a) sets the expansion equal to 44 and rearranges correctly to $x^2 + 5x - 50 = 0$ (cso)	**A1**

(a) Answer: $x^2 + 5x - 50 = 0$

(b) correct factorisation (x + 10)(x - 5) = 0, or correct use of the quadratic formula	**M1**
(b) x = 5, rejecting x = -10 since x > 0	**A1**

(b) Answer: x = 5

(c) width = 4 cm (ft their x, width = x - 1)	**B1**

(c) Answer: 4 cm

Question 7

sets up $-5t^2 + 25t + 2 = 22$ oe	**M1**
rearranges to $-5t^2 + 25t - 20 = 0$ or $t^2 - 5t + 4 = 0$ oe	**M1**
correct factorisation (t - 1)(t - 4) = 0, or correct use of the quadratic formula	**M1**
t = 1	**A1**
t = 4	**A1**

Answer: t = 1 second and t = 4 seconds

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