HIGHER

8.1 Quadratic Simultaneous Equations: 30-minute Pack

EDEXCEL 1MA1 · Calculator allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Solve the simultaneous equations

$y = x^2 - 4$
$x + y = 6$

(Total for Question 1 is 4 marks)

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2 Solve the simultaneous equations

$x^2 + y^2 = 25$
$y = x + 1$

(Total for Question 2 is 4 marks)

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3 Solve the simultaneous equations $xy = 32$ and $y = x - 4$.

(Total for Question 3 is 5 marks)

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4 Solve the simultaneous equations $y = x^2 + 5x + 2$ and $y = 2x$.

(Total for Question 4 is 5 marks)

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5 The line $y = 2x + k$ is a tangent to the curve $y = x^2 + 5x + 2$. Work out the value of k.

(Total for Question 5 is 4 marks)

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6 Solve the simultaneous equations $xy = 6$ and $y = x + 1$.

(Total for Question 6 is 5 marks)

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Mark scheme · 8.1 Quadratic Simultaneous Equations: 30-minute Pack

Question 1

substitute y from the first equation into the second: $x + x^2 - 4 = 6$	**M1**
rearrange to a quadratic and apply the quadratic formula: $x^2 + x - 10 = 0$	**M1**
$x = (-1 + \sqrt{41})/2$ and $x = (-1 - \sqrt{41})/2$ (exact values) cao	**A1**
corresponding y values $y = (13 - \sqrt{41})/2$ and $y = (13 + \sqrt{41})/2$ cao	**A1**

Answer: $x = (-1 \pm \sqrt{41})/2$. Corresponding $y = 6 - x$ so $y = (13 -/+ \sqrt{41})/2$. (Two solution pairs.)

Question 2

substitute $y = x + 1$ into $x^2 + y^2 = 25$ to get $x^2 + (x + 1)^2 = 25$	**M1**
simplify to $2x^2 + 2x - 24 = 0$ and divide by 2 to get $x^2 + x - 12 = 0$	**M1**
factorise to $(x + 4)(x - 3)$ so $x = -4$ or $x = 3$	**A1**
corresponding pairs (x, y) = (-4, -3) and (3, 4) cao	**A1**

Answer: (x, y) = (-4, -3) and (3, 4).

Question 3

substitutes to get $x(x - 4) = 32$	**M1**
rearranges to a quadratic equal to 0	**M1**
solves the quadratic	**M1**
$x = -4$ and $x = 8$	**A1**
(-4, -8) and (8, 4)	**A1**

Answer: (-4, -8) and (8, 4)

Question 4

equates the two expressions for y	**M1**
rearranges to a quadratic equal to 0	**M1**
factorises or solves	**M1**
$x = -2$ and $x = -1$	**A1**
(-2, -4) and (-1, -2)	**A1**

Answer: (-2, -4) and (-1, -2)

Question 5

equates the expressions for y	**M1**
rearranges to $x^2 + 3x + (2 - k) = 0$ or equivalent	**M1**
uses discriminant $b^2 - 4ac = 0$	**M1**
$k = -1/4$	**A1**

Answer: k = -1/4

Question 6

substitutes to get $x(x + 1) = 6$	**M1**
rearranges to a quadratic equal to 0	**M1**
solves the quadratic	**M1**
$x = -3$ and $x = 2$	**A1**
(-3, -2) and (2, 3)	**A1**

Answer: (-3, -2) and (2, 3)

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