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VCE Mathematical Methods ½
Quadratics [1.3]
Test

Results:

Test Questions	_____ / 21
Extension Test Question	_____ / 5



Section A: Test Questions (21 Marks)

INSTRUCTION: 21 Marks. Y Minutes Reading. Z Minutes Writing.



Question 1 (4 marks)

Tick whether the following statements are **true** or **false**.

Statement	True	False
a. Every quadratic can be factorised as the product of two real linear factors.		
b. If the discriminant of a quadratic is negative, then the quadratic has two real solutions.		
c. We can find the turning point of a quadratic if we know only the coordinates of two x -intercepts.		
d. All quadratics have a turning point form.		
e. The solution to the quadratic inequality $x^2 > 4$ is $x \leq -2$ or $x \geq 2$.		
f. The axis of symmetry of $y = 3x^2 - 12x + 13$ is at $x = 2$.		
g. The equation $x^4 - 2x^2 + 1 = 0$ has two distinct real solutions.		
h. The graph of $y = ax^2 + bx + c$ is symmetric about the line $x = \frac{b}{2a}$.		

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Question 2 (3 marks)

The sum of two numbers is 8 and the product of the two numbers is 15.

- a. Write down a quadratic equation in the form $ax^2 + bx + c = 0$ that can be solved to find the numbers. (1 mark)

- b. Find the two numbers. (2 marks)

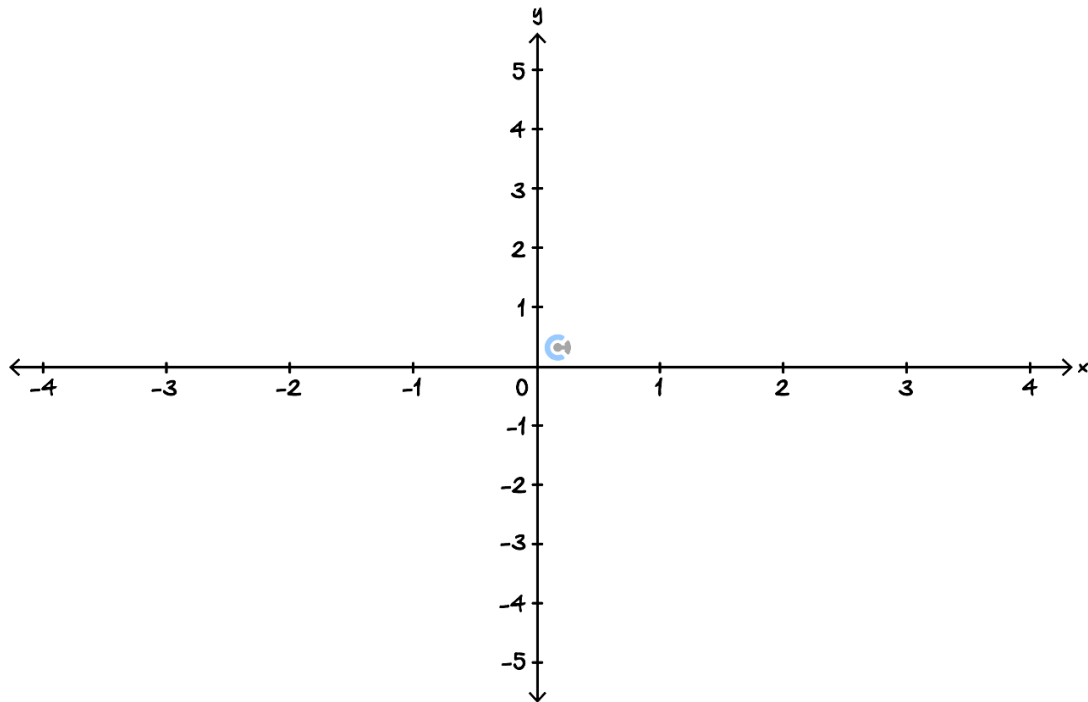
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Question 3 (5 marks)

Consider the function $f(x) = -x^2 + 2x + 3$.

- a. Write $f(x)$ in the form $a(x - h)^2 + k$. (1 mark)

- b. Sketch the graph of $y = f(x)$ on the axes below. Label the turning point and all axes intercepts with coordinates. (2 marks)



- c. Hence, find the value(s) of x , such that $f(x) > 3$. (2 marks)

Question 4 (4 marks)

Sam is competing in a shotput competition. The trajectory of the shot (name of the spherical ball used), is modelled by a quadratic equation $y = ax^2 + bx + c$, where $y \geq 0$ is the height of the shot above the ground in metres and $x \geq 0$ is the horizontal distance of the shot in metres.

The shot reaches a maximum height of $\frac{7}{2}$ metres when it has travelled two metres horizontally, and it has a height of $\frac{3}{2}$ when it is released ($x = 0$).

- a. Write down the trajectory of the shot in turning point form. (2 marks)

- b. Find the horizontal distance that Sam's shot travels. (2 marks)

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Question 5 (5 marks)

Consider the function $f(x) = x^4 - 6x^2 + 8$.

a. Solve the equation $f(x) = 0$. (3 marks)

b. Use the discriminant to determine the value(s) of k , such that $f(x) + k = 0$ has no real solutions. (2 marks)

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Section B: Extension Test Question (5 Marks)

INSTRUCTION: 5 Marks. Y Minutes Reading. Z Minutes Writing.



Question 6 (5 marks)

- a. Solve $x^4 - 2kx^2 + 4 = 0$ for x , in terms of k , where $k \in \mathbb{R}$. (3 marks)

- b. Hence, determine the values of k for which $x^4 - 2kx^2 + 4 = 0$ has 4 real solutions. (2 marks)

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