Unit 4 · Quadratic Equation

WORKSHEET

Full marks 32

Name _____ Class _____ Roll no. _____ Date _____ Marks _____ / 32

1 Key words [3]

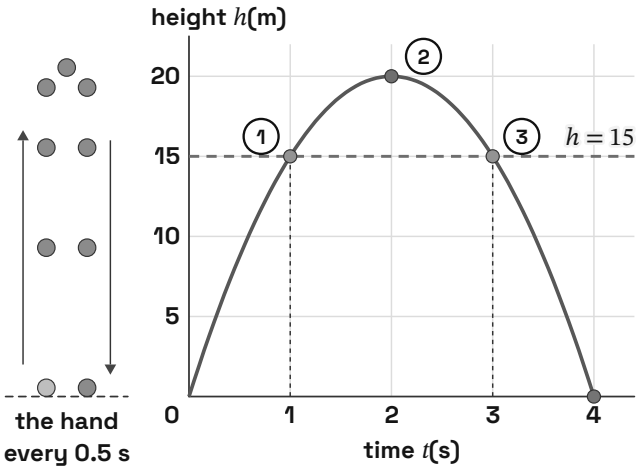
Fill in the blanks with words from the box. Two words in the box are not needed. Each blank carries 0.5 mark.

axis of symmetry	completing the square	hyperbola	linear	parabola	quadratic	translation	vertex

An equation in which the highest power of the variable is 2 is a _____ equation. The graph of $y = ax^2 + bx + c$ is a curve called a _____. The point where it turns is its _____, and the upright line through that point is its _____. Writing $x^2 + 6x$ as $(x + 3)^2 - 9$ is called _____. Sliding $y = x^2$ to a new place without changing its shape is a _____.

2 Read the graph [3]

A ball is thrown straight up. Its height h meters after t seconds is $h = 20t - 5t^2$. Three labels on its graph are left blank: write what each should say.



1. _____ **2.** _____

3. _____

3 Multiple choice [5]

Choose the correct option for each of the following questions.

i. Which of these is a quadratic equation? [1]

a. $5x - 2 = 0$ **b.** $x^3 + x = 0$

c. $x^2 = 4x$ **d.** $\frac{1}{x} = 3$

ii. What is the vertex of $y = (x + 5)^2 - 2$? [1]

a. $(-5, -2)$ **b.** $(5, -2)$

c. $(5, 2)$ **d.** $(-5, 2)$

iii. The parabola $y = -2(x-1)^2 + 3$ **[1]**

a. opens upward, with lowest point (1, 3) **b.** opens downward, with highest point (1, 3)

c. opens downward, with highest point (−1, 3) **d.** opens upward, with lowest point (−1, 3)

iv. How is the graph of $y = (x-4)^2$ obtained from the graph of $y = x^2$? **[1]**

a. 4 units to the left **b.** 4 units up

c. 4 units down **d.** 4 units to the right

v. The graph of $y = x^2 - 6x + 5$ cuts the X-axis at **[1]**

a. $x = -1$ and $x = -5$ **b.** $x = 3$ and $x = -4$

c. $x = 1$ and $x = 5$ **d.** $x = 0$ and $x = 5$

4 Very short answers **[3]**

Write very short answers to the following questions.

a. Write the equation of the axis of symmetry of $y = 3(x-2)^2 + 7$. **[1]**

b. A parabola opens upward and its vertex is (2, 3). How many times does it cut the X-axis? **[1]**

c. Write the function you get when $y = x^2$ is translated 2 units to the left and 6 units down. **[1]**

5 Short answers **[8]**

Write short answers to the following questions.

a. Write $y = x^2 + 8x + 10$ in the form $y = (x-h)^2 + k$, and give its vertex. **[2]**

b. Find the mistake. Sita writes: "$y = (x+3)^2 + 1$ is $y = x^2$ moved 3 units to the right and 1 unit up, so its vertex is (3, 1)." What has she done wrong? Write the correct answer. **[2]**

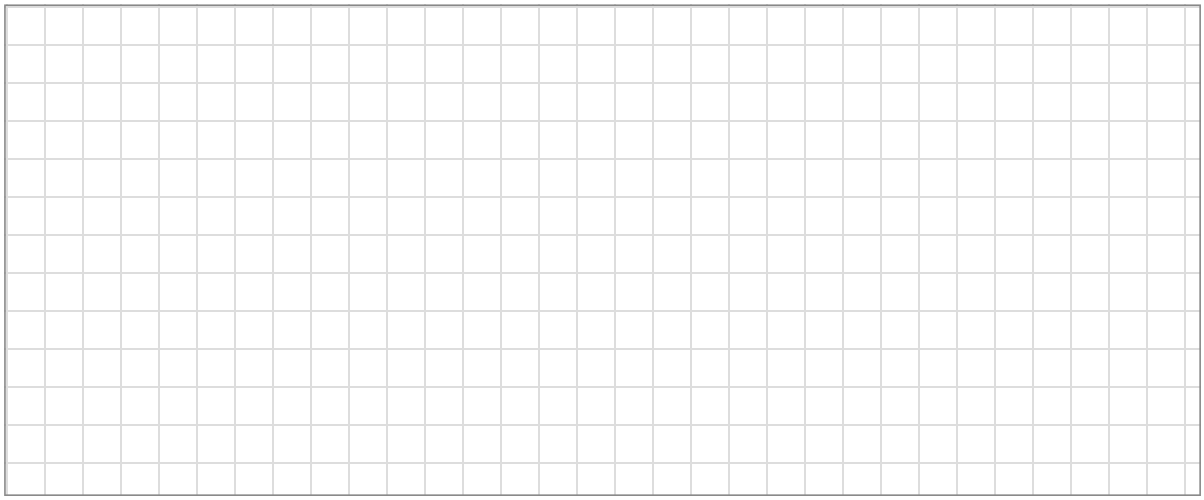
c. Why are the solutions of $ax^2 + bx + c = 0$ the x-coordinates of the points where the graph of $y = ax^2 + bx + c$ meets the X-axis? **[2]**

d. Work backwards. A parabola has its vertex at $(1, -4)$ and passes through $(3, 0)$. Find its equation in the form $y = a(x - h)^2 + k$. **[2]**

6 Long answers **[8]**

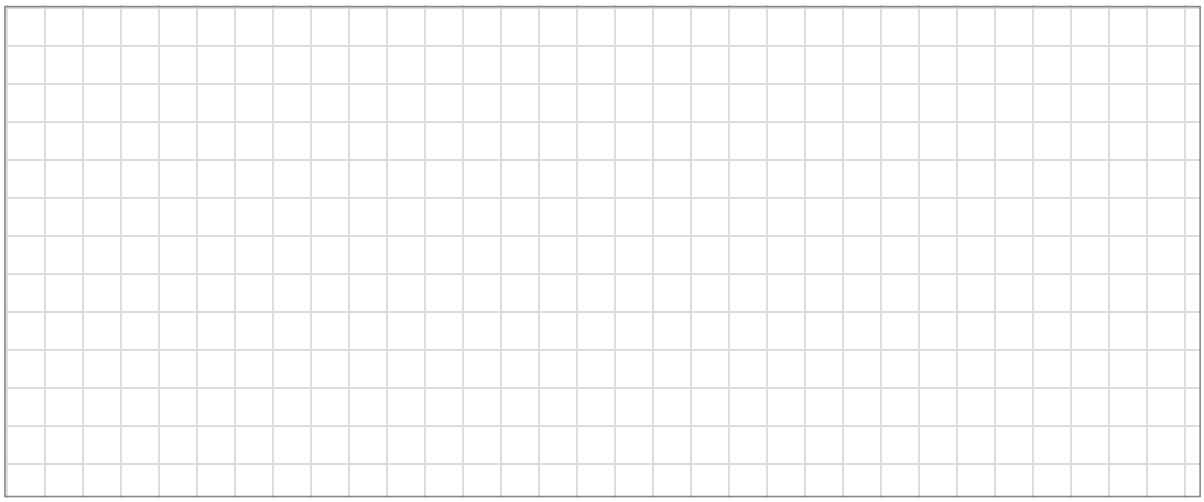
Solve the following problems. Show your working.

a. Convert $y = x^2 - 2x - 8$ into the form $y = (x - h)^2 + k$. Find its vertex, its axis of symmetry and where it cuts the axes, and sketch its graph. **[4]**



Answer:

b. Solve $y = x^2$ and $y = x + 6$ by the graphical method. Check your answer by algebra. **[4]**



Answer:

7 Think [2]

Think, then answer.

A stone is thrown up so that its height is $h = 30t - 5t^2$ meters after t seconds. It is at 25 m twice: after 1 second and after 5 seconds. Without working out anything new, when is it highest? Explain.

8 Activity: A parabola from a table (not marked)

Work with a partner. Fill in the table for $y = x^2 - 4x + 3$, plot the points on graph paper and join them with a smooth curve. Then answer: where is the lowest point, and which points are at the same height?

x	$y = x^2 - 4x + 3$
-1	
0	
1	
2	
3	
4	
5	