Unit 4 · Quadratic Equation

HARDER WORKSHEET

Full marks 25

Name _____ Class _____ Roll no. _____ Date _____ Marks _____ / 25

1 Multiple choice [3]

Choose the correct option for each of the following questions.

i. For which value of c does the parabola $y = x^2 - 6x + c$ just touch the X-axis? [1]

a. 9 **b.** 6

c. 3 **d.** −9

ii. $y = x^2$ is translated so that its vertex goes to $(-2, 5)$. Which point is on the new parabola? [1]

a. $(2, 5)$ **b.** $(0, 5)$

c. $(0, 9)$ **d.** $(-2, 9)$

iii. The line $y = 2x + k$ meets $y = x^2$ at exactly one point. What is k? [1]

a. 1 **b.** 0

c. −2 **d.** −1

2 Short answers [8]

Write short answers to the following questions.

a. Show that. Prove that $y = x^2 - 4x + 7$ is never less than 3, and say for which x it equals 3. [2]

b. Work backwards. A parabola cuts the X-axis at $(-1, 0)$ and $(5, 0)$ and passes through $(1, -16)$. Find its equation and its vertex. [2]

c. Find the mistake. Ramesh converts $y = 3x^2 + 12x + 5$: "$3x^2 + 12x + 36 - 36 + 5 = (3x + 6)^2 - 31$, so the vertex is $(-6, -31)$." Find his mistake and give the right vertex form and vertex. [2]

d. Make your own. Write the equation of a parabola that opens downward, has its vertex at (3, 2) and cuts the X-axis at two points. Give those two points. **[2]**

3 Long answers [12]

Solve the following problems. Show your working.

a. A farmer in Dhading has 40 m of fencing to make a rectangular pen against a long wall, so only three sides need fencing. If the two sides at right angles to the wall are x m each, the area is $A = x(40 - 2x)$ square meters. **[4]**

i. Write A in the form $A = a(x - h)^2 + k$.

ii. What width gives the largest pen, and what is its area?

iii. For which widths is the area 150 m^2?

Answer:

b. For the pair $y = x^2 - 2x$ and $y = x + k$: **[4]**

i. Solve them by the graphical method when $k = 4$.

ii. For which value of k does the line only touch the parabola? Where?

Answer: _____

c. A parabola passes through (0, 1), (1, 0) and (3, 4). **[4]**

i. Find its equation $y = ax^2 + bx + c$.

ii. Write it in vertex form and describe how it is obtained from $y = x^2$.

Answer: _____

4 Think [2]

Think, then answer.

Two parabolas, $y = x^2 - 4x + 5$ and $y = -x^2 + 4x - 3$, are drawn on the same axes. Without drawing them, explain whether they meet, and if so where.