Name:_____ Date:_____

UNIT 9 **LESSON 4**

Do Now:

a. If one root of the equation $x^2 + kx - 15 = 0$ is -3, what is the other root?

$x = -3$

$(-3)^2 + k(-3) - 15 = 0$

$9 - 3k - 15 = 0$

$-6 - 3k = 0$

$+3k \quad +3k$

$\frac{-6}{3} = \frac{3k}{3}$

$-2 = k$

$x^2 + kx - 15 = 0$

$x^2 - 2x - 15 = 0$

$(x - 5)(x + 3) = 0$

$x = 5 \quad | \quad x = -3$

b. Using your calculator, find the axis of symmetry and the turning point of $f(x) = x^2 + 4x - 21$.

$(-2, -25) \rightarrow$ T.P.

$x = -2 \rightarrow$ A.O.S.

AIM: FINDING THE AXIS OF SYMMETRY AND TURNING POINT ALGEBRAICALLY

Other words for turning point: vertex, maximum, minimum, Turning Point

Directions: Find the turning point *algebraically*.

1. $g(x) = x^2 + 4x - 21$

$a = 1$

$b = 4$

$x = \frac{-(4)}{2(1)} = \frac{-4}{2}$

$x = -2$ x-value of T.P.

$g(x) = x^2 + 4x - 21$

$g(-2) = (-2)^2 + 4(-2) - 21$

$g(-2) = -25$ y-value of T.P.

$(-2, -25) \rightarrow$ vertex

Step 1: Identify the a-value & b-value

Step 2: Use the axis of symmetry formula:

$$x = \frac{-b}{2a}$$

Step 3: Plug the x-value into the given equation to find the y-value.

$y = ax^2 + bx + c$

Step 4: Write your answer as coordinates.

Step 5: Check your answer with the table/graph on the calculator

2. Find the vertex *algebraically*. $h(x) = -x^2 - 10x + 24$

$a = -1$ $\quad x = -\frac{(-10)}{2(-1)} = \frac{10}{-2}$

$b = -10$

$\boxed{x = -5}$ → x-value of T.P.

$h(x) = -x^2 - 10x + 24$

$h(-5) = -(-5)^2 - 10(-5) + 24$

$\boxed{h(-5) = 49}$ → y-value of T.P.

$(-5, 49)$ → vertex

Step 1: Identify the a-value & b-value

Step 2: Use the axis of symmetry formula:

$$x = \frac{-b}{2a}$$

Step 3: Plug the x-value into the given equation to find the y-value.

$y = ax^2 + bx + c$

Step 4: Write your answer as coordinates.

Step 5: Check your answer with the table/graph on the calculator

3. Find the minimum point algebraically: $a(x) = x^2 + 6x - 27$

$a = 1$ $\quad x = -\frac{(6)}{2(1)} = \frac{-6}{2}$

$b = 6$

$\boxed{x = -3}$ x-value of T.P.

$a(x) = x^2 + 6x - 27$

$a(-3) = (-3)^2 + 6(-3) - 27$

$\boxed{a(-3) = -36}$ y-value of T.P.

$(-3, -36)$ → vertex

Step 1: Identify the a-value & b-value

Step 2: Use the axis of symmetry formula:

$$x = \frac{-b}{2a}$$

Step 3: Plug the x-value into the given equation to find the y-value.

$y = ax^2 + bx + c$

Step 4: Write your answer as coordinates.

Step 5: Check your answer with the table/graph on the calculator

4. Find the vertex algebraically: $b(x) = x^2 + 8x + 16$

$a=1$ $\quad x = -\frac{(8)}{2(1)} = -\frac{8}{2}$

$b=8$

$x = -4$ → x-value of T.P

$b(x) = x^2 + 8x + 16$

$b(-4) = (-4)^2 + 8(-4) + 16$

$b(-4) = 0$ → y-value of T.P.

$(-4, 0)$ → vertex

Step 1: Identify the a-value & b-value

Step 2: Use the axis of symmetry formula:

$$x = \frac{-b}{2a}$$

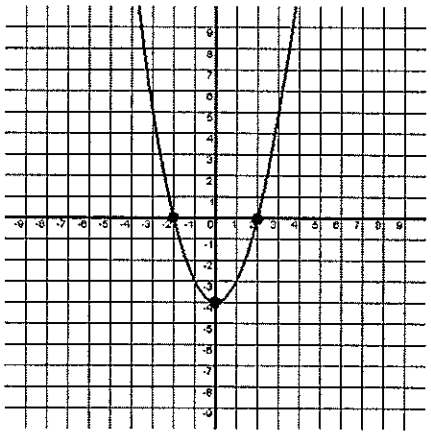
Step 3: Plug the x-value into the given equation to find the y-value.

$y = ax^2 + bx + c$

Step 4: Write your answer as coordinates.

Step 5: Check your answer with the table/graph on the calculator

5) Write the quadratic equation given the graph below.



$x=-2$ | $x=2$

$(x+2)$ | $(x-2)=0$

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

$x^2 - 4 = y$

6) If -1 and 7 are the roots of the quadratic equation $x^2 + kx - 7 = 0$, find the value of k $\quad k = -6$

$x=-1$ | $x=7$

$(x+1)$ | $(x-7)=0$

$x^2 - 7x + 1x - 7 = 0$

$x^2 - 6x - 7 = 0$