HIRSCH

Unit 5 Mid Unit Review – Quadratic Functions

1. **The highest or lowest point of a quadratic function is called the** vertex.
2. **The graph of a quadratic function is in the shape of a** parabola
3. **The point where the graph crosses the y-axis is called the** y-intercept
4. **The x-values of the x-intercepts are called** roots/zeros/solutions
5. **Determine the y-intercept of the following function:** $y = 3x^2 + 5x + 13$ (0, 13)
6. **Use the discriminant to determine the number of solutions for the given equations:** $b^2 - 4ac$

a. $y = 4x^2 + 4x + 1$ $a=4\ b=4\ c=1$

$(4)^2 - 4(4)(1) = \boxed{0}$

1 Real Root

b. $y = 2x^2 + 3x - 10$ $a=2\ b=3\ c=-10$

$(3)^2 - 4(2)(-10) = \boxed{89}$

2 Real Roots

c. $y = 2x^2 - 5x + 10$ $a=2\ b=-5\ c=10$

$(-5)^2 - 4(2)(10) = \boxed{-55}$

0 Real Roots

7. **Find the solutions of the following:** QF

a. $x^2 + 8x + 12 = 0$ $a=1\ b=8\ c=12$

$x = \frac{-8 \pm \sqrt{(8)^2 - 4(1)(12)}}{2(1)}$

$x = \frac{-8 \pm \sqrt{16}}{2}$

$\frac{-8+\sqrt{16}}{2} = (-2)$ $\frac{-8-\sqrt{16}}{2} = (-6)$

b. $x^2 + 4x + 5 = 0$ $a=1\ b=4\ c=5$

$x = \frac{-4 \pm \sqrt{(4)^2 - 4(1)(5)}}{2(1)}$

$x = \frac{-4 \pm \sqrt{-4}}{2}$

NO Real Solutions

c. $2x^2 + 3x + 9 = 0$ $a=2\ b=3\ c=9$

$x = \frac{-3 \pm \sqrt{(3)^2 - 4(2)(9)}}{2(2)}$

$x = \frac{-3 \pm \sqrt{-63}}{4}$

No real solutions

d. $3x^2 + 13x + 12 = 0$ $a=3\ b=13\ c=12$

$x = \frac{-13 \pm \sqrt{(13)^2 - 4(3)(12)}}{2(3)}$

$x = \frac{-13 \pm \sqrt{25}}{6}$

$\frac{-13+\sqrt{25}}{6} = (-1.333)$ $\frac{-13-\sqrt{25}}{6} = (-3)$

8. **Put the following in standard form and find the solutions:**

a. $2x^2 - 5 = 27$

$\frac{2x^2}{2} = \frac{32}{2}$

$x^2 = 16$

$x = \sqrt{16}$

$x = (\pm 4)$

b. $2x^2 - 2x = 12$ $2x^2 - 2x - 12 = 0$ $a=2\ b=-2\ c=-12$

$x = \frac{2 \pm \sqrt{(-2)^2 - 4(2)(-12)}}{2(2)}$

$x = \frac{2 \pm \sqrt{100}}{4}$

$\frac{2+\sqrt{100}}{4} = (3)$

$\frac{2-\sqrt{100}}{4} = (-2)$

9. **Find the vertex and Axis of Symmetry for the following:**

a. $f(x) = x^2 + 10x - 9$ $a=1\ b=10\ c=-9$

$x = \frac{opp\ b}{2a} = \frac{-10}{2(1)} = (-5)$

$y = (-5)^2 + 10(-5) - 9 = (-34)$

vertex $(-5, -34)$

AOS $x = -5$

b. $y = x^2 + 4x - 3$ $a=1\ b=4\ c=-3$

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

$y = (-2)^2 + 4(-2) - 3 = (-7)$

vertex $(-2, -7)$

AOS $x = -2$

c. $y = 2x^2 - 8x + 3$ $a=2\ b=-8\ c=3$

$x = \frac{opp\ b}{2a} = \frac{8}{2(2)} = (2)$

$y = 2(2)^2 - 8(2) + 3 = (-5)$

vertex $(2, -5)$

AOS $x = 2$

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Graph the following and identify the following characteristics:

10. $f(x) = -5 - 4x + x^2$ Standard Form: $x^2 - 4x - 5$ a = 1 b = -4 c = -5

Does it open up or down? UP

y-int: (0, -5)

x-int(s): (-1, 0) & (5, 0)

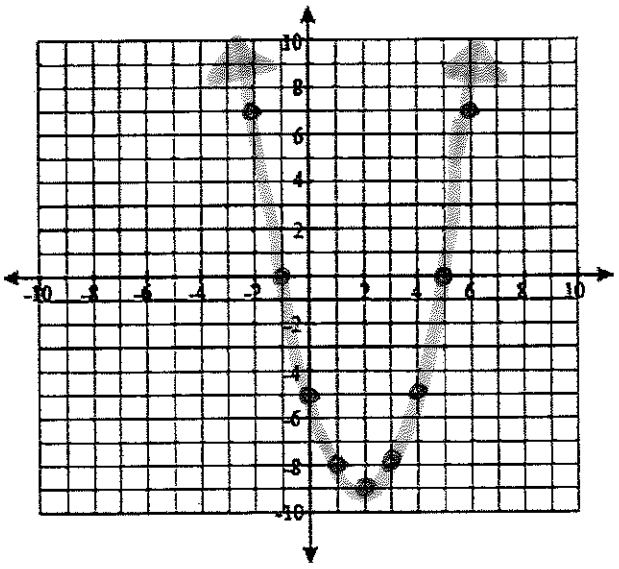
Vertex: (2, -9)

AOS: $x = 2$

Domain: $(-\infty, \infty)$

Range: $[-9, \infty)$

x	y
-1	0
0	-5
1	-8
2	-9
3	-8
4	-5
5	0



Solve the following by factoring or by inspection:

11. $2x^2 - 32 = 0$

$+32 \quad +32$

$\frac{2x^2}{2} = \frac{32}{2}$

$x^2 = 16$

$x = \sqrt{16}$

$x = \pm 4$

12. $3x - 5 = 22$

$+5 \quad +5$

$\frac{3x}{3} = \frac{27}{3}$

$x = 9$

13. $x^2 - 4x - 12 = 0$

$(x-6)(x+2) = 0$

$x - 6 = 0 \quad x + 2 = 0$

$x = 6 \quad x = -2$

Factor the following:

14. $2x - 18$

$\frac{2x}{2} \quad \frac{18}{2}$

$2(x - 9)$

15. $x^2 - 64$

$(x+8)(x-8)$

16. $\frac{5x^2}{x} - \frac{9x}{x}$

$x(5x - 9)$

17. $x^2 - 11x + 24$ 24: $-8, -3$

$(x-8)(x-3)$

18. $x^2 - 14x - 32$ $a \cdot c = -32$: $2, -16$

$(x+2)(x-16)$

19. $x^2 + 8x + 15$ $a \cdot c = 15$: $3, 5$

$(x+3)(x+5)$

20. $2x^2 - 9x - 35$ $a \cdot c = -70$: $5, -14$

$\frac{2x^2}{x} + \frac{5x}{x} - \frac{14x}{-7} - \frac{35}{-7}$

$x(2x+5) - 7(2x+5)$

$(2x+5)(x-7)$

21. $6x^2 - x - 12$ $a \cdot c = -72$: $-9, 8$

$\frac{6x^2}{3x} - \frac{9x}{3x} + \frac{8x}{4} - \frac{12}{4}$

$3x(2x-3) 4(2x-3)$

$(3x+4)(2x-3)$

22. $3x^2 + 13x + 14$ $a \cdot c = 42$: $6, 7$

$\frac{3x^2}{3x} + \frac{6x}{3x} + \frac{7x}{7} + \frac{14}{7}$

$3x(x+2) \; 7(x+2)$

$(3x+7)(x+2)$