Algebra Foundations 2
Chapter 9 Review - C

Name key

1. $y = 3x^2 - 6x - 4$

(a) $a =$ 3 $b =$ -6 $c =$ -4

$X = \frac{-b}{2a} = \frac{-(-6)}{2(3)} = \frac{6}{6} = 1$

(b) Axis of Symmetry: $X = 1$

$3(1)^2 - 6(1) - 4$
$3 - 6 - 4$
-7

(c) Vertex: $(1, -7)$

(d) Fill in the table.

vertex

x	-1	0	1	2	3
y	5	-4	-7	-4	5

(e) Discriminant: $b^2 - 4ac$

$(-6)^2 - 4(3)(-4)$
$36 + 48$
84

(f) Number of Roots: 2 Roots

(g) Let $y = 0$, solve for x by using the Quadratic Formula.

$X = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(3)(-4)}}{2(3)}$

$X = \frac{6 \pm \sqrt{84}}{6}$

$\frac{6 + \sqrt{84}}{6} = 2.53$ $\quad$ $\frac{6 - \sqrt{84}}{6} = -.53$

$Root(s) =$ $X = 2.53$ AND $X = -.53$

2. $y = -2x^2 - 8x + 10$

(a) $a =$ -2 $b =$ -8 $c =$ 10

$X = \frac{-(-8)}{2(-2)} = \frac{8}{-4} = -2$

(b) Axis of Symmetry: $X = -2$

$-2(-2)^2 - 8(-2) + 10$
$-8 + 16 + 10$

(c) Vertex: $(-2, 18)$

(d) Fill in the table.

vertex

x	-4	-3	-2	-1	0
y	10	16	18	16	10

(e) Discriminant: $b^2 - 4ac$

$(-8)^2 - 4(-2)(10)$
$64 + 80$
144

(f) Number of Roots: 2 Roots

(g) Let $y = 0$, solve for x by using the Quadratic Formula

$X = \frac{-(-8) \pm \sqrt{(-8)^2 - 4(-2)(10)}}{2(-2)}$

$X = \frac{8 \pm \sqrt{144}}{-4}$

$X = \frac{8 \pm 12}{-4}$

$\frac{8 + 12}{-4} = \frac{20}{-4} = -5$ $\quad$ $\frac{8 - 12}{-4} = \frac{-4}{-4} = 1$

$Root(s) =$ $X = -5$ AND $X = 1$

Solve the equation or write no solution. Write the solution as integers if possible. NO DECIMAL ANSWERS, SIMPLIFY THE RADICALS.

3. $3x^2 - 16 = 176$

$3X^2 = 192$

$X^2 = 64$

$\sqrt{X^2} = \sqrt{64}$

$X = \pm 8$

Answers = $X = \pm 8$

4. $5x^2 + 45 = 290$

$5X^2 = 245$

$X^2 = 49$

$\sqrt{X^2} = \sqrt{49}$

$X = \pm 7$

Answers = $X = \pm 7$

5. $4x^2 + 12 = 140$

$4X^2 = 128$

$X^2 = 32$

$\sqrt{X^2} = \sqrt{32}$

$X = \pm \sqrt{16} \cdot \sqrt{2}$

$X = \pm 4\sqrt{2}$

Answers = $X = \pm 4\sqrt{2}$

Simplify the radicals. NO DECIMAL ANSWERS.

6. $\sqrt{363} = \sqrt{121} \cdot \sqrt{3}$

$= 11\sqrt{3}$

7. $\sqrt{20x^{64}} = \sqrt{4x^{64}} \cdot \sqrt{5}$

$= 2x^{32}\sqrt{5}$

8. $\sqrt{108x^{26}y^{29}} = \sqrt{36x^{26}y^{28}} \cdot \sqrt{3y}$

$= 6x^{13}y^{14}\sqrt{3y}$

9. $-6\sqrt{27x^{25}y^{19}} = -6\sqrt{9x^{24}y^{18}} \cdot \sqrt{3xy}$

$= -6 \cdot 3x^{12}y^{9} \cdot \sqrt{3xy}$

$= -18x^{12}y^{9}\sqrt{3xy}$

10. $6\sqrt{3} \cdot \sqrt{96} = 6\sqrt{288}$

$= 6 \cdot \sqrt{144}\sqrt{2}$

$= 6 \cdot 12\sqrt{2}$

$= 72\sqrt{2}$

11. $\sqrt{\frac{441}{1089}} = \frac{\sqrt{441}}{\sqrt{\ }} = \frac{21}{33} = \frac{7}{11}$

12. $\sqrt{\frac{80}{196}} = \frac{\sqrt{80}}{\sqrt{196}} = \frac{\sqrt{16} \cdot \sqrt{5}}{14}$

$= \frac{4\sqrt{5}}{14}$

$= \frac{2\sqrt{5}}{7}$

13. $-8\sqrt{\frac{128}{36}} = -8\frac{\sqrt{128}}{\sqrt{36}} = -8\frac{\sqrt{64} \cdot \sqrt{2}}{6}$

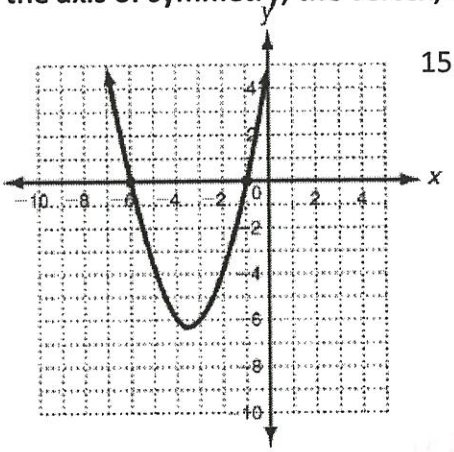
$= -8 \cdot \frac{8 \cdot \sqrt{2}}{6}$

$= -\frac{64\sqrt{2}}{6}$

$= -\frac{32\sqrt{2}}{3}$

Find the axis of symmetry, the vertex, and the roots of each graph.

14.



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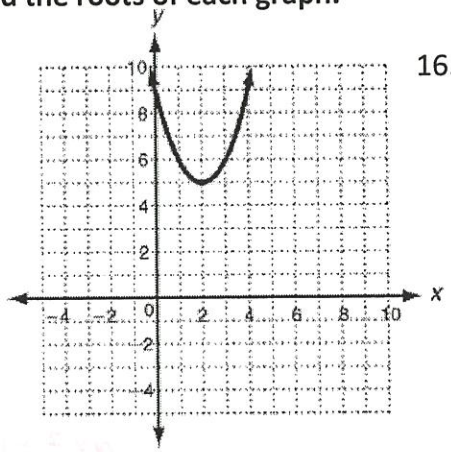

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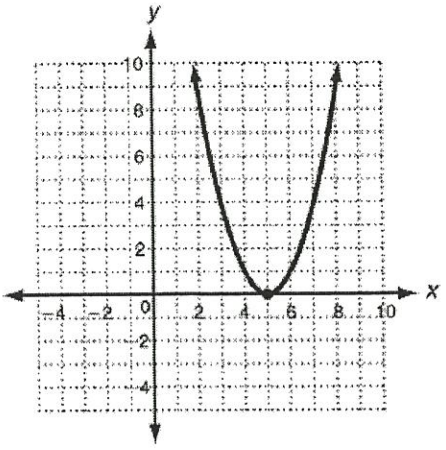

Axis of symmetry: $x = -3.5$ Axis of symmetry: $x = 2$ Axis of symmetry: $x = 5$

Vertex: $(-3.5, -6)$ Vertex: $(2, 5)$ Vertex: $(5, 0)$

Roots: $x = -6$ AND $x = -1$ Roots: NONE Roots: $x = 5$

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17. The height of a dolphin as it jumps out of the water at an aquarium can be modeled by $h(t) = -16t^2 + 32t$, where t is the time in seconds and h is the height in feet.

a.) What is initial height of the dolphin and explain why?

0 FT

b.) How long did it take for the dolphin to reach its maximum height?

$x = -\frac{b}{2a} = \frac{-32}{2(-16)} = \frac{-32}{-32} =$ 1 SECOND

c.) What was the highest point that the dolphin reached?

$-16(1)^2 + 32(1)$

$= -16 + 32$

$=$ 16 FEET

d.) How long did it take for the dolphin to complete its jump?

$0 = -16t^2 + 32t$

$x = \frac{-32 \pm \sqrt{(32)^2 - 4(-16)(0)}}{2(-16)}$

$x = \frac{-32 \pm \sqrt{1024}}{-32}$

$x = \frac{-32 \pm 32}{-32}$

$\frac{-32 + 32}{-32} = \frac{0}{-32} \neq 0$

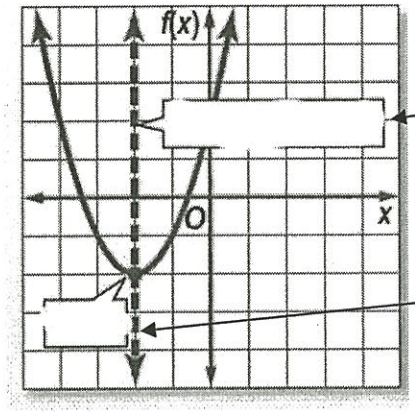
$\frac{-32 - 32}{-32} = \frac{-64}{-32} =$ 2 SECONDS

Fill in each blank using the word bank.

vertex	minimum	axis of symmetry	x-intercepts
parabola	maximum	zeros/roots	$ax^2 + bx + c$

18. Standard form of a quadratic function is y = $ax^2 + bx + c$

19. The shape of a quadratic equation is called a PARABOLA



3. AXIS OF SYMMETRY

4. VERTEX

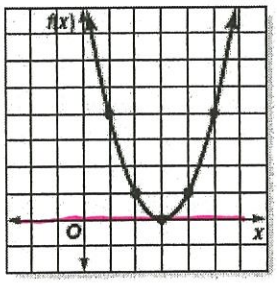
20. When the vertex is the highest point on the graph, we call that a MAXIMUM.

21. When the vertex is the lowest point on the graph, we call that a MINIMUM.

22. Our solutions are the ZEROS/ROOTS.

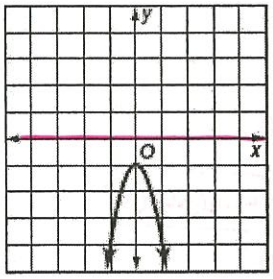
23. Solutions to quadratic equations are called X-INTERCEPTS.

Determine whether the quadratic functions have two real roots, one real root, or no real roots. If possible, list the zeros of the function.



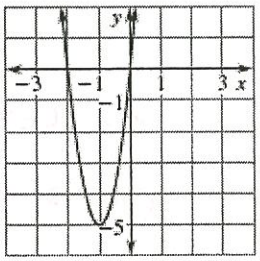
24. Number of roots: 1

Zero(s): X = 3



25. Number of roots: 0

Zero(s): —



26. Number of roots: 2

Zero(s): X = −2 AND X = 0