Name ___Key___

Class period   1   2   3   4   5

For problem 1, graph the absolute value function and identify the following features.

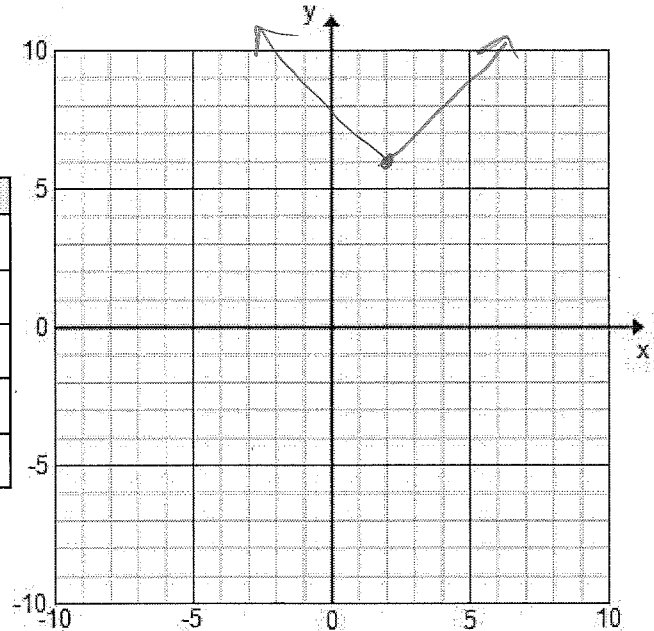1. $y = |x - 2| + 6$

Opens UP / DOWN (Circle one)

Vertex: ___(2, 6)___

Axis of symmetry: ___$x = 2$___

Domain: ___$\mathbb{R}$___

Range: ___$y \geq 6$___

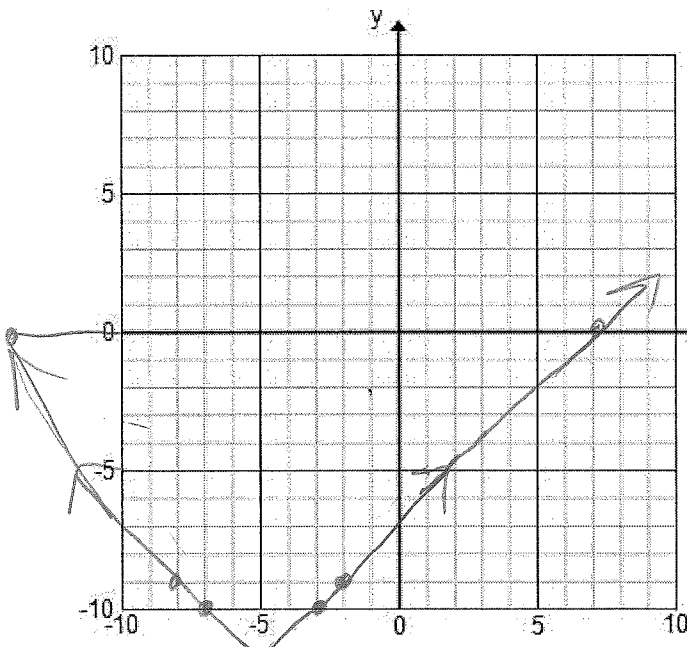| x	y
0	8
1	7
2	6
3	7
4	8

Solve the following equation graphically and algebraically.

2. $|x + 5| = 12$

$|x + 5| - 12 = 0$

Graphical Solutions

x	y
-8	-9
-7	-10
-6	-11
-5	-12
-4	-11
-3	-10
-2	-9

Solution(s): ___$x = -17$, $x = 7$___

Algebraic Solutions

$|x + 5| = 12$

$x + 5 = 12$ $x + 5 = -12$
$-5 \quad -5$ $-5 \quad -5$

$x = 7$ $x = -17$

Solution(s): ___$x = 7$, $x = -17$___

Problems 3 and 4, solve algebraically.

3. $6|x + 5| = 36$

$$\frac{6}{6} \quad \frac{6}{6}$$

$|x+5| = 6$

$x + 5 = 6 \qquad x + 5 = -6$
$-5 \quad -5 \qquad -5 \quad -5$

$x = 1 \qquad\qquad x = -11$

$6|1+5| = 6|6| = 36 ✓ \qquad 6|-11+5| = 6|-6| = 36 ✓$

Solution(s): $x = 1, \ x = -11$

4. $-|x - 8| = -4$

$$\frac{}{-1} \quad \frac{}{-1}$$

$|x-8| = 4$

$x - 8 = 4 \qquad x - 8 = -4$
$+8 \ +8 \qquad +8 \ +8$

$x = 12 \qquad\qquad x = 4$

$-|12-8| = -|4| = -4 ✓ \qquad -|4-8| = -|-4| = -4 ✓$

Solution(s): $x = 12, \ x = 4$

Problems 5-8: Solve by using Square Roots. You must show your work to receive full credit

5. $x^2 - 4 = 32$

$\quad +4 \quad +4$

$\sqrt{x^2} = \sqrt{36}$

$|x| = 6$

Solution(s): $x = \pm 6$

6. $(x + 2)^2 - 2 = 6$

$\qquad +2 \ +2$

$\sqrt{(x+2)^2} = \sqrt{8}$

$|x+2| = 2\sqrt{2}$

$x + 2 = 2\sqrt{2} \qquad x + 2 = -2\sqrt{2}$
$-2 \ -2 \qquad\qquad -2 \ -2$

$x = -2 + 2\sqrt{2} \qquad x = -2 - 2\sqrt{2}$

Solution(s): $x = -2 \pm 2\sqrt{2}$

7. $3x^2 + 5 = -13$

$\quad -5 \quad -5$

$$\frac{3x^2}{3} = \frac{-18}{3}$$

$\sqrt{x^2} = \sqrt{-6} = \sqrt{-1} \cdot \sqrt{6}$

$|x| = i\sqrt{6}$

Solution(s): $x = \pm i\sqrt{6}$

8. $3(x - 6)^2 - 4 = -13$

$\qquad +4 \qquad +4$

$$\frac{3(x-6)^2}{3} = \frac{-9}{3}$$

$\sqrt{(x-6)^2} = \sqrt{-3} = \sqrt{-1} \cdot \sqrt{3}$

$|x-6| = i\sqrt{3}$

$x - 6 = i\sqrt{3} \qquad x - 6 = -i\sqrt{3}$
$+6 \ +6 \qquad\qquad +6 \ +6$

$x = 6 + i\sqrt{3} \qquad x = 6 - i\sqrt{3}$

Solution(s): $x = 6 \pm i\sqrt{3}$

Pick ONE equation for EACH method. You cannot use the same equation twice. Solve the equation for x.

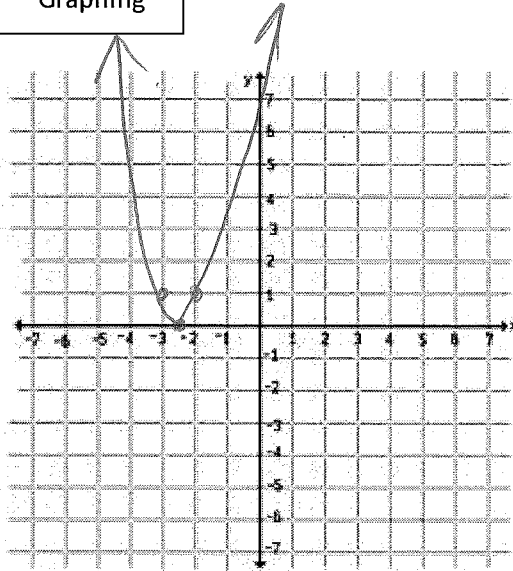9. $x^2 + 6x - 16 = 0$ 10. $4x^2 + 20x + 25 = 0$ 11. $(x-9)^2 = 4$ 12. $x^2 + 2x + 15 = 0$

disc: 100   disc: 0   disc: -56

	Graphing		Factoring	

Graphing

\# 10

x	y
-4	9
-3	1
-2.5	0
-2	1
-1	9

Solution(s): $x = -2.5$ or $-\frac{5}{2}$

Factoring

\# 9

$x^2 + 6x - 16 = 0$

$(x-2)(x+8) = 0$

Factors of 16
-1, 16
(-2, 8)
-4, 4

$x - 2 = 0$ $x + 8 = 0$
$+2 \quad +2$ $-8 \quad -8$

$x = 2$ $x = -8$

Solution(s): $x = 2, x = -8$

Quadratic Formula

\# 12

$a = 1 \quad b = 2 \quad c = 15$

$x = \dfrac{-(2) \pm \sqrt{-56}}{2(1)} = \sqrt{-1} \cdot \sqrt{4} \cdot \sqrt{14}$

$= \dfrac{-2 \pm 2i\sqrt{14}}{2}$

$= -1 \pm i\sqrt{14}$

Solution(s): $x = -1 \pm i\sqrt{14}$

Square Roots

\# 11

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

$|x - 9| = 2$

$x - 9 = 2$ $x - 9 = -2$
$+9 \quad +9$ $+9 \quad +9$

$x = 11$ $x = 7$

Solution(s): $x = 11, x = 7$

Pick ONE equation for EACH method. You cannot use the same equation twice. Solve the equation for x.

13. $x^2 + 16x - 9 = 0$ 14. $2x^2 + 30x = 0$ 15. $\frac{1}{3}(x+2)^2 = 5$ 16. $x^2 + x - 6 = 0$
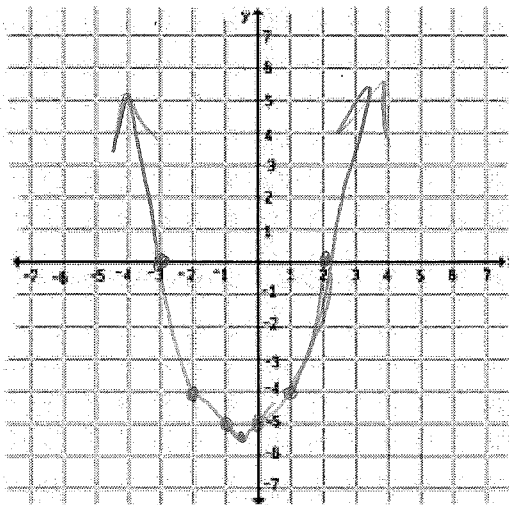
disc: 292   disc: 900   disc: 25

Graphing

__16__

x	y
-3	6
-2	-4
-1	-6
-.5	-6.25
0	-6
1	-4
2	0

Solution(s): ___$X = -3, X = 2$___

Factoring

__14__

$2x^2 + 30x = 0$

$2x(x+15) = 0$

$\frac{2x}{2} = \frac{0}{2}$ $x + 15 = 0$
 $-15 \; -15$
$X = 0$ $x = -15$

Solution(s): ___$X = 0 \quad X = -15$___

Quadratic Formula

__13__

$a = 1 \quad b = 16 \quad c = -9$

$x = \dfrac{-(16) \pm \sqrt{292}}{2(1)} = \sqrt{4} \cdot \sqrt{73}$

$= \dfrac{-16 \pm 2\sqrt{73}}{2}$

$= -8 \pm \sqrt{73}$

Solution(s): ___$X = -8 \pm \sqrt{73}$___

Square Roots

__15__

$\dfrac{\frac{1}{3}(x+2)^2}{\frac{1}{3}} = \dfrac{5}{\frac{1}{3}}$

$\sqrt{(x+2)^2} = \sqrt{15}$

$|x+2| = \sqrt{15}$

$x + 2 = \sqrt{15}$ $x + 2 = -\sqrt{15}$
$-2 -2$ $-2 -2$
$x = -2\sqrt{15}$ $x = -2 - \sqrt{15}$

Solution(s): ___$X = -2 \pm \sqrt{15}$___

17. An apple drops from the top of a tree that is 32 feet tall. The falling object is modeled by, $h(t) = -16t^2 + s$, where h(t) represents the height of the apple after t seconds, and s is the height of the tree. After how many seconds does the apple hit the ground? Use any method to solve. Round your answer to nearest tenth of a second.

square roots

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

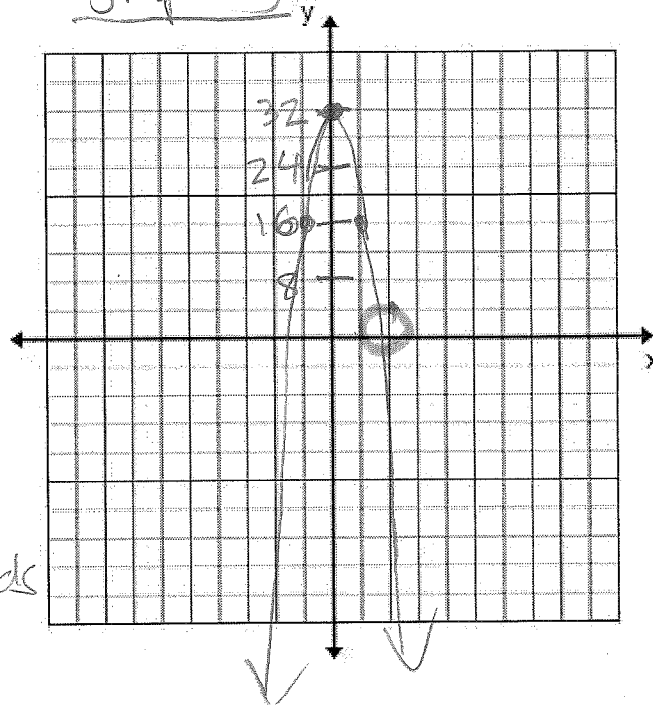$$\frac{-16t^2}{-16} = \frac{-32}{-16}$$

$$\sqrt{t^2} = \sqrt{2}$$

$$|t| = \sqrt{2}$$

$$t = -\sqrt{2} \qquad t = \sqrt{2}$$

graphing

X	Y
-2	-32
-1	16
0	32
1	16
2	-3:

Solution(s): $\underline{\quad t = \sqrt{2} \approx 1.4 \ seconds}$