Name _____ Period _____

5.2O *Solving Quadratic Equations – Choosing the Best Method: Part II*

#1 – 5: Four equations and one situation are given. Solve one by the *square root property*, one by *factoring*, one by *completing the square*, one using the *quadratic formula*, and one by *graphing*. Express your answers in simplest radical form. ***Verify your answer***

1. $2x^2 = -7x + 15$ **2.** $x^2 - 2x - 15 = 0$ **3.** $x^2 + 12x = 20$ **4.** $(x-3)^2 = 8$

5. A group of friends hiked to Havasupai Point in Grand Canyon National Park. The Colorado River was 4755 feet below them. A rock was thrown upward at an initial velocity of 24 feet per second. The rock's height t seconds after it was thrown upward is given by the function $h(t) = -16t^2 + 24t + 4755$. How long did it take for the rock to hit the river?

Solve by: **Square Root Property**

#4 equation: $\sqrt{(x-3)^2} = \sqrt{8}$

Solve:
$|x-3| = 2\sqrt{2}$
$x - 3 = \pm 2\sqrt{2}$
$x = 3 \pm 2\sqrt{2}$

Solution(s): $x = 3 \pm 2\sqrt{2}$

✓ Verify that your answer(s) are solution(s)

$((3+2\sqrt{2})-3)^2 = 8$ $((3-2\sqrt{2})-3)^2 = 8$
$(2\sqrt{2})^2 = 8$ $(-2\sqrt{2})^2 = 8$
$8 = 8$ ✓ $8 = 8$ ✓

Solve by: **Factoring**

#2 equation: $x^2 - 2x - 15 = 0$

Solve:
$(x-5)(x+3) = 0$
$x = 5$ or $x = -3$

Solution(s): $x = 5$ or $x = -3$

✓ Verify that your answer(s) are solution(s)

$(5)^2 - 2(5) - 15 = 0$ $(-3)^2 - 2(-3) - 15 = 0$
$25 - 10 - 15 = 0$ $9 + 6 - 15 = 0$
$0 = 0$ ✓ $0 = 0$ ✓

Solve by: **Completing the Square**

#3 equation: $x^2 + 12x = 20$

Solve:
$x^2 + 12x + 36 = 20 + 36$
$\sqrt{(x+6)^2} = \sqrt{56}$
$|x+6| = 2\sqrt{14}$
$x = -6 \pm 2\sqrt{14}$

Solution(s): $x = -6 \pm 2\sqrt{14}$

✓ Verify that your answer(s) are solution(s)

$(-6+2\sqrt{14})^2 + 12(-6+2\sqrt{14}) = 20$
$36 - 24\sqrt{14} + 56$
$92 - 24\sqrt{14} - 72 + 24\sqrt{14}$
$20 = 20$ ✓

$(-6-2\sqrt{14})^2 + 12(-6-2\sqrt{14}) = 20$
$(36 + 24\sqrt{14} + 56)$
$92 + 24\sqrt{14} - 72 - 24\sqrt{14}$
$20 = 20$ ✓

Solve by: **Using the Quadratic Formula**

#1 equation: $2x^2 + 7x - 15 = 0$

Solve:
$a = 2 \quad b = 7 \quad c = -15$
$x = \frac{-7 \pm \sqrt{7^2 - 4(2)(-15)}}{2(2)}$
$x = \frac{-7 \pm \sqrt{169}}{4}$
$x = \frac{-7+13}{4}$ or $x = \frac{-7-13}{4}$

Solution(s): $x = \frac{3}{2}$ or $x = -5$

✓ Verify that your answer(s) are solution(s)

$2\left(\frac{3}{2}\right)^2 + 7\left(\frac{3}{2}\right) - 15 = 0$
$2\left(\frac{9}{4}\right)$
$\frac{9}{2} + \frac{21}{2} - 15 = 0$
$0 = 0$ ✓

$2(-5)^2 + 7(-5) - 15 = 0$
$50 - 35 - 15 = 0$
$0 = 0$ ✓

Name _____ Period _____

5.2O *Solving Quadratic Equations – Choosing the Best Method: Part II*

#1 – 5 (continued): Four equations and one situation are given. Solve one by the *square root property*, one by *factoring*, one by *completing the square*, one using the *quadratic formula*, and one by *graphing*. Express your answers in simplest radical form. ***Verify your answer***

Solve by: **Graphing**

#5 equation: $h(t) = -16t^2 + 24t + 4755$

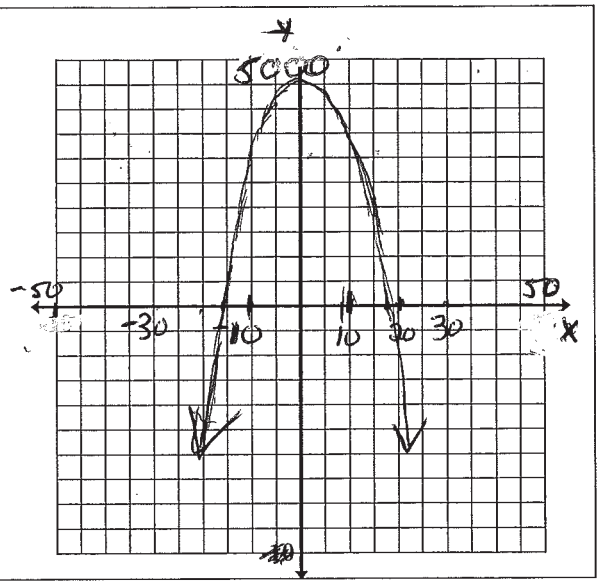
Solution(s): $t = 18.005$ seconds

✓ Verify that your answer(s) are solution(s)

$h(18.005) = -16(18.005)^2 + 24(18.005) + 4755$

$0 \approx 0.2396$ ✗

very close, but not exact.



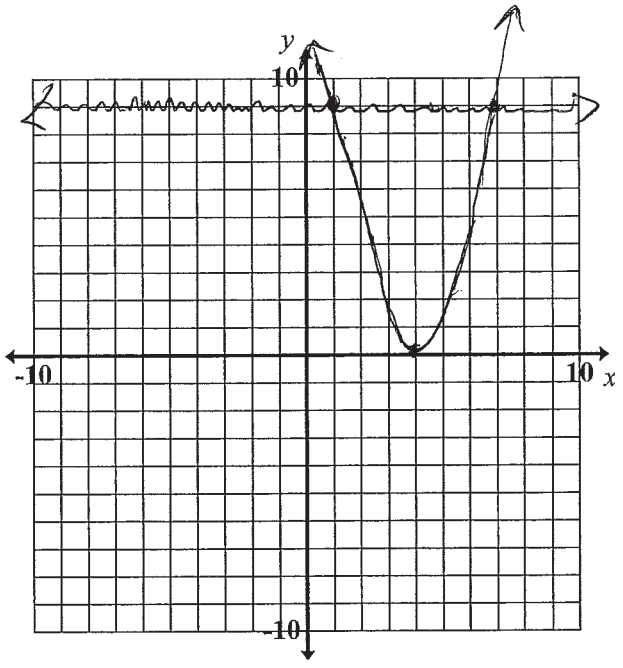
6. a) Solve $\sqrt{(x-4)^2} = \sqrt{9}$

$|x-4| = 3$

$x = 4 \pm 3$

$x = 7$ or $x = 1$

b) Sketch the graphs of $y = (x-4)^2$ and $y = 9$.



c) Describe the connection between the solution in part **a)** and the graph in part **b)**.

The intersection points of the 2 graphs in part (b) are the solutions for x in part (a).

Name _____ Period _____

5.2O Solving Quadratic Equations – Choosing the Best Method: Part II

7. A hose used by the fire department shoots water out in a parabolic arc. Let x be the horizontal distance from the hose's nozzle, and y be the corresponding height of the stream of water, both in feet. The quadratic function is $y = -0.016x^2 + 0.5x + 4.5$.

a) Explain the meaning in the context of the situation of the 4.5 that appears in the equation.

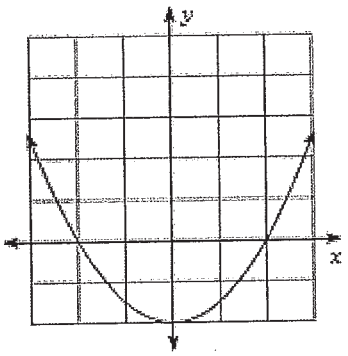
The 4.5 feet is how far the hose's nozzle is above the ground where the water begins to shoot out.

b) What is the horizontal distance from the nozzle to where the stream hits the ground?

38.55 feet

c) Will the stream go over a 6-foot high fence that is located 28 feet from the nozzle? Explain your reasoning. No, At 27.89 ft from the nozzle, the stream would hit the top of the 6-foot fence. However, at the 28 ft distance, the water height is lower, reaching only 5.96 feet high.

8. The graph of $y = x^2 - 400$ is shown at right. Notice that no coordinates appear in the diagram. Without using your graphing calculator, figure out the actual window that was used for this graph. Find the high and low values for both the x- and y-axis. After you get your answer check it on your calculator.



Xmin: -30 Xmax: 30

Ymin: -400 Ymax: 1000

Section 5.2O

Name _____ Period _____

5.2O Solving Quadratic Equations – Choosing the Best Method: Part II

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