Name: Key

Date:____________Period:______

CP Unit 7 Study Guide: Quadratics, Part 1

For questions 1-6, answer the following questions with an A for always, S for sometimes, or an N for never. Explain your answer.

______1. A quadratic function can be solved by factoring.

______2. A quadratic function can be solved using the quadratic formula.

______3. Solving a quadratic function is the same thing as finding its x-intercepts.

______4. Vertex form of a quadratic function is $y = a(x - h)^2 - k$

______5. If a < 0, the parabola will open up.

______6. The axis of symmetry of a quadratic function is the same as the x-coordinate of the vertex.

Identify the vertex. State whether the parabola is opening up or down.

7. $y = -4(x + 8)^2 - 10$

   vertex: (-8, -10)

   up or down: down

8. $y = \frac{1}{7}(x - 6)^2 + 12$

   vertex: (6, 12)

   up or down: up

Identify the y-intercept. State whether the parabola is opening up or down.

9. $y = 7x^2 - 6x + 14$

   y-intercept: 14

   up or down: up

10. $y = -12x^2 + 7x - 19$

   y-intercept: -19

   up or down: down

Identify the zeros. State whether the parabola is opening up or down.

11. $y = -2(x + 0)(x - 12)$

   zeros: x = 0, 12

   up or down: down

12. $y = -5(x - 4)(x + 1)$

   zeros: (4, 0)(-1, 0)

   up or down: down

Solve by factoring.

13. $x^2 + 11x + 30 = 0$

30, 5, 6, 11
$\frac{5}{1}$ $\frac{6}{1}$

$(x+5)(x+6)=0$

$x+5=0$ $x+6=0$
$-5 \;\; -5$ $-6 \;\; -6$
$x=-5$ $x=-6$

$x=-5,-6$

14. $3x^2 + 11x = -6$
$+6 \;\; +6$

$3x^2+11x+6$

18, $3 = \frac{9}{3}$, $\frac{2}{3}$, 11

$(x+3)(x+\frac{2}{3})=0$

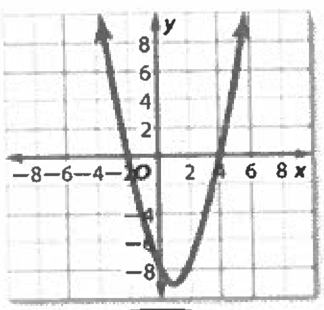
$(x+3)(3x+2)=0$

$x+3=0$ $3x+2=0$
$-3 \;\; -3$ $-2 \;\; -2$
$x=-3$ $\frac{3x}{3}=\frac{-2}{3}$

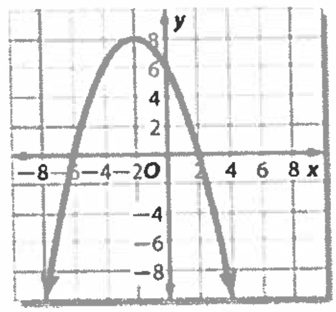
$x=-\frac{2}{3}$

$x=-3,-\frac{2}{3}$

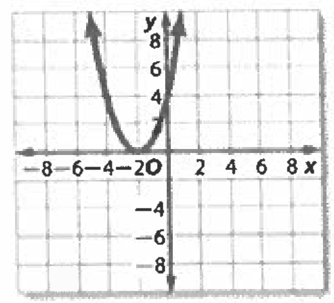
Determine the roots.



15. $x=-2,4$



16. $x=-6,2$



17. $x=-2$

Solve by taking the square root.

18. $2x^2 - 128 = 0$
$+128 \;\; +128$

$\frac{2x^2}{2}=\frac{128}{2}$

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

$x=\pm 8$

Solve using the quadratic formula.

19. $x^2 + 6x = -15$
$+15 \;\; +15$

$x^2+6x+15=0$

$a=1 \quad b=6 \quad c=15$

$$x=\frac{-6\pm\sqrt{6^2-4(1)(15)}}{2(1)}=\frac{-6\pm\sqrt{36-60}}{2}=\frac{-6\pm\sqrt{-24}}{2}=\frac{-6\pm\sqrt{24}\,i}{2}=\frac{-6\pm 2\sqrt{6}\,i}{2}$$

$\sqrt{24}\,i=\sqrt{2\cdot2\cdot2\cdot3}\,i=2\sqrt{6}\,i$

24
4 6
2 2 2 3

$x=-3\pm\sqrt{6}\,i$

Solve by completing the square.

20. $x^2 + 6x - 12 = 0$ $(\frac{6}{2})^2=9$

$x^2+6x+9-9-12=0$

$(x+3)^2-21=0$
$+21 \;\; +21$

$\sqrt{(x+3)^2}=\sqrt{21}$

$x+3=\pm\sqrt{21}$

$x=-3\pm\sqrt{21}$

Solve using any method you choose. Explain why you chose the method you chose.

21. $x^2 - 36 = 0$

$+36 \quad +36$

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

$x = \pm 6$

22. $3x^2 - 5x + 8 = 0$

$a=3 \quad b=-5 \quad c=8$

$x = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(3)(8)}}{2(3)} = \frac{5 \pm \sqrt{25-96}}{6}$

$x = \frac{5 \pm \sqrt{-71}}{6} = \frac{5 \pm \sqrt{71}\, i}{6}$

23. Give an example of a quadratic function with a vertex of (-5, 8).

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

24. Alonso and Aida are solving $x^2 + 8x - 20 = 0$ by completing the square. Is either of them correct? Explain.

Alonso	Aida X
$x^2 + 8x - 20 = 0$	$x^2 + 8x - 20 = 0$
$x^2 + 8x = 20$	$x^2 + 8x = 20$
$x^2 + 8x + 16 = 20 + 16$	$x^2 + 8x + 16 = 20$
$(x+4)^2 = 36$	$(x+4)^2 = 20$
$x + 4 = \pm 6$	$x + 4 = \pm\sqrt{20}$
$x = -4 \pm 6$	$x = -4 \pm \sqrt{20}$

25. Write the equation of a quadratic function with vertex (-1, -25) that goes through the point (-3, -21). Write the function in vertex, factored, and standard form.

$y = a(x+1)^2 - 25$

$-21 = a(-3+1)^2 \cancel{-25}$

$+25 \qquad \cancel{+25}$

$4 = a(-2)^2$

$\frac{4}{4} = \frac{4a}{4}$

$1 = a$

$y = 1(x+1)^2 - 25$ vertex

$y = x^2 + 2x + 1 - 25$

$y = x^2 + 2x - 24$ standard

-24, -4, 6, 2

$y = (x-4)(x+6)$ factored

26. Describe three different ways to solve $x^2 - x - 20 = 0$. Which method do you prefer and why? Solve using that method.

-20
-5 4
-1

$(x-5)(x+4)=0$

$x-5=0$ $\quad$ $x+4=0$

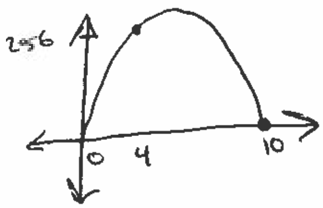
$+5\ +5$ $\quad$ $-4\ -4$

$x=5$ $\quad$ $x=-4$

$x=-4, 5$

Factoring, Quadratic Formula, Completing the square, Graphing

27. One of the competitors in a Punkin Chunkin contest launches a pumpkin from the ground. After 4 seconds, it is 256 feet high. The pumpkin lands after 10 seconds. What is the maximum height of the pumpkin? What are the appropriate domain and range for this situation?



$y = a(x-0)(x-10)$

$256 = a(4-0)(4-10)$

$256 = a(4)(-6)$

$\frac{256}{-24} = \frac{-24a}{-24}$

$-\frac{32}{3} = a$

$y = -\frac{32}{3}(x-0)(x-10)$

$x = \frac{-b}{2a}$ $\quad$ $y = -\frac{32}{3}x^2 + \frac{320}{3}x$

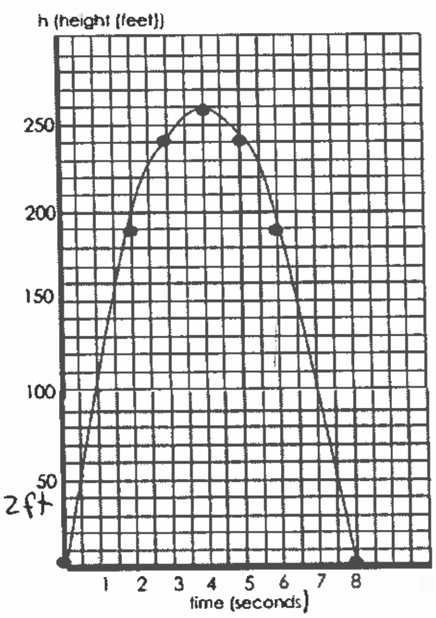
$x = \frac{-320/3}{2(-32/3)} = 5$

or $\frac{0+10}{2} = 5$

$y = -\frac{32}{3}(5-0)(5-10) = 266.67\text{ft}$

D: [0,10]
R: [0, 266.67]

28. The graph at the right shows the height h in feet of a small rocket t seconds after it is launched. The path of the rocket is given by the equation: $h(t) = -16t^2 + 128t$.



A. How long is the rocket in the air?

8 seconds

B. What is the greatest height the rocket reaches?

$-16(4)^2 + 128(4) = 256\text{ft}$

C. About how high is the rocket after 1 second? Is the rocket going up or going down?

$-16(1)^2 + 128(1) = 112\text{ft}$

about 110ft going up

D. After 6 seconds, about how high is the rocket? Is the rocket going up or going down?

$-16(6)^2 + 128(6) = 192\text{ft}$

about 190ft going down

F. Do you think the rocket is traveling faster from 0 to 1 second or from 3 to 4 seconds? Explain your answer.

0-1 seconds because the slope is steeper from 0-1 compared to 3-4 seconds.