Chapter Five Review

Name KEY Period

1. Solving the quadratic equation by using any method: $3x^2 + 8x - 3 = 0$. "b"

Factor

$(3x - 1)(x + 3) = 0$

$3x - 1 = 0$ $\quad +1 \quad +1$

$\frac{3x}{3} = \frac{1}{3}$

$x = \frac{1}{3}$

$x + 3 = 0$ $\quad -3 \quad -3$

$x = -3$

1. $x = \frac{1}{3}$ $\quad x = -3$

2. Solving the quadratic equation by using any method: $-4x^2 = 35$ "no b"

Sq. Roots

$\frac{-4x^2}{-4} = \frac{35}{-4}$

$\sqrt{x^2} = \sqrt{-\frac{35}{4}}$

$x = \pm i\frac{\sqrt{35}}{\sqrt{4}}$

$\sqrt{35} = \sqrt{5} \cdot \sqrt{7}$

$x = \pm i\frac{\sqrt{35}}{2}$

2. $x = \frac{i\sqrt{35}}{2} \approx 2.96i$ $\quad x = -\frac{i\sqrt{35}}{2} \approx -2.96i$

3. Solving the quadratic equation by using any method: $4(x - 2)^2 = -8$ "no b"

Sq. Roots

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

Isolate the Variable

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

$x - 2 = \pm i\sqrt{2}$

$+2 \quad +2$

$x = 2 \pm i\sqrt{2}$

3. $x = 2 + i\sqrt{2}$ $\quad x = 2 - i\sqrt{2}$

4. Solving the quadratic equation by using any method: $x^2 + 2x - 2 = 0$ "b"

Factor... doesn't factor

$(x \quad 2)(x \quad 1) = 0$

Complete the Square

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

$+2 \quad +2$

$x^2 + 2x + \boxed{1} = 2 + \boxed{1}$

$\sqrt{(x+1)^2} = \sqrt{3}$

$x + 1 = \pm\sqrt{3}$

$-1 \quad -1$

$x = -1 \pm \sqrt{3}$

OR Quadratic Formula

$a = 1$

$b = 2$

$c = -2$

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

$= \frac{-2 \pm \sqrt{4 + 8}}{2}$

$= \frac{-2 \pm \sqrt{12}}{2} = \frac{-2 \pm 2\sqrt{3}}{2} = -1 \pm \sqrt{3}$

4. $x = -1 + \sqrt{3} \approx .73$ $\quad x = -1 - \sqrt{3} \approx -2.73$

5. Solving the quadratic equation by using any method: $3x^2 - 14x = -49$ "b"

Quad. Formula

$3x^2 - 14x + 49 = 0$

$a = 3$

$b = -14$

$c = 49$

$x = \frac{-(-14) \pm \sqrt{(-14)^2 - (4)(3)(49)}}{2(3)}$

$= \frac{14 \pm \sqrt{196 - 588}}{6}$

$\frac{14 \pm \sqrt{-392}}{6}$

$\frac{14 \pm 14i\sqrt{2}}{6_3} = \frac{7 \pm 7i\sqrt{2}}{3}$

$\sqrt{392} = \sqrt{4} \cdot \sqrt{98} = \sqrt{4} \cdot \sqrt{2} \cdot \sqrt{49} = 2 \cdot \sqrt{2} \cdot 7 = 14\sqrt{2}$

5. $x = \frac{7 + 7i\sqrt{2}}{3}$ $\quad x = \frac{7 - 7i\sqrt{2}}{3}$

6. Solving the quadratic equation by using any method: $(x-2)^2 + 64 = 0$ "no b"

6. $x = 2+8i$ $x = 2-8i$

Sq. Roots

$\sqrt{(x-2)^2} = \sqrt{-64}$

$x - 2 = \pm 8i$

$+2 \quad +2$

$x = 2 \pm 8i$

7. Write the following expression as a complex number in standard form: $(7 + 2i) - (3 + 3i)$

7. $4 - i$

$(7+2i) + (-3-3i)$

$4 - i$

8. Write the following expression as a complex number in standard form: $(5 + 3i)(2 - 4i)$

8. $22 - 14i$

$10 - 20i + 6i - 12i^2$

$10 - 14i - 12(-1)$

$10 - 14i + 12$

$22 - 14i$

9. Write the following expression as a complex number in standard form: $\dfrac{3-i}{2+i}$

9. $1 - i$

$\dfrac{(2-i)}{(2-i)}$

$\dfrac{6 - 3i - 2i + i^2}{4 - 2i + 2i - i^2} = \dfrac{6 - 5i + (-1)}{4 - (-1)} = \dfrac{5 - 5i}{5} = \dfrac{1-i}{1} = 1 - i$

$i^2 = -1$ $\quad -i^2 = -(-1)$

Not Solve!!!

10. Factor the following expression completely: $10x^2 - 3x - 1$

10. $(5x+1)(2x-1)$

Add

$10x^2 \quad -1$

$(5x + 1)(2x - 1)$

$+2x$

$-5x$

$-3x$

11. Factor the following expression completely: $9x^2 - 121$

11. $(3x+11)(3x-11)$

Perfect Squares

$9x^2 \quad -121$

$(3x + 11)(3x - 11)$

$+33x$

$-33x$

$+0x$

12. Factor the following expression completely: $6x^2 + 17x + 5$

12. $(3x+1)(2x+5)$

Add

$6x^2 \quad +5$

$(3x + 1)(2x + 5)$

$+2x$

$+15x$

$+17x$

$5 \quad 1 \quad 5$

13. Factor the following expression completely:
$2x^2 - x - 21$

Add

21
1 | 21
3 | 7

$2x^2$ -21
$(2x - 7)(x + 3)$
$-7x$
$+6x$
$-1x$

13. $(2x-7)(x+3)$

14. Factor the following expression completely:
$5x^2 + 3x - 2$

Add

2
1 | 2

$5x^2$ -2
$(5x - 2)(x + 1)$
$-2x$
$+5x$
$+3x$

14. $(5x-2)(x+1)$

15. Factor the following expression completely:
$3x^2 + 8x - 3$

Add

3
1 | 3

$3x^2$ -3
$(3x - 1)(x + 3)$
$-1x$
$+9x$
$+8x$

15. $(3x-1)(x+3)$

16. A model for Healey Construction's revenue is $R = -15p^2 + 300p + 12000$, where p is the price in dollars of the company's product. What price will maximize the revenue? What will be the maximum revenue?

initial height

VERTEX

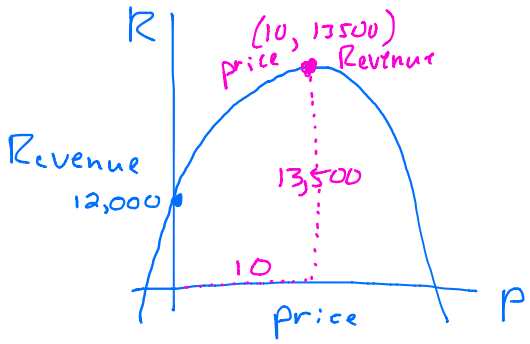
$a = -15$
$b = 300$
$c = 12000$

p $x = \frac{-300}{2(-15)} = \frac{-30\cancel{0}}{-3\cancel{0}} =$ \$10 price

R $f(10) = -15(10)^2 + 300(10) + 12000$
$=$ \$13,500 Revenue if items are priced at \$10.00.

16. Price: \$10.00

Maximum revenue: \$13,500.00



17. The equation for the motion of a projectile fired straight up at an initial velocity of 64 ft/sec is $h = -16t^2 + 64t$, where h is the height in feet and t is the time in seconds. Find the time the projectile needs to reach its highest point. How high will it go? At what height does it start before the projectile is fired?

Vertex

$a = -16$
$b = 64$
$c = 0$

t $x = \frac{-b}{2a} = \frac{-64}{2(-16)} = \frac{-64}{-32} =$ 2 seconds

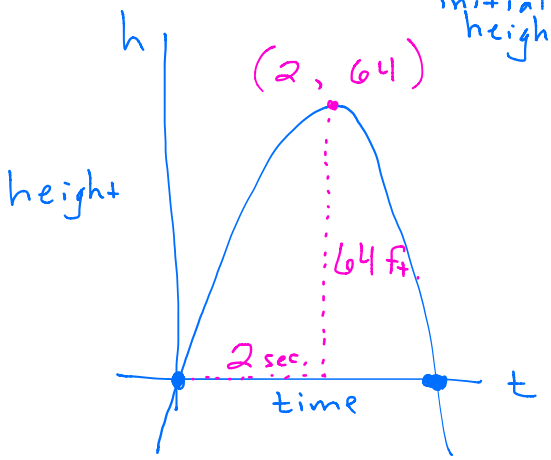
h $f(2) = -16(2)^2 + 64(2)$
$=$ 64 ft. high @ 2 seconds

17. Time: 2 seconds

Height: 64 feet

Original height: 0 ft. $c = 0$

initial height



18. From 1990 to 1996, the consumption of poultry per capita is modeled by $y = -0.2125t^2 + 2.615t + 56.33$, where $t = 0$ corresponds to 1990. During what year was the consumption of poultry per capita at about 61 per capita?

18. Year: 1992 and 2000

$61 = -.2125t^2 + 2.615t + 56.33$

$-61 \quad\quad -61$

$0 = -.2125t^2 + 2.615t - 4.67$

$a = -.2125$, $b = 2.615$, $c = -4.67$

$x = \dfrac{-2.615 \pm \sqrt{(2.615)^2 - (4)(-.2125)(-4.67)}}{2(-.2125)}$ =>

$x \approx 2.17$ yrs. after 1990 ... so, 1992

$x \approx 10.14$ yrs. after 1990 ... so, 2000

Find the vertex of the quadratic function and explain how you found it. Identify the axis of symmetry. Identify the coordinate of the *y*-intercept. Identify the coordinates of the *x*-intercept(s). Also identify if the vertex of the graph is a minimum or maximum. Then graph the quadratic function.

19. $y = 4x^2 + 8x - 45$

"a" positive, opens up

$x = \dfrac{-b}{2a} = \dfrac{-(8)}{2(4)} = \dfrac{-8}{8} = -1$

$y = 4(-1)^2 + 8(-1) - 45$
$= 4(1) - 8 - 45$
$4 - 8 - 45$
$-4 - 45$
-49

Vertex: $(-1, -49)$

Vertex: Minimum Maximum

Axis of symmetry: $x = -1$

y-intercept: $(0, -45)$

x-intercept(s): $\left(\frac{5}{2}, 0\right)$ $\left(-\frac{9}{2}, 0\right)$ (2.5, −4.5)

$4x^2 + 8x - 45 = 0$

$(2x - 5)(2x + 9) = 0$

$2x - 5 = 0$ $\quad$ $2x + 9 = 0$

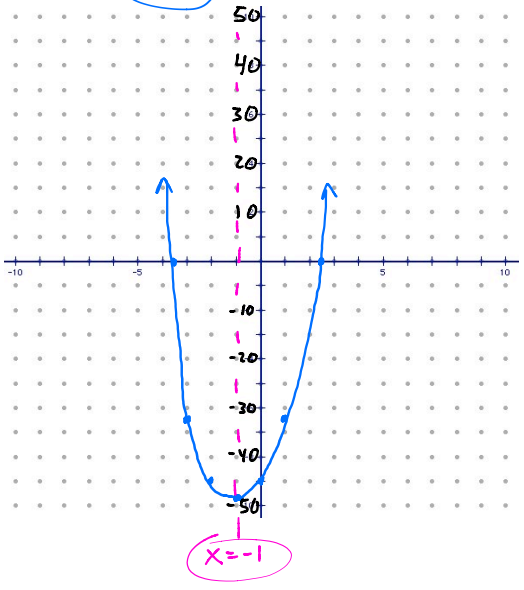
$+5 \quad +5$ $\quad$ $-9 \quad -9$

$\frac{2x}{2} = \frac{5}{2}$ $\quad$ $\frac{2x}{2} = \frac{-9}{2}$

$x = \frac{5}{2}$ or 2.5 $\quad$ $x = -\frac{9}{2}$ or −4.5

x	y
-3	-33
-2	-45
-1	-49
0	-45
1	-33

Vertex



20. $y = -(x - 1)^2 - 1$

negative "a" opens down

opposite, real

Vertex: $(1, -1)$

Vertex: Minimum Maximum

Axis of symmetry: $x = 1$

y-intercept: $(0, -2)$

$-(0-1)^2 - 1$
$-(-1)^2 - 1$
$-1 - 1$
-2

x-intercept(s): No Real number intercepts

$0 = -(x-1)^2 + 1$
$+1 \quad\quad +1$
$1 = -(x-1)^2$
$-1 \quad\quad -1$
$\sqrt{-1} = \sqrt{(x-1)^2}$
$\pm i = x - 1$
$+1 \quad +1$
$1 \pm i = x$

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

Vertex