Math II
Chapter 4 Review

Name Key
Date_____ Period_____

1. What is the vertex of $f(x) = 2(x + 3)^2 + 5$?

$(-3, 5)$

2. What are the x-intercepts of $f(x) = -2(x + 5)(x - 3)$?

$(-5, 0)$ $(3, 0)$

3. Given $f(x) = ax^2 + bx + c$, what does the $x = -b/2a$ represent? Could it be more than one thing?

axis of symmetry
x-value of vertex

4. Factor the following equations completely.

a. $2x^3 - 16x^2 + 24x$

$2x(x^2 - 8x + 12)$

$2x(x-6)(x-2)$

b. $12x^2 + 19x - 18$

$(3x - 2)(4x + 9)$

c. $x^2 - 13x + 30$

$(x - 10)(x - 3)$

d. $4n^2 - 49$

$(2n + 7)(2n - 7)$

e. $2x^2 + 7x - 15$

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

f. $6t^2 + 23t + 20$

$(3t + 4)(2t + 5)$

g. $4x^2 - 16x$

$4x(x - 4)$

5. How do you convert a quadratic equation that is given in intercept form to standard form?

multiply it out

6. How do you convert a quadratic equation that is given in standard form to vertex form?

use axis of symmetry or complete the square

7. Solve $\frac{3(m - 4)^2}{3} = \frac{24}{3}$

$(m-4)^2 = 8$

$m = 4 \pm \sqrt{8}$

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

8. Solve $(x + 2)^2 - 12 = 36$
$+12 \quad 12$

$(x+2)^2 = 48$

$x + 2 = \pm\sqrt{48}$

$x = -2 \pm 4\sqrt{3}$

9. Solve $5(x - 2)^2 + 40 = 0$

$5(x-2)^2 = -40$

$(x-2)^2 = -8$

$x - 2 = \pm\sqrt{-8}$

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

10. Solve the following equations.

a. $x^2 + 12x - 45 = 0$

$(x + 15)(x - 3) = 0$

$x = -15 \quad x = 3$

b. $2w^2 + 13w - 7 = 0$

$(2w - 1)(w + 7) = 0$

$w = 1/2 \quad w = -7$

c. $10y^2 + 11y - 6 = 0$

$(5y - 2)(2y + 3) = 0$

$y = 2/5 \quad y = -3/2$

$x = \frac{-12}{2(2)} = -3$ $\quad y = 2(-3)^2 + 12(-3) + 15$

$y = -3$

11. Write the equation $y = 2x^2 + 12x + 5$ in vertex form.

$y = a(x - h)^2 + k$

$x = \frac{-12}{2(2)} = -3$

$y = 2(x+3)^2 - 13$

$y = 2(-3)^2 + 12(-3) + 5$

$y = -13$

12. Write the quadratic function that has a vertex at (2, 7) and passes through (4, 2).

$y = a(x-2)^2 + 7$

$2 = a(4-2)^2 + 7$

$-5 = 4a$

$y = -\frac{5}{4}(x-2)^2 + 7$

$a = -5/4$

13. Write the quadratic function that has a vertex at (-3, -2) and passes through (1, -10)

$y = a(x+3)^2 - 2$

$-10 = a(1+3)^2 - 2$

$-8 = 16a$

$y = -1/2(x+3)^2 - 2$

$a = -1/2$

14. Write the equation of a parabola that has x-intercepts of -3 and 2 and passes through the point (3, 12)

$y = a(x+3)(x-2)$

$12 = a(3+3)(3-2)$

$12 = a(6)(1)$

$y = 2(x+3)(x-2)$

$12 = 6a$

$a = 2$

15. Write the equation of a parabola that has x-intercepts of -7 and -3 and passes through the point (-1, 12)

$y = a(x+7)(x+3)$

$12 = a(-1+7)(-1+3)$

$12 = a(6)(2)$

$y = (x+7)(x+3)$

$12 = 12a$

$a = 1$

16. Use the discriminant to describe the types of solutions for the equation $-3x^2 - 3x + 9 = -4x + 1$.

$+4x \quad -1 \quad +4x \quad -1$

$-3x^2 + x + 8 = 0$

$(1)^2 - 4(-3)(8) = 97 \leftarrow$ pos. #

2 Real Sol.

17. Solve: $5x^2 + 11 = 14$

$-11 \quad -11$

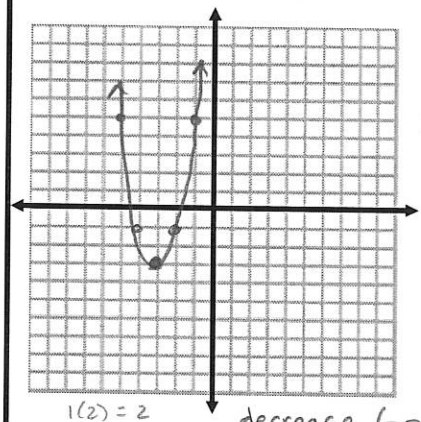
$5x^2 = 3$

$x^2 = \frac{3}{5}$

$x = \pm\sqrt{3/5} = \pm\frac{\sqrt{15}}{5}$

Graph the following quadratics: (show work)

18. $y = 2x^2 + 12x + 15$



a) Graph

b) vertex: (,) $(-3, -3)$

c) axis of symmetry: x = -3

d) x-intercept:(exact value)

$x = \frac{-12 \pm \sqrt{(12)^2 - 4(2)(15)}}{2(2)}$

$x = \frac{-12 \pm \sqrt{24}}{4} = \frac{-6 \pm \sqrt{6}}{2}$

e) y-intercept: $(0, 15)$

f) domain: $\mathbb{R}$

g) range: $[-3, \infty)$

h) increasing and decreasing

i) end behavior $x \to -\infty \; f(x) \to \infty$

$x \to \infty \; f(x) \to \infty$

$1(2) = 2$

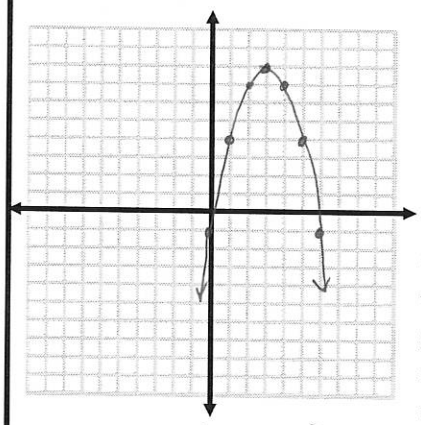
$3(2) = 6$

$5(2) = 10$

decrease $(-\infty, -3)$

increase $(-3, \infty)$

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



a) Graph

b) vertex: (,) $(3, 8)$

c) axis of symmetry: x = 3

d) x-intercept:(exact value)

$0 = -(x-3)^2 + 8$

$-8 = -(x-3)^2$

$x - 3 = \pm\sqrt{8}$ $\quad x = 3 \pm 2\sqrt{2}$

e) y-intercept: $(0, -1)$

f) domain: $\mathbb{R}$

g) range: $(-\infty, 8]$

h) increasing and decreasing

i) end behavior

$x \to -\infty \; f(x) \to -\infty$

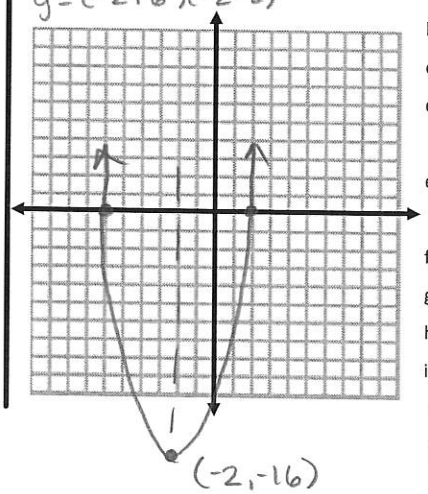
$x \to \infty \; f(x) \to -\infty$

Increase $(-\infty, 3)$

decrease $(3, \infty)$

20. $y = (x + 6)(x - 2)$

$y = (-2+6)(-2-2)$



a) Graph

b) vertex: (,) $(-2, -16)$

c) axis of symmetry: x = -2

d) x-intercept:(exact value)

$(-6, 0)$ $\quad (2, 0)$

e) y-intercept:

$y = (0+6)(0-2)$ $\quad (0, -12)$

$y = -12$

f) domain: $\mathbb{R}$

g) range: $[-16, \infty)$

h) increasing and decreasing

i) end behavior

$x \to -\infty \; f(x) \to \infty$

$x \to \infty \; f(x) \to \infty$

$(-2, -16)$

decrease $(-\infty, -2)$

increase $(-2, \infty)$

21. Solve for x three times: by factoring completely, by completing the square and by the quadratic formula

$$x^2 - 10x + 16 = 0$$

Factoring	completing the square	quadratic formula
$(x-8)(x-2)=0$	$x^2-10x+\_\_ = -16+\_\_$	$x = \frac{10 \pm \sqrt{(-10)^2-4(1)(16)}}{2(1)}$
$x=8 \quad x=2$	$x^2-10x+25 = -16+25$	$x = \frac{10 \pm \sqrt{36}}{2}$
	$(x-5)^2 = 9$	$x = \frac{10 \pm 6}{2}$
	$x-5 = \pm\sqrt{9}$	$\frac{16}{2}, \frac{4}{2}$
	$x = 5 \pm 3$	$x = 8, 2$
	$x = 8, 2$	

22. Solve for x three times: by factoring completely, by completing the square, and by the quadratic formula

$$2x^2 + 8x - 10 = 0$$

Factoring	completing the square	quadratic formula
$2(x^2+4x-5)=0$	$2x^2+8x-10=0$	$x = \frac{-8 \pm \sqrt{8^2-4(2)(-10)}}{2(2)}$
$2(x+5)(x-1)=0$	$2(x^2+4x+\underline{4}) = 10+\underline{8}$	$x = \frac{-8 \pm \sqrt{144}}{4}$
$x=-5 \quad x=1$	$2(x+2)^2 = 18$	$x = \frac{-8 \pm 12}{4}$
	$(x+2)^2 = 9$	$\frac{4}{4}$ or $\frac{-20}{4}$
	$x+2 = \pm\sqrt{9}$	$x = 1$ or -5
	$x = -2 \pm 3$	
	$x = 1$ or -5	

23. If a toy rocket is launched vertically upward from ground level with an initial velocity of 128 feet per second, then its height h after t seconds is given by the equation $h(t) = -16t^2 + 128t$ (if air resistance is neglected).

a. How long will it take for the rocket to return to the ground?

8 seconds

$0 = -16t^2 + 128t$

$0 = -16t(t-8)$

$t=0 \quad t=8$

b. After how many seconds will the rocket be 112 feet above the ground?

1 or 7 seconds

$112 = -16t^2 + 128t$

$16t^2 - 128t + 112 = 0$

$16(t^2 - 8t + 7) = 0$

$16(t-7)(t-1) = 0$

$t=7 \quad t=1$

c. How long will it take the rocket to reach its maximum height?

4 seconds

$x = \frac{-128}{2(-16)}$

$x = 4$

d. What is the maximum height?

256 feet

$y = -16(4)^2 + 128(4)$

$y =$

V: (4, 256)

24. The function $y = -0.03(x-14)^2 + 6$ models the jump of a red kangaroo where x is the horizontal distance in feet and y is the corresponding height in feet.

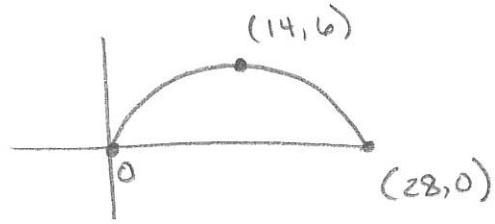
V: (14, 6)

a) What is the kangaroo's maximum height?

6 ft

b) How far does the kangaroo jump?

28 ft



25. Multiply $(6 - i)(-2 - 3i)$

$-12 - 18i + 2i + 3i^2$

$\boxed{-15 - 16i}$

26. Find the quotient.

a. $\frac{2+i}{3-4i} \frac{(3+4i)}{(3+4i)}$

$\frac{6 + 8i + 3i + 4i^2}{9 - 16i^2} = \boxed{\frac{2+11i}{25}}$

b. $\frac{3+i}{2-3i}$

$\frac{(3+i)(2+3i)}{(2-3i)(2+3i)} = \frac{6 + 9i + 2i + 3i^2}{4 - 9i^2}$

$\boxed{\frac{3+11i}{13}}$