Math II Retake
Chapter 4 Review

Name Key
Date_____ Period_____

1. What is the vertex of $f(x) = 2(x - 3)^2 - 6$?
V: (3, -6)

2. What are the x-intercepts of $f(x) = 2(x - 1)(x + 3)$?
x-intercepts 1 & -3

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

4. Factor the following equations completely.

a. $x^2 - 7x + 10$ $(x-5)(x-2)$

b. $12x^2 + 19x - 18$ $(3x-2)(4x+9)$

c. $x^2 - 11x + 30$ $(x-6)(x-5)$

d. $n^2 - 64$ $(n+8)(n-8)$

e. $2x^2 + 7x - 15$ $(2x-3)(x+5)$

f. $6t^2 + 23t + 20$ $(3t+4)(2t+5)$

5. Solve the following equations.

a. $x^2 + 12x - 45 = 0$ $(x+15)(x-3)=0$
$x=-15$ $x=3$

b. $9x^2 + 6x + 1 = 0$
$(3x+1)(3x+1)=0$ $x=-1/3$

c. $x^2 - 3x - 40 = 0$
$(x-8)(x+5)=0$ $x=8,-5$

d. $r^2 - 13r + 42 = 0$
$(r-6)(r-7)=0$ $r=6,7$

e. $2w^2 + 13w - 7 = 0$
$(2w-1)(w+7)=0$ $w=1/2, -7$

f. $10y^2 + 11y - 6 = 0$
$(2y+3)(5y-2)=0$
$y=-3/2, 2/5$

6. What is the simplified form of the expression $\sqrt{1800}$?
$\sqrt{900\cdot 2} = 30\sqrt{2}$

7. What is the simplified form of the expression $\sqrt{24}\cdot\sqrt{30}$?
$2\sqrt{6}\sqrt{30} = 2\sqrt{180} = 12\sqrt{5}$ (4·6; 36·5)

8. Solve $\frac{2(m - 7)^2}{2} = \frac{16}{2}$
$(m-7)^2=8$
$\sqrt{(m-7)^2}=\pm\sqrt{8}$
$m-7=\pm\sqrt{8}$
$m=7\pm\sqrt{8}$
$m=7\pm 2\sqrt{2}$

9. Solve $(x + 2)^2 - 12 = 36$
$+12 \quad 12$
$(x+2)^2=48$
$x+2=\pm\sqrt{48}$ (16·3)
$x+2=\pm 4\sqrt{3}$
$x=-2\pm 4\sqrt{3}$

10. Solve $5(x - 2)^2 + 40 = 0$
$-40 \quad -40$
$\frac{5(x-2)^2}{5}=\frac{-40}{5}$
$(x-2)^2=-8$
$x-2=\pm\sqrt{-8}$
$x=2\pm i\sqrt{8}$
$x=2\pm 2i\sqrt{2}$

11. Solve $2(x - 3)^2 + 64 = 0$
$-64 \quad -64$
$\frac{2(x-3)^2}{2}=\frac{-64}{2}$
$(x-3)^2=-32$
$x-3=\pm\sqrt{-32}$ (16·2)
$x=3\pm 4i\sqrt{2}$

12. Multiply $(3 - i)(-2 + 4i)$
$-6+12i+2i-4i^2$
$-6+14i+4$
$-2+14i$

13. Find the quotient.

a. $\frac{(2+i)(3-4i)}{(3+4i)(3-4i)}$
$\frac{6-8i+3i-4i^2}{9-12i+12i-16i^2}=$
$\frac{6-5i+4}{9+16}=$
$\frac{10-5i}{25}=\frac{2-i}{5}$

b. $\frac{(3+i)(2+3i)}{(2-3i)(2+3i)}$
$\frac{6+9i+2i+3i^2}{4+6i-6i-9i^2}=$
$\frac{6+11i-3}{4+9}=$
$\frac{3+11i}{13}$

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

a

$y = a(x - h)^2 + k$ $\quad x = \frac{-b}{2a} = \frac{-12}{2(2)} = -3$

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

$y = -13$ $\quad$ V: $(-3, -13)$ $\quad a = 2$

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

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

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

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

$-5 = 4a$

$a = -5/4$

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

$y = a(x+3)^2 - 2$ $\quad y = -\frac{1}{2}(x+3)^2 - 2$

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

$-8 = 16a$

$a = -1/2$

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

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

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

$12 = 6a$

$a = 2$

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

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

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

$12 = 12a$

$a = 1$

19. Use the discriminant to describe the types of solutions for the equation $2x^2 - 7x + 9 = -4x + 1$.

$b^2 - 4ac$ $\quad +4x \; -1 \quad +4x \; -1$

$(-3)^2 - 4(2)(8) =$ $\quad 2x^2 - 3x + 8 = 0$

$9 - 64 = -55$

negative # $\quad$ 2 imaginary numbers

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

$-11 \quad -11$

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

$x = \pm\sqrt{\frac{3}{5}} = \frac{\pm\sqrt{3}}{\sqrt{5}} \frac{(\sqrt{5})}{(\sqrt{5})} =$

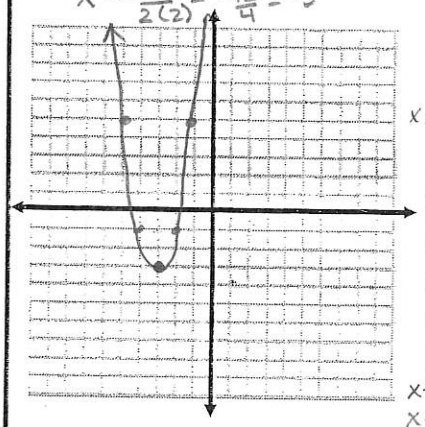
$x = \frac{\pm\sqrt{15}}{5}$

$y = 2(-3)^2 + 12(-3) + 15 = -3$

Graph the following quadratics: (show work)

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

$x = \frac{-12}{2(2)} = \frac{-12}{4} = -3$



a) Graph

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

c) axis of symmetry: $x = -3$

d) x-intercept: $x = \frac{-12 \pm \sqrt{144 - 4(2)(15)}}{2(2)}$

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

e) y-intercept: $y = 15$

f) domain: All reals

g) range: $y \geq -3$

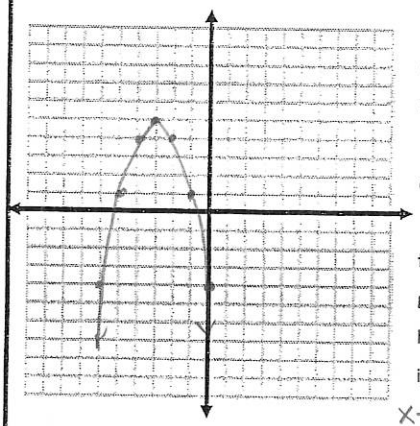
h) increasing and decreasing $(-\infty, -3)$ decrease $(-3, \infty)$ increase

i) end behavior

$x \to -\infty \; y \to \infty$

$x \to \infty \; y \to \infty$

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



a) Graph

b) vertex: $(-3, 5)$

c) axis of symmetry: $x = -3$

d) x-intercept: $0 = -(x+3)^2 + 5$

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

$5 = (x+3)^2$

$\pm\sqrt{5} = x + 3$

$x = -3 \pm \sqrt{5}$

e) y-intercept: $y = -4$

f) domain: All reals

g) range: $y \leq 5$

h) increasing and decreasing $(-\infty, -3)$ increase $(-3, \infty)$ decrease

i) end behavior

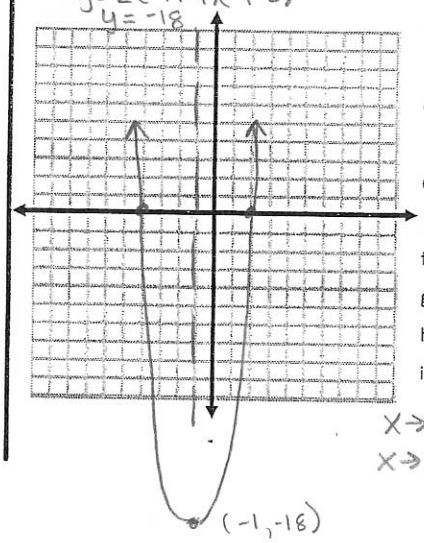
$x \to -\infty \; y \to -\infty$

$x \to \infty \; y \to -\infty$

23. $y = 2(x + 4)(x - 2)$

$y = 2(-1+4)(-1-2)$

$y = -18$



a) Graph

b) vertex: (,) $(-1, -18)$

c) axis of symmetry: $x = -1$

d) x-intercept: $-4, 2$

e) y-intercept: $y = 2(0+4)(0-2)$

$y = 2(4)(-2)$

$y = -16$

f) domain: All reals

g) range: $y \geq -18$

h) increasing and decreasing $(-\infty, -1)$ decrease $(-1, \infty)$ increase

i) end behavior

$x \to -\infty \; y \to \infty$

$x \to \infty \; y \to \infty$

$(-1, -18)$

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

$$x^2 - 12x + 35 = 0$$

Factoring

$x^2 - 12x + 35 = 0$

$(x-7)(x-5) = 0$

$x - 7 = 0 \quad x - 5 = 0$

$x = 7 \quad x = 5$

completing the square

$x^2 - 12x + 35 = 0$

$x^2 - 12x + \underline{36} = -35 + \underline{36}$

$\left(\frac{-12}{2}\right)^2 = 36$

$(x-6)(x-6) = 1$

$(x-6)^2 = 1$

$x - 6 = \pm\sqrt{1}$

$x - 6 = \pm 1$

$x = 6 \pm 1$

$x = 6 + 1 = 7$

$6 - 1 = 5$

quadratic formula

$1x^2 - 12x + 35 = 0$

a b c

$x = \dfrac{12 \pm \sqrt{(-12)^2 - 4(1)(35)}}{2(1)}$

$x = \dfrac{12 \pm \sqrt{4}}{2}$

$x = \dfrac{12 \pm 2}{2}$

$x = \dfrac{12+2}{2} = 7 \qquad x = \dfrac{12-2}{2} = 5$

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

$$4x^2 - 3x - 10 = 0$$

Factoring

$4x^2 - 3x - 10 = 0$

$(4x + 5)(x - 2) = 0$

$4x + 5 = 0 \qquad x - 2 = 0$

$\qquad\qquad\qquad +2 \quad +2$

$4x = -5 \qquad x = 2$

$x = \dfrac{-5}{4}$

completing the square

$4x^2 - 3x - 10 = 0$

$4x^2 - 3x = 10$

$4\left(x^2 - 3/4x + \underline{9/64}\right) = 10 + \underline{9/16}$

$\left(\frac{-3}{4 \cdot 2}\right)^2 = \frac{9}{64}$

$4(x - 3/8)^2 = 10\,9/16$

$\frac{4}{4}(x - 3/8)^2 = \frac{169}{16 \cdot 4}$

$(x - 3/8)^2 = \frac{169}{64}$

$x - 3/8 = \pm\sqrt{\frac{169}{64}}$

$x - 3/8 = \pm 13/8$

$x = 3/8 \pm 13/8$

$x = 3/8 + 13/8 = \frac{16}{8} = 2$

$x = 3/8 - 13/8 = -10/8 = -5/4$

quadratic formula

$4x^2 - 3x - 10 = 0$

$x = \dfrac{3 \pm \sqrt{(-3)^2 - 4(4)(-10)}}{2(4)}$

$x = \dfrac{3 \pm \sqrt{169}}{8}$

$x = \dfrac{3 \pm 13}{8}$

$x = \dfrac{3+13}{8} = \dfrac{16}{8} = 2$

$x = \dfrac{3-13}{8} = \dfrac{-10}{8} = \dfrac{-5}{4}$