Chapter 8 Review Problems (1)

- ***Factor each of the following quadratic expressions completely:***

a) $2x^2 - 32x + 126$
$= 2(x^2 - 16x + 63)$
$= 2(x-9)(x-7)$

b) $x^2 - 5x - 14$
$(x-7)(x+2)$

c) $2x^2 + 17x + 21$
$(2x+3)(x+7)$

d) $7x^2 - 45x - 28$
$(7x+4)(x-7)$

e) $16x^2 - 81$
$(4x-9)(4x+9)$

f) $4x^2 + 16$
$4(x^2+4)$

- ***Solve each quadratic equation by factoring and using the Zero Product Property.***

a) $3x^2 - 8x - 16 = 0$
$(3x+4)(x-4) = 0$
$3x+4=0 \quad x-4=0$
$3x = -4$
$x = -4/3 \quad x = 4$

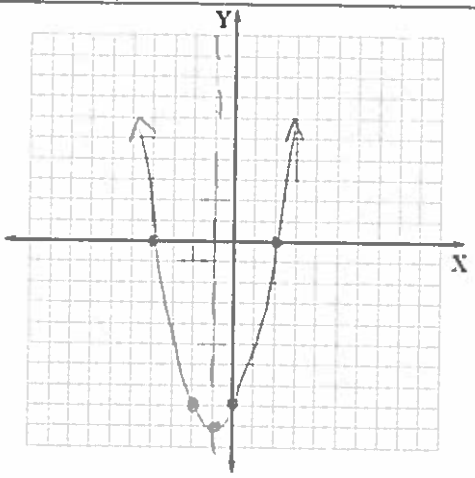
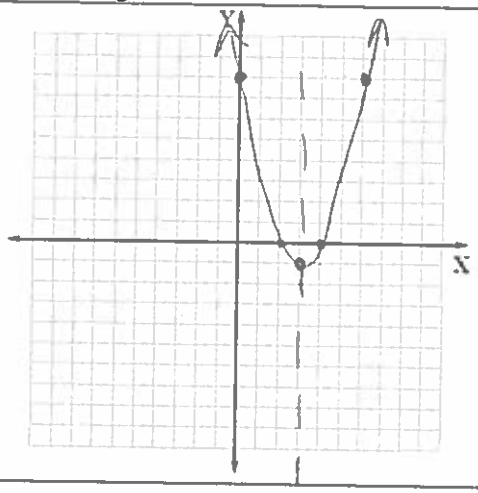
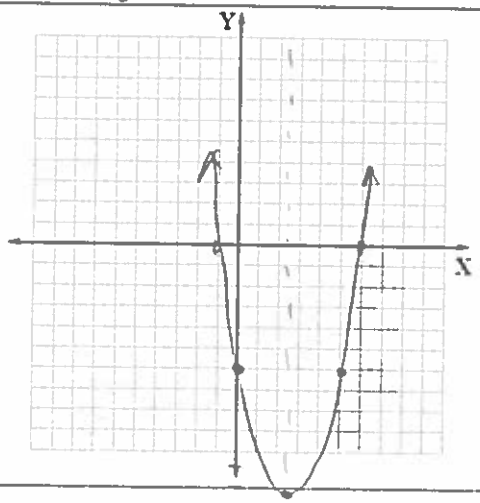
b) $x^2 + 9x + 18 = 0$
$(x+6)(x+3) = 0$
$x = -6, -3$

- ***Find the x- and y-intercepts of the given quadratic functions. Also find the vertex and line of symmetry for each one. Then sketch a graph of each function on the grids found below.***

	$y = x^2 + 2x - 8$	$y = x^2 - 6x + 8$	$y = x^2 - 5x - 6$
y-intercept	-8	8	-6
x-intercepts	$(-4,0)\ (2,0)$	$(4,0)\ (2,0)$	$(6,0)\ (-1,0)$
Line of symmetry	$x = -1$	$x = 3$	$x = 2.5$
vertex	$(-1, -9)$	$(3, -1)$	$(2.5, -12.25)$

$y = (x+4)(x-2)$ $y = (x-4)(x-2)$ $y = (x-6)(x+1)$
$-3, -3$ $-1, 1$ $(-3.5)(3.5)$

Chapter 8 Review Problems (2)

$y = x^2 + 2x - 8$	$y = x^2 - 6x + 8$
	
$y = x^2 - 5x - 6$	
	

- ***Interpret the meaning of the intercepts and the vertex in the context of a problem***

Jason jumped off of a cliff into the ocean in Acapulco while vacationing with some friends. His height as a function of time could be modeled by the function $h(t) = -16t^2 + 16t + 480$, where t is the time in seconds and h is the height in feet.

What is the meaning of the 480 in the expression?

He jumped from a height of 480 feet

Use your graphing calculator or DESMOS to approximate the vertex of this function.
What is the meaning of each coordinate of the vertex as related to this particular problem?

(.5, 484) In ½ sec, Jason reached a maximum height of 484 feet.

Chapter 8 Review Problems

- ***Write each equation in graphing form. Identify the vertex. Then find the exact x-intercepts. Simplify all radicals***

a. $y = x^2 - 8x + 13$

$16 + y - 13 = x^2 - 8x + 16$

$y + 3 = (x-4)^2$

$y = (x-4)^2 - 3$

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

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

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

vertex: $(4, -3)$

b. $y = x^2 + 10x + 35$

$25 + y - 35 = x^2 + 10x + 25$

$y - 10 = (x+5)^2$

$y = (x+5)^2 + 10$

no x-intercepts

vertex $(-5, 10)$

c. $y = x^2 + 2x - 6$

$1 + y + 6 = x^2 + 2x + 1$

$y + 7 = (x+1)^2$

$y = (x+1)^2 - 7$

$\sqrt{7} = \sqrt{(x+1)^2}$

$\pm\sqrt{7} = x + 1$ $\quad y = -1 \pm \sqrt{7}$

vertex: $(-1, -7)$

d. $y = x^2 + 6x$

$y + 9 = x^2 + 6x + 9$

$y = (x+3)^2 - 9$

$\sqrt{9} = \sqrt{(x+3)^2}$

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

$x = 0, -6$

vertex: $(-3, -9)$

- ***Solve each quadratic equation by completing the square.***

a. $0 = x^2 + 16x - 22$

$64 + 22 = x^2 + 16x + 64$

$\sqrt{86} = \sqrt{(x+8)^2}$

$\pm\sqrt{86} = x + 8$

$-8 \pm \sqrt{86} = x$

b. $0 = x^2 - 12x + 26$

$36 - 26 = x^2 - 12x + 36$

$\sqrt{10} = \sqrt{(x-6)^2}$

$\pm\sqrt{10} = x - 6$

$6 \pm \sqrt{10} = x$

- ***Solve each quadratic equation by using the Quadratic Formula.***

a. $0 = 9x^2 + 4x - 16$

$x = \dfrac{-4 \pm \sqrt{16 - 4(9)(-16)}}{18}$

$= \dfrac{-4 \pm \sqrt{16 + 576}}{18}$

$= \dfrac{-4 \pm \sqrt{592}}{18}$

$= \dfrac{-4 \pm 4\sqrt{37}}{18}$ $= \dfrac{-2 \pm 2\sqrt{37}}{9}$

b. $4 = 4x^2 + 8x + 7$

$0 = 4x^2 + 8x + 3$

$x = \dfrac{-8 \pm \sqrt{64 - 4(4)(3)}}{8}$

$x = \dfrac{-8 \pm \sqrt{64 - 48}}{8}$

$x = \dfrac{-8 \pm \sqrt{16}}{8}$

$x = \dfrac{-8 \pm 4}{8}$ $\quad x = -\frac{1}{2}, -1\frac{1}{2}$

Chapter 8 Review Problems (4)

- ***Simplify fractional exponents***

  Write each expression in two different ways. One way must include a radical.

  a) $x^{\frac{5}{4}}$

  $\sqrt[4]{x^5}$ $\quad (x^{1/4})^5$

  $(\sqrt[4]{x})^5$ $\quad (x^5)^{1/4}$

  b) $\sqrt[3]{y^2}$

  $(\sqrt[3]{y})^2$ $\quad (y^{1/3})^2$

  $y^{2/3}$ $\quad (y^2)^{1/3}$

- ***Write an explicit equation to describe each sequence:***

  a) -2, -4, -8, -16, . . .

  $t_n = -1(2)^n$

  b) 35, 32, 29, 26

  $t_n = 38 - 3n$

- ***Use a system of linear equations to solve problems***

  Amanda and John are selling flower bulbs for a school fundraiser. Customers can buy packages of tulip bulbs and bags of daffodil bulbs. Amanda sold 6 packages of tulip bulbs and 12 bags of daffodil bulbs for a total of $198. John sold 7 packages of tulip bulbs and 6 bags of daffodil bulbs for a total of $127. Find the cost of one package of tulip bulbs and one bag of daffodil bulbs.

  Let x = price of tulip pkg
  y = price of daffodil pkg

  $6x + 12y = 198$
  $7x + 6y = 127$ $\xrightarrow{\times -2}$ $-14x - 12y = -254$

  $-8x = -56$

  $x = 7$

  Tulips cost $7/pkg.
  Daffodils cost $13/pkg.

  $7(7) + 6y = 127$
  $6y = 78$
  $y = 13$

- ***Write an exponential function for the graph that contains the given two points:***

  a) (2, 24) and (4, 96)

  $\frac{96}{24} = \frac{ab^4}{ab^2}$

  $4 = b^2$

  $2 = b$

  $24 = a(2)^2$

  $6 = a$

  $y = 6(2)^x$

  b) (1, 12) and (3, 192)

  $\frac{192}{12} = \frac{ab^3}{ab}$

  $16 = b^2$

  $4 = b$

  $12 = a \cdot 4$

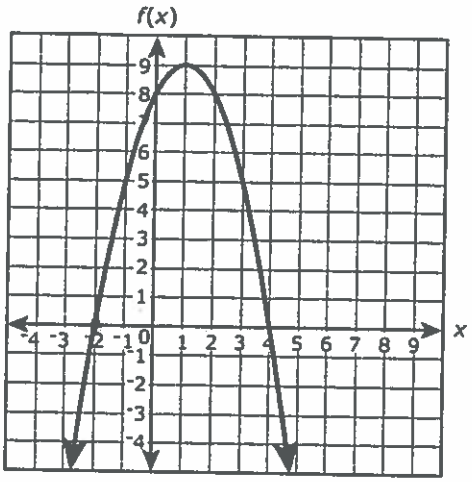
  $3 = a$

  $y = 3(4)^x$

Chapter 8 Review Problems

• Comparing functions: f(x) to g(x) – graph to equation

The figure shows a graph of the function of $f(x)$ in the xy-coordinate plane, with the vertex at (1, 9) and the zeros at −2 and 4.



The function g is defined by $g(x) = -3x + 2$.

Which statements are true? Select **all** that apply.

- Ⓐ $f(-2)$ is greater than $g(-2)$. F
- Ⓑ $f(-1)$ is less than $g(-1)$. F
- Ⓒ $f(0)$ is greater than $g(0)$. T
- Ⓓ $f(1)$ is less than $g(1)$. F
- Ⓔ $f(2)$ is greater than $g(2)$. F

• Simplify each of the expressions

$ba^4 \cdot (2ba^4)^{-3}$	$x^4y^3 \cdot (2y^2)^0$	$\frac{2y^3 \cdot 3xy^3}{3x^2y^4}$	$(x^4)^{-3} \cdot 2x^4$
$ba^4 \cdot (\frac{1}{8}b^{-3}a^{-12})$ $= \frac{1}{8}b^{-2}a^{-8}$ $= \frac{1}{8a^8b^2}$	$= x^4y^3$	$= \frac{6xy^6}{3x^2y^4}$ $= \frac{2y^2}{x}$	$= x^{-12} \cdot 2x^4$ $= 2x^{-8}$ $= \frac{2}{x^8}$