FIRST: CKPT 4.1 (*Formative*)

Are there any Homework Questions you would like to see on the board?

pp. 232-233 # 1ac, 2abc, 5, 7, 8a, 11
Work ahead on Mid-chapter Review
p. 226 # 8 – 11

Today's Learning Goal(s):

By the end of the class, I will be able to:

a) Compare the standard and vertex forms of a quadratic function.

p. 232 **1.** Write the discriminant. Do not evaluate.

a) $x^2 - 5x + 7 = 0$ **c)** $3(x + 2)^2 - 19 = 0$

b) $x^2 + 11x = 6x^2 - 17$ **d)** $(x + 3)(2x - 1) = 4(x + 2)$

c) $3(x+2)^2 - 19 = 0$

$3(x^2+4x+4) - 19 = 0$

$3x^2+12x+12-19=0$

$3x^2+12x-7=0$

$a=3 \quad b=12 \quad c=-7$

b^2-4ac

$=(12)^2-4(3)(-7)$

$=144+84$

$=228$

p. 232 **5.** For what value(s) of k does the function $f(x) = kx^2 - 8x + k$ have no zeros?

$a=k \quad b=-8 \quad c=k$

$b^2-4ac<0$

NOTE: DO NOT WORRY about this type of question, when there is a k^2. You will not be tested on this.

$(-8)^2-4(k)(k)<0$

$64-4k^2<0$

$4(16-k^2)<0$

$4(4-k)(4+k)<0$

NOT

Yes

$64-4k<0$

$-4k<-64$

$k>\frac{-64}{-4}$

$k>16$

p. 233 **7.** For what value of k does $8x^2 + 4x + k = 0$ have two distinct real solutions? one solution? no solution?

$b^2 - 4ac > 0$

$(4)^2 - 4(8)(k) > 0$

$16 - 32k > 0$

$-32k > -16$

$k < \frac{-16}{-32}$

$k < \frac{1}{2}$

$a = 8 \quad b = 4 \quad c = k$

$b^2 - 4ac = 0$

$16 - 32k = 0$

$k = \frac{1}{2}$

$b^2 - 4ac < 0$

$k > \frac{1}{2}$

p. 233 **8.** **a)** Explain how you would solve this problem: For what value of k does the function $f(x) = 3x^2 - 5x + k$ have only one zero?

b) Use your strategy to find the value of k.

a) I would set the discriminant = 0, and then find the value of k that makes the equation true.

b) $b^2 - 4ac = 0$

$(-5)^2 - 4(3)(k) = 0$

$25 - 12k = 0$

$-12k = -25$

$k = \frac{25}{12}$

p. 226 **Lesson 4.3**

8. Solve using the quadratic formula.

a) $x^2 + 2x - 15 = 0$
b) $9x^2 - 6x + 1 = 0$
c) $2(x-7)^2 - 6 = 0$
d) $x^2 + 7x = -24$

$$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

c) $2(x-7)^2 - 6 = 0$

$2(x^2 - 14x + 49) - 6 = 0$

$2x^2 - 28x + 98 - 6 = 0$

$2x^2 - 28x + 92 = 0$

$a = 2 \quad b = -28 \quad c = 92$

$$= \frac{-(-28) \pm \sqrt{(-28)^2 - 4(2)(92)}}{2(2)}$$

$$= \frac{28 \pm \sqrt{48}}{4}$$

$$\therefore x = \frac{28+\sqrt{48}}{4} \text{ or } x = \frac{28-\sqrt{48}}{4}$$

$\doteq 8.732$ $\doteq 5.267$

$\doteq 8.73$ $\doteq 5.27$ Round

MCF 3MI

4.1 The Vertex Form of a Quadratic Function

$f(x)=a(x-h)^2+k$ $f(x)=ax^2+bx+c$ Date: Apr-2/19

VERTEX FORM ***vs.*** ***STANDARD FORM***

$g(w)=-(w-15)^2+225$ (Show by expanding) $f(w)=-w^2+30w$

We are able to obtain "standard form" by expanding the vertex form.

$=-(w-15)(w-15)+225$

$=-(w^2-30w+225)+225$

$=-w^2+30w-225+225$ $\rightarrow -w^2+30w$

Ex. 1: Given $f(x)=3(x+4)^2-8$, determine the:

a) direction of opening up

b) axis of symmetry $x=-4$

c) ~~max~~/min value -8

d) vertex $(-4,-8)$

e) State the Domain and Range

D: $\{x \in \mathbb{R}\}$

R: $\{y \in \mathbb{R} \mid y \geq -8\}$

$-8 \leq y$

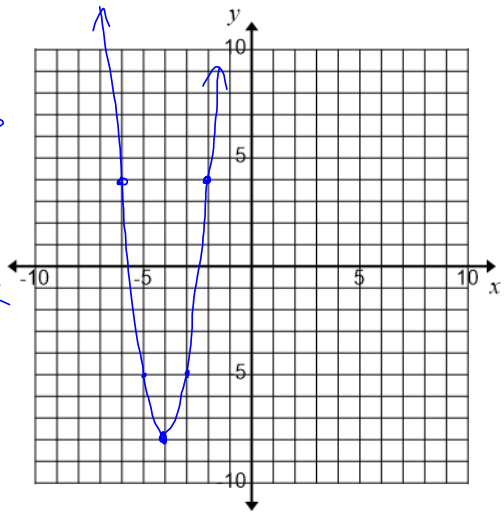
f) the sketch of the graph (no technology)

MG $a=3$

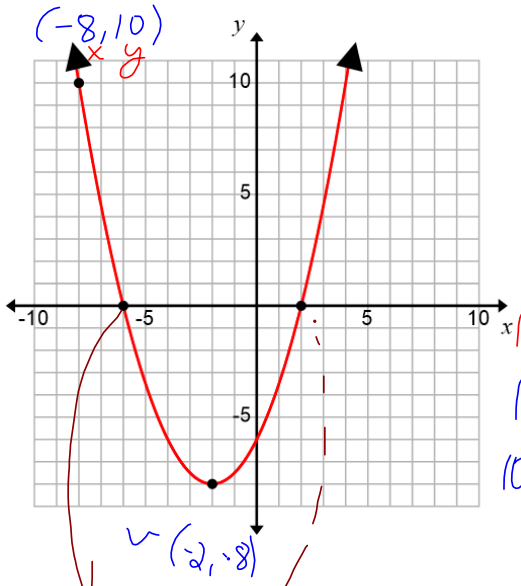
1 $\rightarrow 3$

2 $\rightarrow 12$

3 $\rightarrow 27$



Ex. 2: Given the diagram below, write the quadratic function in each of the 3 forms.



(-8, 10)

(-2, -8)

$r = -6 \quad s = 2$

$\therefore y = a(x+6)(x-2)$

$y = \frac{1}{2}(x+6)(x-2)$

Vertex form

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

$y = a(x+2)^2 - 8$

$10 = a(-8+2)^2 - 8$

$10 = a(-6)^2 - 8$

$10 + 8 = 36a$

$18 = 36a$

$\frac{18}{36} = a$

$\frac{1}{2} = a$

$\therefore y = \frac{1}{2}(x+2)^2 - 8$

Standard Form

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

$= \frac{1}{2}(x^2 + 4x + 4) - 8$

$= \frac{1}{2}x^2 + \frac{1}{2}(4x) + \frac{1}{2}(4) - 8$

$= \frac{1}{2}x^2 + 2x + 2 - 8$

$= \frac{1}{2}x^2 + 2x - 6$

Factored Form

$y = \frac{1}{2}(x^2 + 4x - 12)$

$= \frac{1}{2}(x-2)(x+6)$

Ex. 3: What information about the parabola does each form provide?

Standard Form	Factored Form	Vertex Form
$y = ax^2 + bx + c$	$y = a(x-r)(x-s)$	$y = a(x-h)^2 + k$
c = y-intercept	r & s are the x-intercepts	vertex (h, k)

Ex. 4: Write the equation of the quadratic function, first in vertex form and then in standard form, given vertex $(-6, 7)$ and passing through $(2, -9)$.

(x, y)

$y = a(x+6)^2 + 7$

$-9 = a(2+6)^2 + 7$

$-9 = a(8)^2 + 7$

$-9 - 7 = 64a$

$-16 = 64a$

$\frac{-16}{64} = a$

$a = -\frac{1}{4}$

$\therefore y = -\frac{1}{4}(x+6)^2 + 7$ is the equation in vertex form.

→ in standard form.

$y = -\frac{1}{4}(x+6)^2 + 7$

$= -\frac{1}{4}(x^2 + 12x + 36) + 7$

$= -\frac{1}{4}x^2 - \frac{1}{4}(12x) - \frac{1}{4}(36) + 7$

$= -\frac{1}{4}x^2 - 3x - 9 + 7$

$\therefore y = -\frac{1}{4}x^2 - 3x - 2$ is the equation in standard form.

Today's Homework:

p.232 # 2def, 4 **AND**
pp. 203-205 # 1 – 4, 8 – 10 **AND**
Work ahead on Mid-chapter Review: p. 226 # 1 – 4