Present Tuesday: 7.7 #14, 27, [43&45]

9:55 Jared Taf., Briana, Rachel, Jena, Rebekah Wol., Luke Ack.
11:00 Kayla Tet., Kelly, Calli, Molly, Tyson You., Colin Abe.

Quadratic Functions and Applications

Homework: 8.5 #1-6, 11, 15, 47, 49, 53
(plus the group problem solving tasks from class today)

Present Wednesday: 8.5 #47, 49, 53

9:55 Arie Bac., Kelly, Leigha, Alexis, Ashley, Mae Bre.
11:00 Janessa Bec., Mykki, Brittany, Lauren, Katie, Courtney Hac.

Looking ahead:

* **Wednesday** we will have a (p)Review day, with a selection of problems to work on from our algebra unit.
* **Thursday** we will have project presentations.
* **Monday** we will review for the third exam.
* **Tuesday** is Exam 3.
* **After Exam 3**, you will begin working on a "problem study" that will culminate in the creation of a "digital learning object" that will be shared with others to help prepare them for the Praxis exam.

$$\frac{8\pm\sqrt{48}}{8} = \frac{8\pm\sqrt{16\cdot 3}}{8}$$

$$= \frac{8\pm 4\sqrt{3}}{8}$$

$$= \frac{4(2\pm\sqrt{3})}{2\cdot 4} = \frac{2\pm\sqrt{3}}{2}$$

$$\frac{8\pm 4\sqrt{3}}{8} = \frac{4(2\pm\sqrt{3})}{8\cdot 2}$$

$$= \frac{2\pm\sqrt{3}}{2} = \frac{2}{2}\pm\frac{\sqrt{3}}{2}$$

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

$$\frac{8}{8}+\frac{4\sqrt{3}}{8}$$

$$\frac{4}{13}+\frac{7}{13} = \frac{11}{13}$$

25) $(2x-5)^2 = 13$

$$2x-5 = \pm\sqrt{13}$$

$$\frac{2x}{2} = \frac{5}{2}\pm\frac{\sqrt{13}}{2}$$

$$x = \frac{5}{2}\pm\frac{\sqrt{13}}{2} = \frac{5\pm\sqrt{13}}{2}$$

$$x\in\left\{\frac{5}{2}+\frac{\sqrt{13}}{2},\ \frac{5}{2}-\frac{\sqrt{13}}{2}\right\}$$

$$\frac{5 \pm \sqrt{20}}{2} = \frac{5 \pm \sqrt{4 \cdot 5}}{2} = \frac{5 \pm \sqrt{4} \cdot \sqrt{5}}{2}$$

$$\sqrt{a \cdot b} = \sqrt{a} \cdot \sqrt{b}$$

$$= \frac{5 \pm 2\sqrt{5}}{2}$$

$$= \frac{5}{2} \pm \sqrt{5}$$

a) $\sqrt{12} = \sqrt{4} \cdot \sqrt{3} = 2\sqrt{3}$

$\sqrt{ab} = \sqrt{a} \cdot \sqrt{b}$

b) $\sqrt{75} = \sqrt{25} \cdot \sqrt{3}$

$= 5\sqrt{3}$

c) $\sqrt{20} = \sqrt{4} \cdot \sqrt{5} = 2\sqrt{5}$

After reviewing the correct solution (below), write your score on the back of your quiz.

0 = no progress at all; just rewrote problem
0.5 = false start, not based on relevant principles
1 = false start, but sustained effort with some relevant principles
1.5 = significant mistake(s), or significant misunderstanding(s)
2 = mistake near the end or could not finish; also excessive reliance on calculator or 'brute force' methods
2.5 = trivial mistake (e.g. arithmetic error), but work is mostly correct
3 = correct answer and work

Mth126 Quick Quiz
Tue 4/19/2011

Name: _____
Section: 9:55 11:00

a) Factor using the CFQ method: $3x^2 + 16x - 12$.

$ac = -36$
target: 16
$(+18)(-2) = -36$ ✓
$18 - 2 = 16$ ✓

$\frac{(3x + 18)(3x - 2)}{3} = \frac{3(x + 6)(3x - 2)}{3} = (x + 6)(3x - 2)$.

b) Solve by completing the square: $x^2 - 18x + 14 = 0$.

$x^2 - 18x + 81 = -14 + 81 \Rightarrow (x - 9)^2 = 67$

$(-9)^2$

$\Rightarrow x - 9 = \pm\sqrt{67}$

$\Rightarrow x = 9 \pm \sqrt{67}$ ≈ 17.19 or +0.81

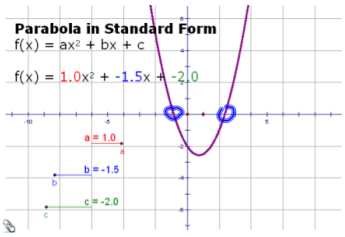
As we have seen: *quadratic equations* are those which can be written in the form:

$ax^2 + bx + c = 0$ (where $a \neq 0$)

The left hand side of a quadratic equation is a *quadratic function*. In *standard form*, it is written this way:

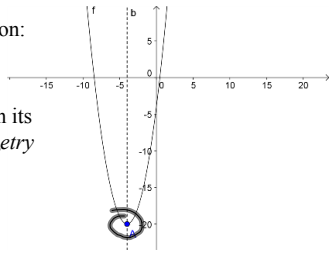
$f(x) = ax^2 + bx + c$ → a>0 ++ a<0 −−

Its graph y = f(x) is a parabola:



Consider the quadratic function:

$f(x) = x^2 + 8x - 4$

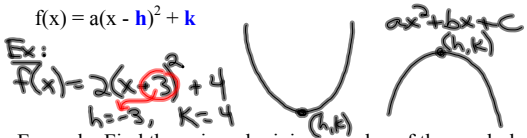


Its graph is shown, along with its *vertex* A and its *axis of symmetry* (dotted).

By completing the square, we can locate the vertex and axis precisely. (Note: the vertex corresponds to the minimum of the parabola, which is often of practical significance.)

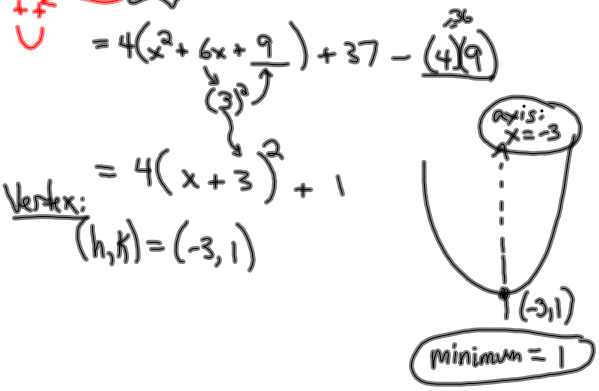
Vertex form: By completing the square, we put the quadratic function in *vertex form*, where the vertex (h, k) is easy to read off:

$f(x) = a(x - \mathbf{h})^2 + \mathbf{k}$



Example: Find the axis and minimum value of the parabola described by the quadratic function:

$f(x) = 4x^2 + 24x + 37$

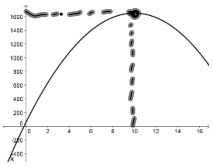


Vertex form: By completing the square, we put the quadratic function in *vertex form*, where the vertex (h, k) is easy to read off:

$f(x) = a(x - \mathbf{h})^2 + \mathbf{k}$

Example: A cannon ball is launched from a 50 foot tall guard tower. Find the maximum height of the cannon ball if its height after *t* seconds is given by the function:

$h(t) = -16t^2 + 320t + 50.$



$= -16(t^2 - 20t) + 50$

$= -16(t^2 - 20t + 100) + 50 + 1600$

(notice this parabola 'opens downward', so the vertex corresponds to a *maximum*)

$= -16(t - 10)^2 + 1650$

$(h, k) = (10, 1650)$

Max height is 1,650 feet.

Do #1, just complete the square to find the vertex.