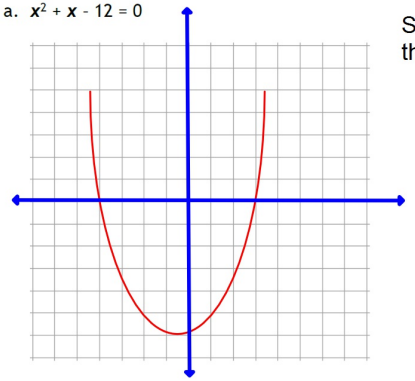
Topic 6: Polynomial Equations

Agilemind website: Exploring "Quadratic Equations" Page 6

SAS2 - Question #8 a,b

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



Since this graph has two x-intercepts the equation must have 2 real solutions.

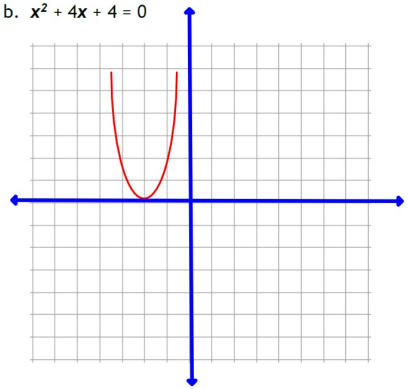
$x^2 + x - 12 = 0$

-12, $+4$, -3, $+1$

$(x+4)(x-3)=0$

$x = -4, 3$

b. $x^2 + 4x + 4 = 0$



Since the vertex is the only x-intercept this equation must have only one real solution.

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

$+4$, $+2$, $+2$, $+4$

$(x+2)(x+2)=0$

$x=-2$

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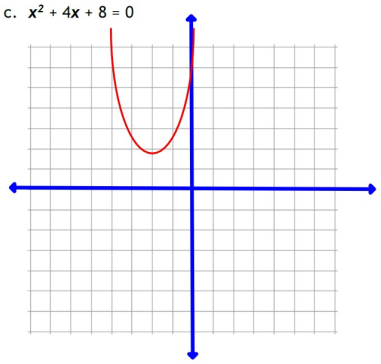
SAS2 - Question #8 c

c. $x^2 + 4x + 8 = 0$



Since the parabola has no x-intercepts there must be no real solutions to the equation.

If you tried using the Quadratic Formula $b^2 - 4ac = -16$.

$h(t) = -t^2 + 4t + 24$

Suppose this equation models the height (as a function of time) of an object that is shot into the air from an initial height of 24ft.

Find the amount of time it would take to hit the ground? $h = 0$

$0 = -t^2 + 4t + 24$

$a = -1$ $\quad b^2 - 4ac = 112$

$b = 4$

$c = 24$ $\quad t = \frac{-4 \pm \sqrt{112}}{-2}$

$t = -3.29$ & 7.29

Since negative time doesn't make sense in this situation the only answer is

t = 7.29 sec

Solve. $(x+3)^2 - 16 = 0$

If a quadratic equation is in Vertex Form, you can solve the equation using Square Roots.

$(x+3)^2 - 16 = 0$

$+16 \quad +16$

$\sqrt{(x+3)^2} = \sqrt{16}$

$x + 3 = \pm 4 - 3$

-3

$x = \begin{cases} +4 - 3 = 1 \\ -4 - 3 = -7 \end{cases}$

$x = -7, 1$

Use this quadratic function: $0 = -x^2 + 4x + 24$

How could you write the quadratic in Vertex Form?

1ST Find the Vertex

a. use LOS to find x-coord $x = \frac{-b}{2a} = \frac{-4}{2(-1)}$ $x = 2$

b. Substitute $x=2$ to find the y-coord $y = -(2)^2 + 4(2) + 24 = 28$

Vertex $(2, 28)$

$a = -1$ (same as a in Std Form)

Vertex Form: $y = -(x-2)^2 + 28$

Since the equation is now in Vertex Form you could then choose to solve using Square Roots.

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SAS2 - Question #9

You can also use Square Roots to solve a Quadratic Equation when in Standard Form b=0

9. **REINFORCE** The height of a tomato dropped from 16 feet above the ground is given by the function $h(t) = -16t^2 + 16$. How long will it take for the tomato to hit the ground?

$h = 0$

$0 = -16t^2 + 16$

$-16 \quad -16$

$\frac{-16}{-16} = \frac{-16t^2}{-16}$

$\sqrt{1} = \sqrt{t^2}$ $\quad t = \pm 1$

since t represents time in this situation and negative time doesn't make sense, the only answer is

t = 1 sec

Hwk #29

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SAS2: questions 10 a-d, 11, 12a,b