Solve each quadratic equation using the Quadratic Formula. Round real solutions to the nearest hundredth. Leave imaginary solutions in simplified form.

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

1. $-2x^2 - 42x = 71$

$-2x^2 - 42x - 71 = 0$ $\quad b^2 - 4ac = 1196$

$x = -19.15$ & -1.85 $\quad 42 \pm \sqrt{1196}$

2. $24x^2 + 84x + 73.5 = 0$

-4

$b^2 - 4ac = 0$

$x = \frac{-84}{48} = -1.75$

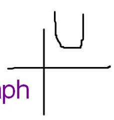
Solving Quadratic Equations:

1. Factoring. Works only if quadratic is factorable.
2. Square Roots. Works only if b=0
3. Graphing. Works only if solutions are real #'s
4. Quadratic Formula. **ALWAYS WORKS!**

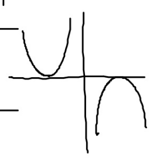
Discriminant: $\boxed{b^2 - 4ac}$

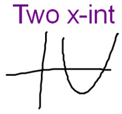
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

How many and what type of solutions are possible?



2 complex sol's	$b^2 - 4ac < 0$	No x-int of graph
1 real sol	$b^2 - 4ac = 0$	One x-int of graph
2 real sol's	$b^2 - 4ac > 0$	Two x-int of graph





Complex solutions using the Quadratic Formula

When $b^2 - 4ac$ is negative the equation has complex/imaginary solutions.

For these you'll be asked to leave your answer in simplified radical form.

Solve each of these quadratics using the Quadratic Formula.

1. $x^2 - 10x + 29 = 0$

2. $x^2 + 8x + 19 = 0$

3. $9x^2 - 42x + 50 = 0$

1. $x^2 - 10x + 29$

$b^2 - 4ac = -16$

$$\frac{10 \pm \sqrt{-16}}{2} = \frac{10 \pm 4i}{2} = 5 \pm 2i$$

2. $x^2 + 8x + 19$

$b^2 - 4ac = -12$

$$\frac{-8 \pm \sqrt{-12}}{2} = \frac{-8 \pm 2i\sqrt{3}}{2}$$

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

3. $9x^2 - 42x + 50$

$b^2-4ac = -36$

$$\frac{42 \pm \sqrt{-36}}{18}$$

$$\frac{42\pm 6i}{18} = \frac{7\pm i}{3}$$

An object is shot upward with an initial velocity of 88 ft/sec from a height of 49 feet. The following equation models the height of the object as a funciton of time: $h(t)= -16t^2 + 88t + 49$

Will the object ever reach each height?
If yes, how many times?

One way to answer these is to find the vertex (max ht and time)

$t = \frac{-b}{2a} = \frac{-88}{2(-16)} = 2.75$ sec

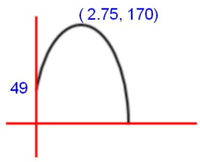
Find the height by substituting this time into the eq: $h(2.75)=170$ ft

1. 140 ft ?

Using the sketch and the vertex it appears that the object will reach a ht of 140 ft twice, once on the way up to the max and once more on the way down to the ground.

2. 190 ft ?

Using the sketch and the vertex the object will not reach a ht of 190 ft because its max ht is only 170 ft.



3. 170 ft ?

This is the max ht so it will be that height only one time.

4. 30 ft ?

Using the sketch and the vertex it appears that the object will only be 30 ft high one time, on the way down to the ground

An object is shot upward with an initial velocity of 88 ft/sec from a height of 49 feet. The following equation models the height of the object as a funciton of time: $h(t)= -16t^2 + 88t + 49$

Another way to answer these questions is using the discriminant and the quadratic formula.

Will the object ever reach each height?
If yes, how many times?

1. 140 ft ?

$b^2-4ac=$ pos
Yes 2 times

Since $b^2 - 4ac = 1920$ there are two real solutions. Using the Quad Formula give two pos answers so both sol are possible.

2. 190 ft ?

$b^2-4ac=$ neg
NO

$b^2 - 4ac = -1280$ which means there is no real solution...the object will never reach a ht of 190 ft.

3. 170 ft ? $b^2-4ac=0$
Yes 1 time

Since $b^2 - 4ac=0$ there is only 1 real sol which means the object will only reach this ht once.

4. 30 ft ? Yes 1x $b^2-4ac=$ pos

$b^2 - 4ac = 8960$

But, using the Quad Formula one answer will be negative, therefore, it won't make sense. The object will reach this ht only once.