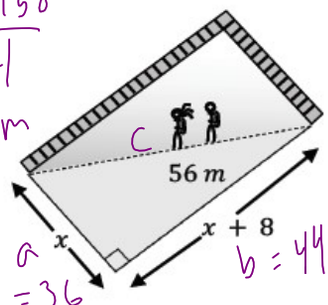
Section 4 – Topic 9
Solving Quadratic Equations Using the Quadratic Formula – Part 2

We can also use the quadratic formula to solve real-world problems.

Let's Practice!

1. Charles lives on a golf course on a corner lot. Often, golfers cut across his lot to save walking distance. Given the diagram below, approximate - to the nearest meter - how many meters of walking distance are saved by cutting across their property instead of walking around the lot.



$a^2+b^2=c^2$

$x^2+(x+8)^2=56^2$

$x^2+(x^2+16x+64)=3136$

$2x^2+16x+64=3136$

$-3136 \quad -3136$

$2x^2+16x-3072=0$

$\frac{-16\pm\sqrt{(16)^2-2(4)(-3072)}}{2(2)}$

$\frac{-16\pm\sqrt{324+24576}}{4}$

$\frac{-16\pm\sqrt{24900}}{4}=\frac{-16\pm158}{4}$

$\frac{-16-158}{4}$ $\frac{-16+158}{4}$

$\frac{142}{4}=36m$

$36+44=80$

$80-56=24m$ saved $=36$

$a=x$

$b=44$

$(2x+1)(2x+1)$

$4x^2+2x+2x+1$

BEAT THE TEST!

Consider the quadratic equation shown.

$$-5x^2 + 7x - 8 = (2x+1)^2$$

$-5x^2+7x-8 = 4x^2+4x+1$

$-4x^2-4x-1 \quad -4x^2-4x=1$

$\frac{-9x^2+3x-9}{3} = 0$

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

Pick values from the left column to write them in the boxes to complete the solution to the equation.

−1
−6
−35
36
1
6
35
36
i

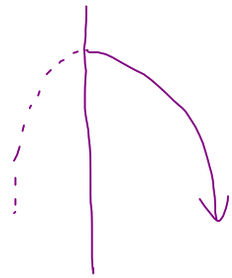
$$x = \frac{1 \pm i\sqrt{35}}{6}$$

$\frac{-1 \pm \sqrt{(1)^2-4(-3)(-3)}}{2(-3)}$

$\frac{-1 \pm \sqrt{1-36}}{-6} = \frac{-1 \pm \sqrt{-35}}{-6}$

$\frac{-1 \pm i\sqrt{35}}{-6} =$

2. The Lower Falls in the Grand Canyon have a height of 308 feet. A pebble is thrown upward from the top of the falls with an initial velocity of 15 feet per second. Assume there is no air resistance.



Part A: How many seconds will it take the pebble to hit the ground? Round your answer to the nearest tenth of a second.

$-16t^2+15t+308=0$

$$\frac{-15\pm\sqrt{(-15)^2-4(-16)(308)}}{2(-16} = \frac{-15\pm\sqrt{225+19712}}{-32} = \frac{-15\pm\sqrt{19937}}{-32}$$

$$\frac{-15\pm 141.2}{-32} \qquad \frac{-15-141.2}{-32} = \frac{-156.2}{-32} = 4.9 \text{ seconds}$$

Part B: How long after the pebble is thrown will it be 75 feet from the ground? Round your answer to the nearest tenth of a second.

$-16t^2+15t+308=75$

$-75 \quad -75$

$-16t^2+15t+233=0$

$\frac{-15\pm\sqrt{225-4(-16)(233)}}{-32} = \frac{-15\pm\sqrt{225+14912}}{-32} = \frac{-15\pm\sqrt{15137}}{-32}$

$\frac{-15\pm 122.11}{-32} \quad \frac{-15-122.11}{-32} = \frac{-137.11}{-32} = 4.3$ seconds