What Music Do Barbers and Tailors Play Together?

1.) $x^2 + 8 = 6x$
$x^2 - 6x + 8 = 0$
O { 2, 4}

2.) $x^2 - 15 = 2x$
$x^2 - 2x - 15 = 0$
U { -3, 5}

3.) $2x^2 + x - 6 = 0$
T { 3/2, 2}

4.) $4x^2 - 7 = 18$
$4x^2 - 25 = 0$
O{ -5/2, 5/2}

7.) $x^2 + (x+1)^2 = 41$
$2x^2 + 2x - 40 = 0$
N { -5, 4}

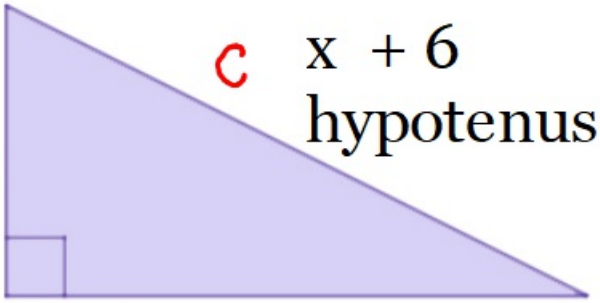
8.) $x^2 + 3(x+2) = 24$
$x^2 + 3x - 18 = 0$
S{ 3, 5}

9.) $(x+2)^2 - 2x = 52$
$x^2 + 2x - 48 = 0$
I {6, -8}

10.) $x^2 + (x+2) = 22$
$x^2 + x - 20 = 0$
H {-5, 4}

Pythagorean Theorem with Quadratics

The larger leg of a right triangle is 3 centimeters longer than its smaller leg. The hypotenuse is 6 centimeters longer than the smaller leg. How many centimeters long is the smaller leg? → x =



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

$(x)^2+(x+3)^2=(x+6)^2$

$x^2+x^2+6x+9=x^2+12x+36$

$2x^2+6x+9=x^2+12x+36$

$-x^2-12x-36 \quad -x^2-12x-36$

$x^2-6x-27=0 \quad a=1 \; b=-6 \; c=-27$

$(x-9)(x+3)=0$

$ac=-27$

-1	27
-3	9

$x-9=0 \quad x+3=0$

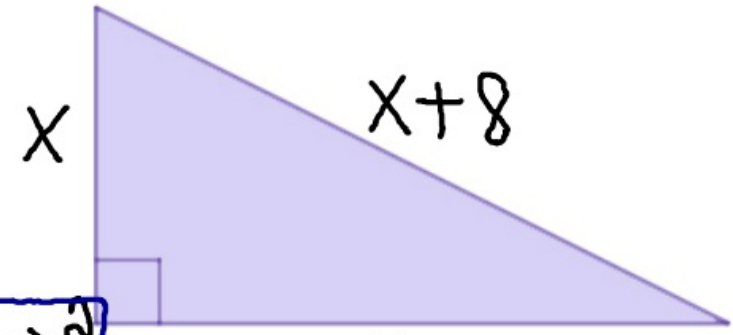
$+9+9$

$x=9$ cm

Pythagorean Theorem with Quadratics

The larger leg of a right triangle is 7 inches longer than its smaller leg. The hypotenuse is 8 inches longer than the smaller leg. How many centimeters long is the smaller leg?

Label your picture!



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

$(x)^2+(x+7)^2=(x+8)^2$

$x^2+x^2+14x+49=x^2+16x+64$

$2x^2+14x+49=x^2+16x+64$

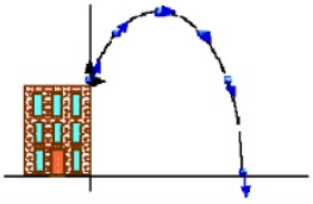
$-x^2-16x-64 \quad -x^2-16x-64$

$x^2-2x-15=0$

$(x-5)(x+3)=0$

$x-5=0$

$x=5$ in.



PROJECTILE MOTION

$X = t \quad Y = h$

1. A soccer ball is kicked from the ground with an initial upward velocity of 90 feet per second. The equation $h = -16t^2 + 90t$ gives the height h of the ball after t seconds.

1a. 126.56 ft.

b. 5.625 sec

a. Find the maximum height of the ball.

$t = \frac{-90}{2(-16)} = 2.8125$

$h = -16(2.8125)^2 + 90(2.8125)$

$h = 126.5625$

b. How many seconds will it take for the ball to reach the ground?

$-16t^2 + 90t = 0$

$t =$

$-2t(8t - 45) = 0$

$\frac{-2t}{-2} = \frac{0}{-2}$ ~~$8t - 45 = 0$~~

$t = 0$ ~~$+45 \quad +45$~~

~~$\frac{8t}{8} = \frac{45}{8}$~~

2. An apple is launched directly upward at 64 feet per second from a platform 80 feet high. The equation for this apple's height h at time t seconds after launch is $h = -16t^2 + 64t + 80$.

2a. 144 ft.

b. 5 sec.

a. Find the maximum height of the apple.

$t = \frac{-64}{2(-16)} = 2$ $h = -16(2)^2 + 64(2) + 80$

$h = 144$

b. How many seconds will it take for the apple to reach the ground?

$-16t^2 + 64t + 80 = 0$

$-16(t^2 - 4t - 5) = 0$

$(t+1)(t-5) = 0$

$t+1=0$ $t-5=0$

$t = -1$ $t = 5$

3. In science class, the students were asked to create a container to hold an egg. They would then drop this container from a window 25 feet above the ground. The equation $h = -16t^2 + 25$, gives the container's height h after t seconds.

3a. 25 ft.

b. 1.25 sec

a. Find the maximum height of the container.

$t = \frac{0}{2(-16)} = 0 \quad h = -16(0)^2 + 25$

b. How many seconds will it take for the container to reach the ground?

$-16t^2 + 25 = 0$

$-1(16t^2 - 25) = 0 \quad -1 = 0$

$-1(4t - 5)(4t + 5) = 0$

$4t - 5 = 0$

$+5 \quad +5$

$\frac{4t}{4} = \frac{5}{4}$

4. A penny is dropped off the Empire State Building, ~~which is 1,250 feet tall~~. If the penny's pathway can be modeled by the equation $h = -16t^2 + 1250$, how long would it take the penny to strike a 6 foot tall person?

4. 8.82 s

$-16t^2 + 1250 = 6$

$-6 \quad -6$

$-16t^2 + 1244 = 0$

Desmos $t = 8.82$

5. Some fireworks are fired vertically into the air from the ground at an initial speed of 80 feet per second. The equation for this object's height h at time t seconds after launch is $h = -16t^2 + 80t$. How long will it take the fireworks to reach the ground?

5. 5 sec.

$-16t^2 + 80t = 0$

6. The Apollo's Chariot, a rollercoaster at Busch Gardens, moves at 110 feet per second. The equation of the ride can be represented by the equation $h = -16t^2 + 101t + 10$. What is the maximum height reached by this ride?

↳ "y" of vertex

6. 169.39 ft.

7. Eva is jumping ~~on a trampoline~~. Her height h at time t can be modeled by the equation $h = -16t^2 + 20t + 6$. Would Eva reach a height of 14 feet?

$-16t^2+20t+6=14$

$-14 \quad -14$

$-16t^2+20t-8=0$

7. no

8. An astronaut on the Moon throws a baseball upward with an initial velocity of 10 meters per second, letting go of the baseball 2 meters above the ground. The equation of the baseball pathway can be modeled by $\boldsymbol{h = -0.8t^2 + 10t + 2}$. The same experiment is done on Earth, in which the pathway is modeled by equation $\boldsymbol{h = -4.9t^2 + 10t + 2}$. How much longer would the ball stay in the air on the Moon compared to on Earth?

8. _____

Challenge!

One leg of a right triangle exceeds the other leg by four inches. The hypotenuse is 20 inches. Find the length of the shorter leg of the right triangle.