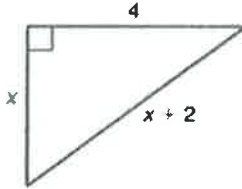


Connecting Pythagorean Theorem to Algebra...

a) Find the value of x .



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

$$(4)^2 + (x)^2 = (x+2)^2 \leftarrow \text{two factors of } (x+2) \text{ so FOIL}$$

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

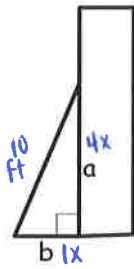
$$16 + x^2 = x^2 + 4x + 4$$

$$16 = 4x + 4$$

$$12 = 4x$$

$$x = 3$$

b) To prevent a ladder from shifting, safety experts recommend that the ratio of $a:b$ be 4:1. How far from the base of the wall should you place the foot of a 10-foot ladder? Round to the nearest inch.



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

$$(4x)^2 + (x)^2 = 10^2$$

$$16x^2 + x^2 = 100$$

$$\frac{17x^2}{17} = \frac{100}{17}$$

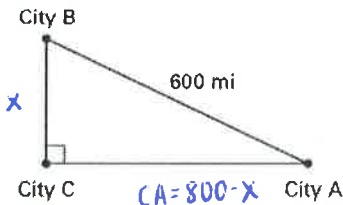
$$x = \sqrt{\frac{100}{17}} \approx \cancel{-2.43} \text{ or } 2.43$$

$$\text{base} = 1(2.43)$$

$$= 2.43$$

You should place the ladder 2.43 ≈ 2 ft 5 in from the base of the wall

c) A small commuter airline flies to three cities whose locations form the vertices of a right triangle. The total flight distance (from City A to City B to City C and back to City A) is 1400 miles. It is 600 miles between the two cities that are furthest apart. Find the other two distances between cities.



Total perimeter = 1400 miles
- 600 miles ← hypotenuse
800 miles to share b/w the two legs

$$x + CA + 600 = 1400$$

$$x + CA = 800$$

$$CA = 800 - x$$

When $x = 541.4$:
BC = 541.4
CA = 258.6
When $x = 258.6$:
BC = 258.6
CA = 541.4

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

$$x^2 + (800 - x)^2 = 600^2$$

$$x^2 + (800 - x)(800 - x) = 360000$$

$$x^2 + 640000 - 800x - 800x + x^2 = 360000$$

$$2x^2 - 1600x + 640000 = 360000$$

$$2x^2 - 1600x + 280000 = 0$$

$$\frac{800 \pm \sqrt{(-1600)^2 - 4(2)(280000)}}{2} = \frac{800 \pm \sqrt{800000}}{2}$$

$$= \frac{800 + \sqrt{800000}}{2} = 541.4$$

$$= \frac{800 - \sqrt{800000}}{2} = 258.6$$

$$\frac{2(x^2 - 800x + 140000)}{2} = 0 \Rightarrow x^2 - 800x + 140000 = 0$$

↑ use Quadratic Formula