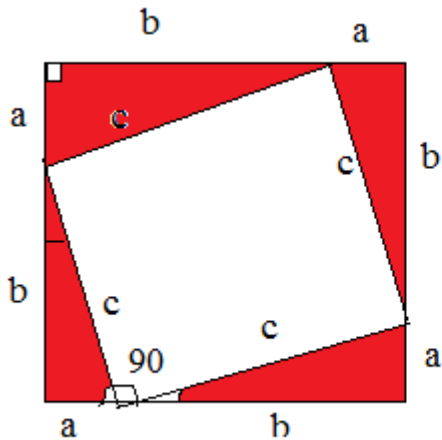


### Pythagorean Theorem Proof



Inside is a square!

$$\text{Area big square} = (a+b)(a+b)$$

$$\begin{aligned}\text{Area big square} &= \text{Small square} + \\ &\quad 4 * \text{Triangle} \\ &= c * c + 4 * (1/2) * a * b\end{aligned}$$

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$$(a + b)^2 = c^2 + 4 \times \frac{1}{2} ab$$

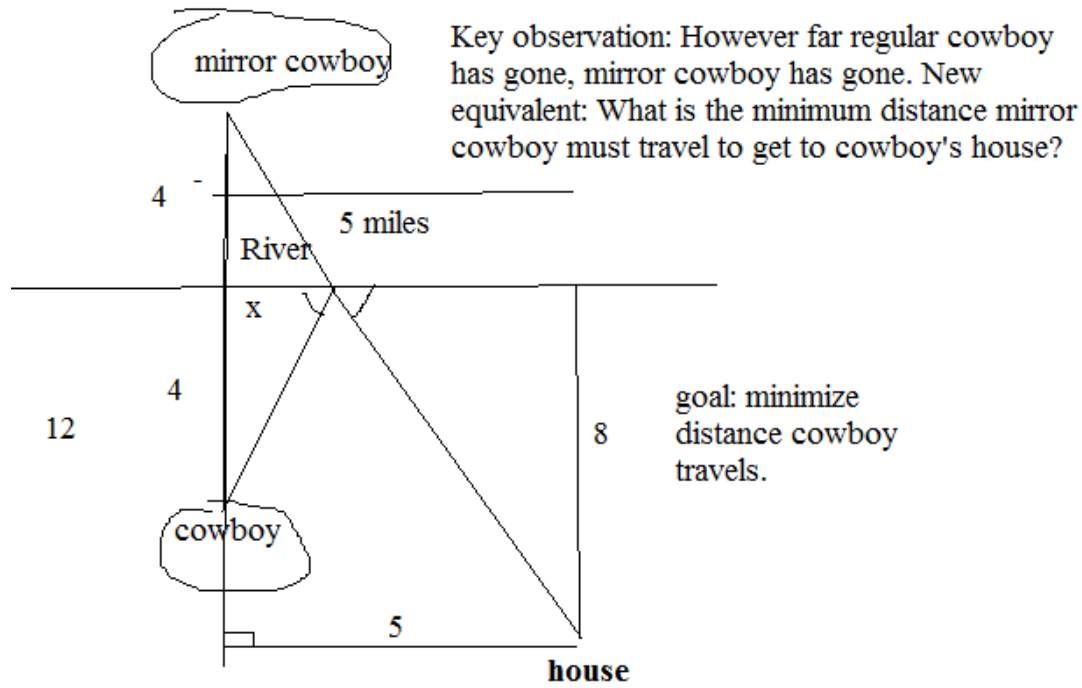
$$(a + b)^2 = c^2 + 2ab$$

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

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

### Mirror Cowboy Problem

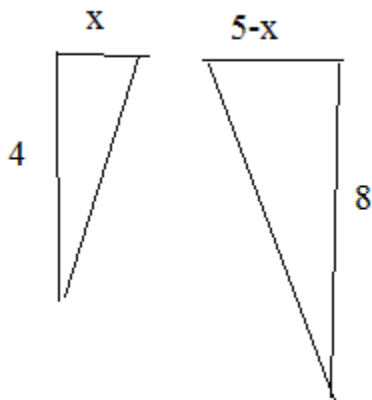
A cowboy is 4 miles south of a river. The river runs East-West. He needs to go to the river so his horse can get some water, and then head home. His house is 4 miles south and 5 miles east of his current location. What's the shortest distance he can travel to get to the river and then to his house?



Answer: Mirror cowboy goes in a straight line!

$$Distance = \sqrt{12^2 + 5^2} = \sqrt{144 + 25} = \sqrt{169} = 13$$

To solve for x, use similar triangles:



$$\frac{x}{4} = \frac{5-x}{8}$$

$$8x = 4(5-x)$$

$$8x = 20 - 4x$$

$$12x = 20$$

$$x = \frac{5}{3}$$