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part 1.

1. the joke is about three India women, a woman with her son, the son weighed 140 pounds. a buffalo skin woman and her son weighed 160 pounds and a hippopotamus skin woman weighed 300 pounds. A native American mathematician saw this and noted that the square on the hippopotamus was equal to the sums of the squares on the other two sides.

$$2. \quad a = m^2 - n^2 \quad b = 2mn \quad c = m^2 + n^2$$

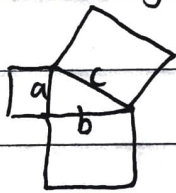
$$a^2 + b^2 = m^2 - n^2 + 2mn$$

$$\text{when } m=2 \quad n=1$$

$$a=3 \quad b=4 \quad c=5$$

$$3^2 + 4^2 = 5^2$$

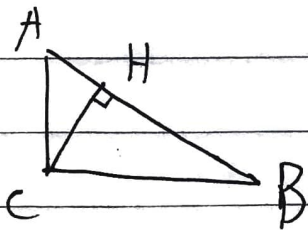
part 2. Pythagorean Theorem is a set of positive integers a, b, c satisfy $a^2 + b^2 = c^2$.



$$\text{when } a=3 \quad b=4 \quad c=5$$

$$a^2=9 \quad b^2=16 \quad c^2=25$$

it's correct



$\triangle ACH$ and $\triangle ABC$ are similar triangle:

$$\frac{BC}{AB} = \frac{BH}{BC} \quad \frac{AC}{AB} = \frac{AH}{AC}$$

$$\text{so } BC^2 = AB \cdot BH \quad AC^2 = AB \cdot AH$$

$$BC^2 + AC^2 = AB \cdot BH + AB \cdot AH = AB^2$$