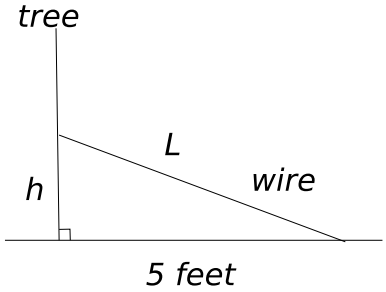
Task. A tree is supported by a wire anchored in the ground 5 feet from its base. The wire is one foot longer than the height that it reaches on the tree. Find the length of the wire.

Solution. Consider the figure:



Let L be the length of the wire and h be the height where it reaches the tree. Then by assumption

$$h = L - 1.$$

On the other hand by Pythagorean theorem from the right triangle we get:

$$L^2 = h^2 + 5^2.$$

Substituting $h = L - 1$ we obtain

$$L^2 = (L-1)^2 + 5^2,$$
$$L^2 = L^2 - 2L + 1 + 25,$$
$$2L = 26,$$
$$L = 13\,\text{feet}.$$

Answer. $L = 13$ feet.