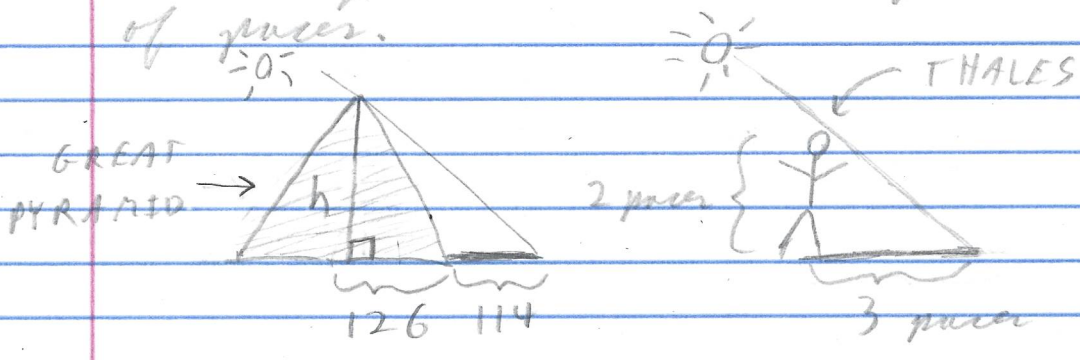


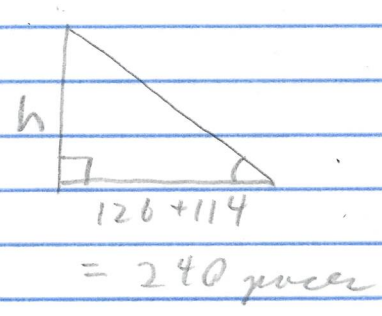
Exercise A.2.53 How tall do the Great Pyramid?
 The ancient Greek philosopher Thales of Miletus is reported on one occasion to have visited Egypt and calculated the height of the Great Pyramid of Cheops by means of shadow reckoning. Thales knew that each side of the base of the pyramid was 252 paces and that his own height was 2 paces. He measured the length of the pyramid's shadow to be 114 paces and determined the length of his shadow to be 3 paces. Using similar triangles, determine the height of the Great Pyramid in terms of the number of paces.



Solution

Let h be the height of the Great Pyramid. Then the Pyramid and its shadow determine the right triangle:

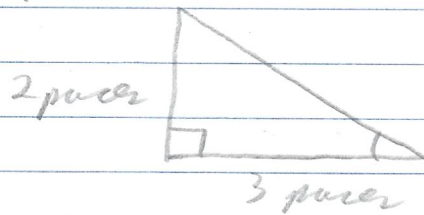
Notice that this triangle only uses half the base of the Pyramid:



$$\frac{252}{2} = 126 \text{ paces.}$$

A. 2.53
continued

Thales and his shadow also determine a right triangle:



Since these two measurements are taken at the same time (this is meant to be implied by the problem), then the altitude of the sun is the same in both cases and so the marked angles are the same in both triangles. Hence, by Angle-Angle of Theorem A. 2. D, the two triangles are similar. So corresponding edges are in proportion.

$$\text{So } \frac{h}{240} = \frac{2}{3} \text{ or } h = \frac{2}{3} (240) \text{ paces}$$

or $h = 160 \text{ paces,}$ \square