## Applications of the Pythagorean Theorem 2

Example 1. Find the diagonal of the rectangular prism on the right.
The diagonal in question is marked with $x$. To find its length, we will use the right triangle shaded in pink.

That right triangle, in its turn, has as one of its legs the diagonal (d) of the bottom square of the prism.

We will first solve for $d$ using the Pythagorean Theorem:

$$
\begin{aligned}
3^{2}+3^{2} & =d^{2} \\
18 & =d^{2} \\
d & =\sqrt{18}
\end{aligned}
$$



We don't need a decimal approximation for $d$, since we this is only an intermediary result. (Since we continue the calculation, it is better to use the exact value, but if not, you would want to keep at least 4 decimals.)

Next, we look at the right triangle with sides $5, d$ or $\sqrt{18}$, and $x$, and use the Pythagorean Theorem. This is left for you to do in exercise 1.

1. Finish solving the problem in Example 1.
2. Find the diagonal of a cube with $15-\mathrm{cm}$ edges. Draw a sketch first.
3. The picture shows a right pyramid with a 12 -inch square as the base.

Find its surface area. (You will need to draw additional lines to the picture.)

4. Calculate the length of the rafter in feet and inches, if...
a. ...the run is 12 ft and the rise is 3 ft

b. ...the run is 12 ft and the rise is 5 ft 3 in .

