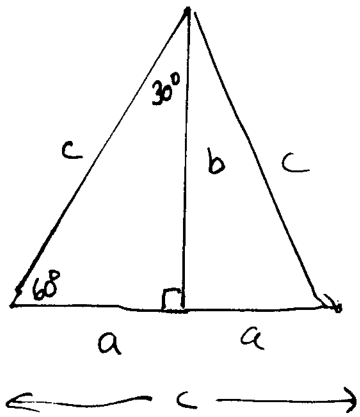
<u>Review of</u> special triangles: $30°-60°-90°$ triangles

Always, in rt. triangles, $a^2+b^2=c^2$



By this geometric trick, also

$$\boxed{c=2a}$$

Substitute into $a^2+b^2=c^2$, get

$$a^2+b^2=(2a)^2$$
$$a^2+b^2=4a^2$$
$$-a^2 \qquad -a^2$$
$$b^2=3a^2$$
$$\sqrt{b^2}=\sqrt{3a^2}$$
$$\boxed{b=a\sqrt{3}}$$

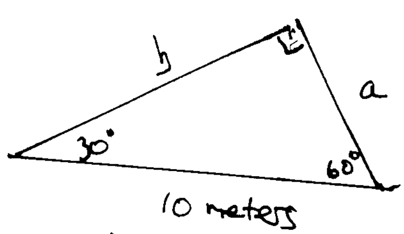
In words, in a $30°-60°-90°$ triangle

(1) the hypotenuse is twice the shortest side,

(2) the medium side is $\sqrt{3}$ times the shortest side.

∴ If you know one side, you know one side, you know all three.

ex:



what is a? $c=2a$

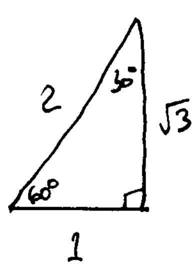
$10=2a$

$a=5$ meters

what is b? $b=a\sqrt{3}$

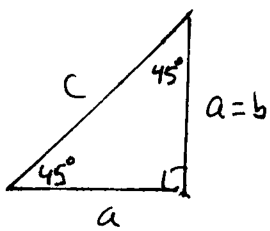
$b=5\sqrt{3}$ meters

Remark:



All $30°-60°-90°$ triangles are similar to this triangle.

Special triangles: $45°-45°-90°$ triangles



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

But also $\boxed{a=b}$. Substitute:

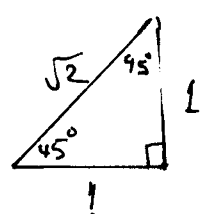
$$a^2+a^2=c^2$$
$$2a^2=c^2$$
$$\sqrt{2a^2}=\sqrt{c^2}$$
$$\boxed{a\sqrt{2}=c}$$

In words: (1) Both legs are shortest.

(2) The hypotenuse is $\sqrt{2}$ times the legs.

Again: If you know one side, you know all three.

Remark:

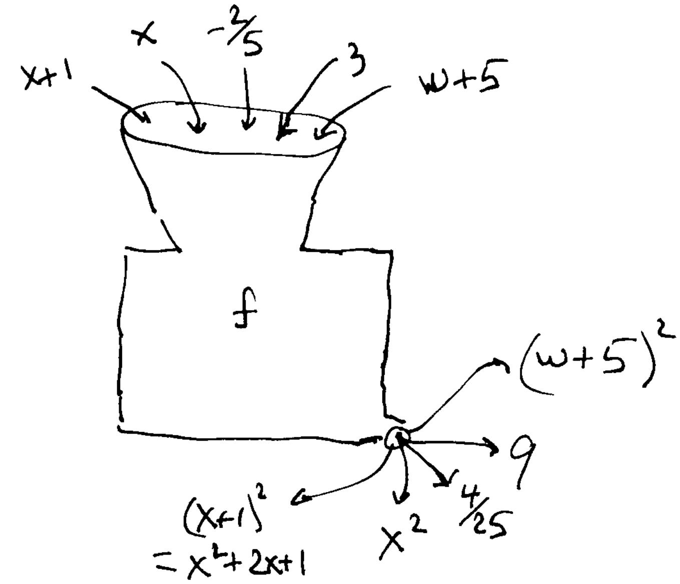


All isosceles right triangles are similar to this one.

Five ways anyone ever thinks about functions

Example the squaring function.

(1) Machine:



(2) Equation $f(x) = x^2$ OR $y = x^2$

$f\left(-\frac{2}{5}\right) = \left(-\frac{2}{5}\right)^2$

$f(x+1) = (x+1)^2$

x = independent variable

y = dependent variable

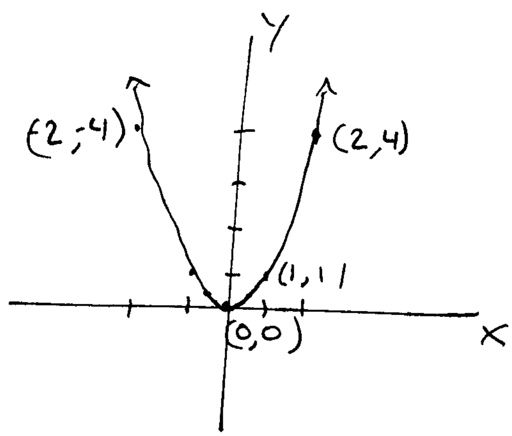
(3) Table of ordered pairs

x	$f(x)$
-3	9
-2	4
-1	1
0	0
1	1
2	4
3	9

Domain of f = all reals

Range of f = $[0, \infty)$

(4) Graph



(5) Mapping