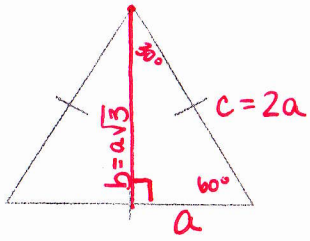
NOTES 9.2: 30° – 60° – 90° TRIANGLES



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

$a^2 + b^2 = (2a)^2$

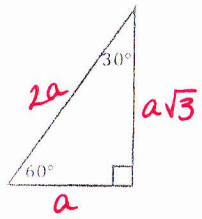
$a^2 + b^2 = 4a^2$

$b^2 = 3a^2$

$\sqrt{b^2} = \sqrt{3a^2}$

$b = a\sqrt{3}$

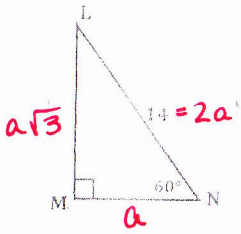
So anytime you are solving for a missing length in a 30° – 60° – 90° triangle, label it like this:



- across from 30° ∡ = a
- across from 60° ∡ = a√3
- across from 90° ∡ = 2a

EXAMPLES: Find the lengths of the missing sides.

1.



LM = $7\sqrt{3}$

MN = 7

* Given the hypotenuse. Solve equation to find a!

$14 = 2a$

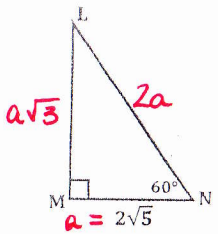
$7 = a$

Plug a in to find other side!

$a\sqrt{3}$

$7\sqrt{3}$

2.



* Given side across from 30° ∡. Already know a!

$a = 2\sqrt{5}$

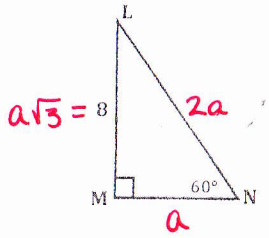
Plug a in to find other two sides!

$2a$: $2(2\sqrt{5})$, $4\sqrt{5}$

$a\sqrt{3}$: $2\sqrt{5}(\sqrt{3})$, $2\sqrt{15}$

LM = $2\sqrt{15}$ LN = $4\sqrt{5}$

3.



* Given side across from 60° ∡. Solve equation to find a!

$(\sqrt{3})\, a\sqrt{3} = 8(\sqrt{3})$

$3a = 8\sqrt{3}$

$a = \frac{8\sqrt{3}}{3}$

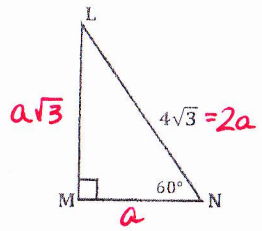
Plug a in to find other side!

$2a$

$2\left(\frac{8\sqrt{3}}{3}\right) = \frac{16\sqrt{3}}{3}$

LN = $\frac{16\sqrt{3}}{3}$ MN = $\frac{8\sqrt{3}}{3}$

4.



* Given the hypotenuse. Solve equation to find a!

$4\sqrt{3} = 2a$

$2\sqrt{3} = a$

Plug a in to find other side!

$a\sqrt{3}$

$2\sqrt{3}(\sqrt{3})$

$2 \cdot 3$

6

LM = 6 MN = $2\sqrt{3}$