# Teaching Notes for Geometry
Homework #3

Overview: In this lesson, students will learn about similar triangles and special right triangles

Preparation: Watch video on "similar triangles" and "smiley and frown face triangles."

If it is a 30-60-90, you redraw it on your paper so that the 30 degree angle is on top, the 90 degree angle is right below it, and the 60 degree angle is to the right of the 90. You then draw a big smiley face on top of the triangle. At the left end of the smile write $\sqrt{3}$ and at the right end write 2 (see drawing). If it is a 45-45-90, you redraw it on your paper so that the 45 is on top, the 90 is directly below it, and the other 45 is to the right of the 90. You then draw a big frown face, tilted slightly to the right, on top of the triangle. At the top of the tilted frown face, you write $\sqrt{2}$ (see drawing).
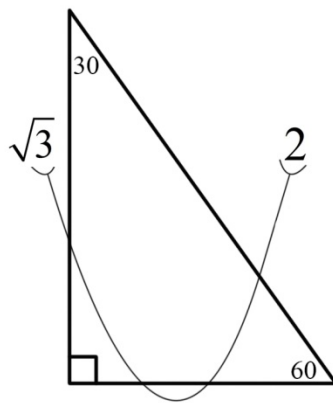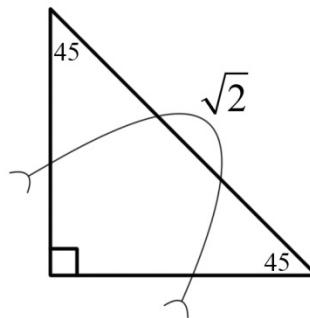
30-60-90 Smiley Face   45-45-90 Frown Face

You will now ride the smiley or frown face like you were on a skateboard, riding up and down a half-pipe at a skateboard park. Your starting place on the picture will be the length of the side that you know. If you are travelling downward on your skateboard, from that position, you divide (this is easy to remember because they both begin with D's – down/divide). If you are travelling upwards, you multiply. For example, if you have a 30-60-90 triangle and you know that the side between the 30 and 60 degree angles is 10, you start riding your skateboard at the top of the right side of the smiley face. You have no choice but to ride downward to the bottom. Since you are going downward, you divide the length from where you started by the number on the face from where you started. Dividing 10 by 2 gives you 5. Therefore, the length of the bottom side (between the 90 and the 60 degree angles) is 5. You now continue riding the half-pipe but this time you are travelling upwards, towards $\sqrt{3}$. Since you are travelling upwards, you multiply the length of the side where you started by the number you are traveling towards. Multiplying 10 by $\sqrt{3}$ gives you $10\sqrt{3}$. Therefore the length of the left side (between the 90 and 30 degree angles) is $10\sqrt{3}$.
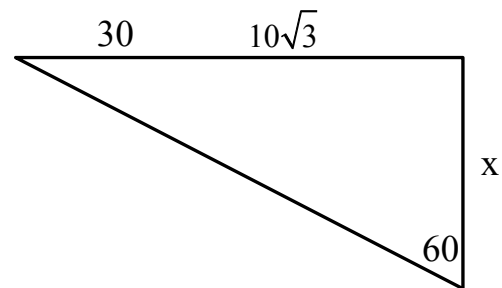
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Classroom Examples:
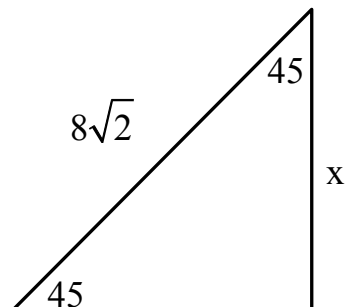
1) If these two triangles are similar, find x.

10   18

x   12
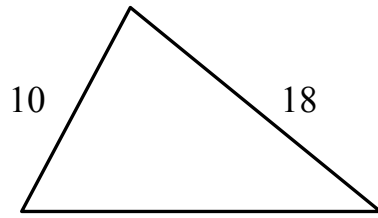
$$x = \frac{20}{3}$$

2) Find x in the following triangle:

30      $10\sqrt{3}$

x

60

$x = 10$

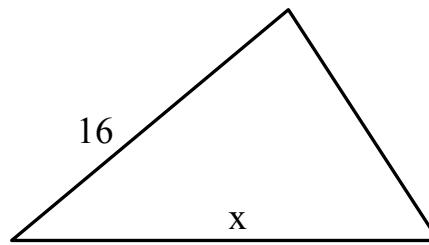3) Find x in the following triangle:
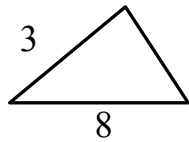
45

$8\sqrt{2}$

x

45

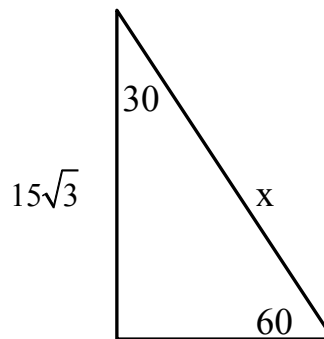$x = 8$

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4)   If these two triangles are similar, find x.

3

8

16

x

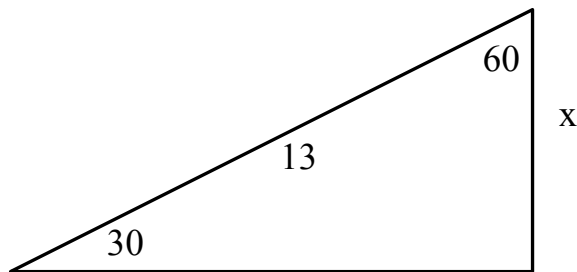$$\frac{8}{3} = \frac{x}{16}$$

$$\frac{8(16)}{3} = x$$

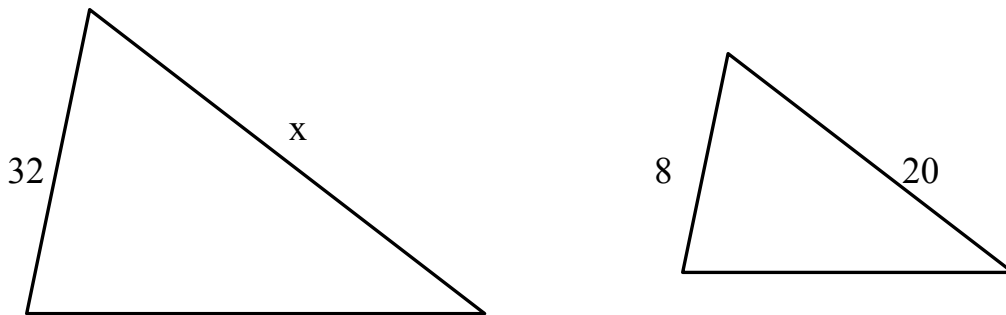$$\frac{128}{3} = x$$

5)   Find x in the following triangle:

30

$15\sqrt{3}$

x

60

$x = 30$

6)   Find x in the following triangle:

60

x

13

30

$$x = \frac{13}{2}$$

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7) If these two triangles are similar, find x.

$$\frac{x}{32} = \frac{20}{8}$$

$$x = \frac{20(32)}{8}$$

$$x = 80$$

8) Interior decorators who design rooms often create scale models on a computer that are a fraction of the size of the actual room but similar in shape. All of the dimensions of the small model are exactly proportional to those of the full-sized room. The height of the model room is 6 inches, and the length of the model room is 10 inches. If the height of the actual room is 18 feet, how long, in feet, is the actual room?

$$\frac{10}{6} = \frac{x}{18}$$

$$\frac{10(18)}{6} = x$$

$$30 = x$$