

**CHAPTER 8: RIGHT TRIANGLES**

**SECTION 8.1: SIMILARITY IN RIGHT TRIANGLES - DAY 1**

**RADICAL REVIEW**

A radical is in simplest form when:

- 1) NO perfect square factor other than 1 is under  $\sqrt{\quad}$
- 2) NO fraction is under the  $\sqrt{\quad}$
- 3) NO fraction has a  $\sqrt{\quad}$  in the denominator.

**EXAMPLE 1**

Simplify.

a) $\sqrt{75} = 5\sqrt{3}$	b) $\sqrt{\frac{2}{5}} = \frac{\sqrt{2}}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{\sqrt{10}}{5}$	c) $2\sqrt{48} = 8\sqrt{3}$	d) $\sqrt{16} \cdot \sqrt{4} = 4 \cdot 2 = 8$
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**YOUR TURN**

Simplify.

a) $\sqrt{50} = 5\sqrt{2}$	b) $3\sqrt{8} = 6\sqrt{2}$	c) $\sqrt{\frac{1}{5}} = \frac{\sqrt{1}}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{\sqrt{5}}{5}$
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**EXAMPLE 2**

$$x^2 + 4^2 = 5^2$$

$$x^2 + 16 = 25$$

$$\sqrt{x^2} = \sqrt{9} \quad |x = 3|$$

**YOUR TURN**

$$x^2 + 3^2 = 4^2$$

$$x^2 + 9 = 16$$

$$\sqrt{x^2} = \sqrt{7} \quad |x = \sqrt{7}|$$

**REMEMBER**

$$\frac{a}{x} = \frac{y}{b} \quad x \text{ and } y \text{ are the means}$$

$$(a : x = y : b)$$

**DEFINITION**

If  $a, b$  &  $x$  are positive numbers and  $\frac{a}{x} = \frac{x}{b}$  then  $x$  is called the geometric mean between  $a$  &  $b$ .

$$x^2 = ab$$

$$x = \pm \sqrt{ab}$$

$$x = \sqrt{ab} \quad (x \text{ must be positive!})$$

**EXAMPLE 3**

Find the geometric mean between 8 and 7.

$$\frac{8}{x} = \frac{x}{7}$$

$$x^2 = 56$$

$$x = 2\sqrt{14}$$

**YOUR TURN**

Find the geometric mean between 6 and 11.

$$\frac{6}{x} = \frac{x}{11}$$

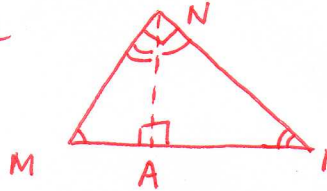
$$x^2 = 66$$

$$x = \sqrt{66}$$

**NOTES SECTION 8.1: SIMILARITY IN RIGHT TRIANGLES**

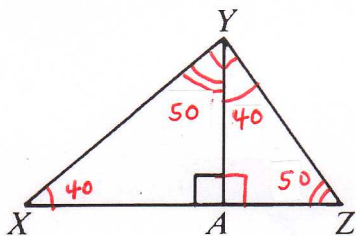
**THEOREM**

If the altitude is drawn to the hypotenuse of a right triangle, then the two triangles formed are similar to the original triangle and to each other.



$\triangle MNP \sim \triangle NAP \sim \triangle MAN$

I-3:  $\angle XYZ$  is a right angle. Complete.



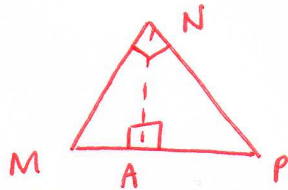
1)  $\overline{YA}$  is the altitude to the hypotenuse of right  $\angle XYZ$ .

2)  $\triangle XYZ \sim \triangle XAY \sim \triangle YAZ$

3) If  $m(\angle YXZ) = 40$ , then  $m(\angle ZYA) = \underline{40^\circ}$ ,  
 $m(\angle YZA) = \underline{50^\circ}$ , and  
 $m(\angle XYA) = \underline{50^\circ}$ .

**COROLLARY**

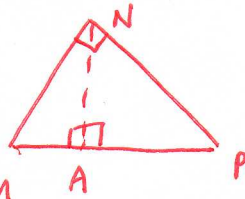
When the altitude is drawn to the hypotenuse of a right triangle, the length of the altitude is the geometric mean between the segments of the hypotenuse.



$$\frac{\text{piece of hyp}}{\text{alt}} = \frac{\text{alt}}{\text{piece of hyp}} \quad \frac{MA}{NA} = \frac{NA}{AP}$$

**COROLLARY**

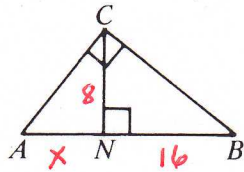
When the altitude is drawn to the hypotenuse of a right triangle, each leg is the geometric mean between the hypotenuse and the segment of the hypotenuse that is adjacent to that leg.



$$\frac{\text{hyp}}{\text{leg}} = \frac{\text{leg}}{\text{piece of hyp adj to leg}}$$

$$\frac{MP}{MN} = \frac{MN}{MA} \quad \frac{MP}{NP} = \frac{NP}{AP}$$

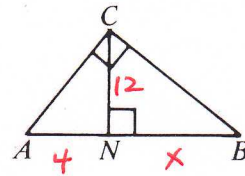
4) If  $CN = 8$  and  $NB = 16$ , find  $AN$ .



$$\frac{x}{8} = \frac{8}{16} \quad 16x = 64$$

$$x = 4$$

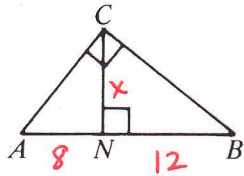
5) If  $AN = 4$  and  $CN = 12$ , find  $NB$ .



$$\frac{4}{12} = \frac{12}{x} \quad 4x = 144$$

$$x = 36$$

6) If  $AN = 8$  and  $NB = 12$ , find  $CN$ .

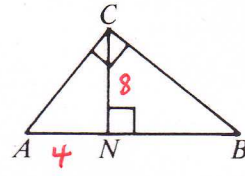


$$\frac{8}{x} = \frac{x}{12} \quad x^2 = 96$$

$$x = \sqrt{96}$$

$$x = 4\sqrt{6}$$

7) If  $AN = 4$  and  $CN = 8$ , find  $AB$ .

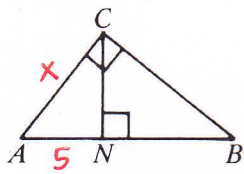


$$\frac{4}{8} = \frac{8}{NB} \quad 4(NB) = 64$$

$$NB = 16$$

$$AB = 20$$

8) If  $AN = 5$  and  $AB = 12$ , find  $AC$ .

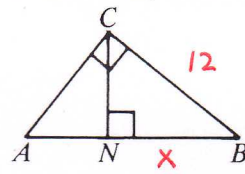


$$\frac{12}{x} = \frac{x}{5} \quad x^2 = 60$$

$$x = \sqrt{60}$$

$$x = 2\sqrt{15}$$

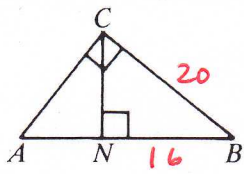
9) If  $AB = 18$  and  $CB = 12$ , find  $NB$ .



$$\frac{18}{12} = \frac{12}{x} \quad 144 = 18x$$

$$x = 8$$

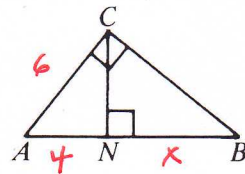
10) If  $CB = 20$  and  $NB = 16$ , find  $AB$ .



$$\frac{AB}{20} = \frac{20}{16} \quad 16(AB) = 400$$

$$AB = 25$$

11) If  $AC = 6$  and  $AN = 4$ , find  $NB$ .



$$\frac{4+x}{6} = \frac{6}{4} \quad 16+4x = 36$$

$$4x = 20$$

$$x = 5$$

★ Look @ page 287 ex 4 ★