

Name: Caleb McWhorter — Solutions

MATH 307

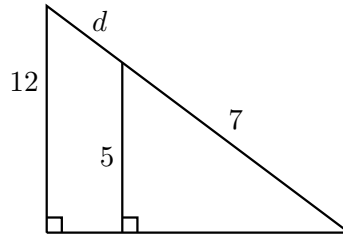
Spring 2023

HW 14: Due 04/26

*“Geometry is the science of correct
reasoning on incorrect figures”*

— George Pólya

Problem 1. (10pt) Consider the right triangles shown below. Find the value of d .



Solution.

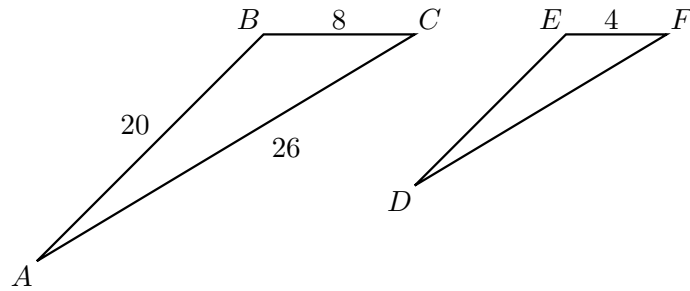
$$\frac{d+7}{12} = \frac{7}{5}$$

$$5d + 35 = 84$$

$$5d = 49$$

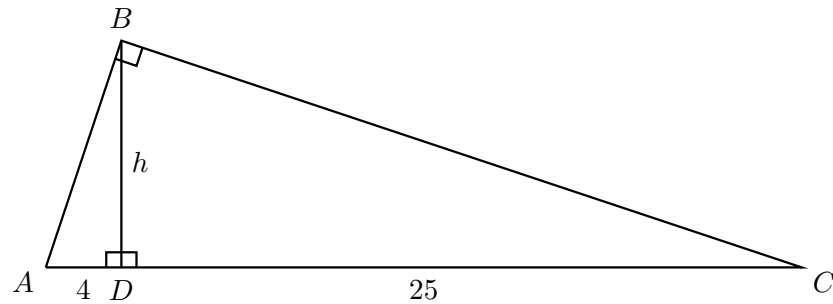
$$d = \frac{49}{5} \approx 9.8$$

Problem 2. (10pt) For the triangles $\triangle ABC$ and $\triangle DEF$, shown below, assume that $\triangle ABC \sim \triangle DEF$. Find the missing sides of $\triangle DEF$.



Solution. Because $\triangle ABC \sim \triangle DEF$, there is a k such that if S is the length of a side of $\triangle ABC$, then $s = kS$ is the length of a side of the corresponding side of $\triangle DEF$. But then we know that $8k = 4$, so that $k = \frac{4}{8} = \frac{1}{2}$. But then we know that $|\overline{ED}| = 20 \cdot \frac{1}{2} = 10$ and $|\overline{AC}| = 26 \cdot \frac{1}{2} = 13$.

Problem 3. (10pt) Consider the triangles shown below.



- (a) Explain why $\triangle ADB \sim \triangle ABC$ and $\triangle BDC \sim \triangle ABC$.
- (b) Does (a) imply that $\triangle ADB \sim \triangle BDC$? Explain.
- (c) Find h .

Solution.

- (a) Notice that $\triangle ADB$ and $\triangle ABC$ share $\angle BAD$ and both are right triangles. Therefore, they share two angles so that they are similar. Similarly, both $\triangle BDC$ and $\triangle ABC$ share $\angle DCB$ and are right triangles. Therefore, they share two angles so that they are similar.
- (b) If two triangles are similar to some triangle, they are similar to each other. Therefore, $\triangle ADB \sim \triangle BDC$.
- (c) We have...

$$\frac{h}{4} = \frac{25}{h}$$

$$h^2 = 100$$

$$h = \sqrt{100}$$

$$h = 10$$