Name: Key

Date: _____

**UNIT 5**

**LESSON 6**

**AIM: HOW DO WE SOLVE PROPORTIONS IN SIMILAR RIGHT TRIANGLES (DAY 2- HLLS)?**

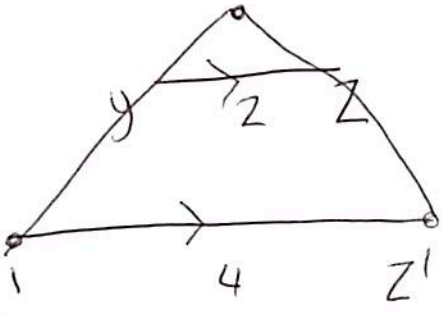
*Do Now:* If $\overline{YZ}$ is dilated by a factor of 2 about a point not on $\overline{YZ}$ to produce the image $\overline{Y'Z'}$, then which of the following is true?

(1) $\overline{Y'Z'} \parallel \overline{YZ}$ and $Y'Z' = \frac{1}{2}YZ$

(2) $\overline{Y'Z'} \perp \overline{YZ}$ and $Y'Z' = \frac{1}{2}YZ$

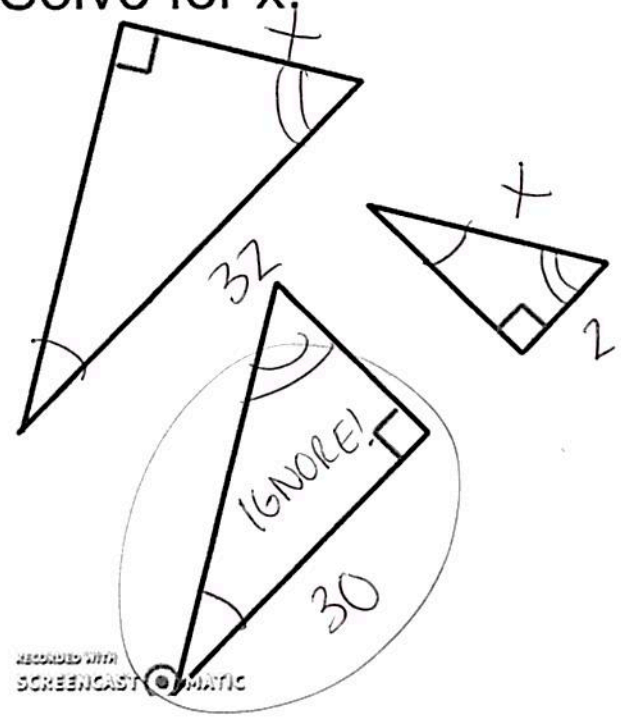
(3) $\overline{Y'Z'} \perp \overline{YZ}$ and $Y'Z' = 2YZ$

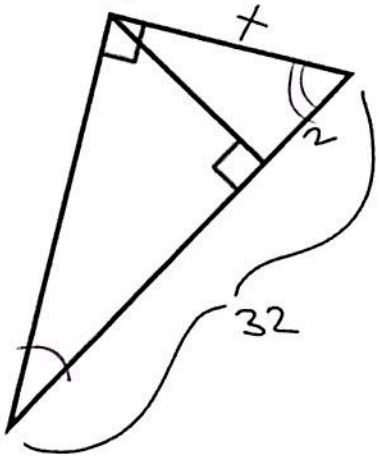
(4) $\overline{Y'Z'} \parallel \overline{YZ}$ and $Y'Z' = 2YZ$




Follow along with the video and complete the following example: *(9:49-12:42)*

Solve for x:



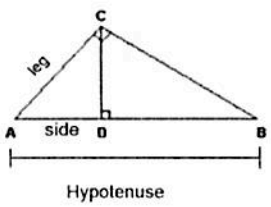

$\frac{32}{x} = \frac{x}{2}$

$\sqrt{64} = \sqrt{x^2}$

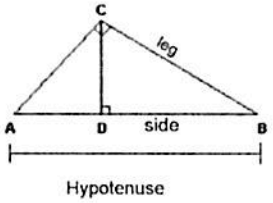
$x = 8$

**WHAT IS AN EASIER WAY TO DO THIS?!**

**GEOMETRIC MEAN (LEG) THEOREM**




Hypotenuse




Hypotenuse

**Use the Hypotenuse of the largest triangle**

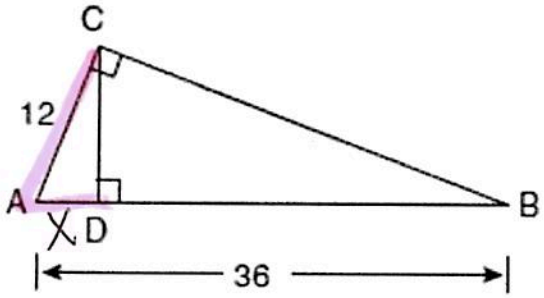
**Use the side closest to the marked leg**

$\frac{\text{Hyp}}{\text{leg}} = \frac{\text{leg}}{\text{side}} \rightarrow \frac{H}{L} = \frac{L}{S}$

HLLS!

**PRACTICE PROBLEMS**

1) In the diagram below of right triangle $ACB$, altitude $\overline{CD}$ is drawn to hypotenuse $\overline{AB}$. If $AB = 36$ and $AC = 12$, what is the length of $\overline{AD}$?

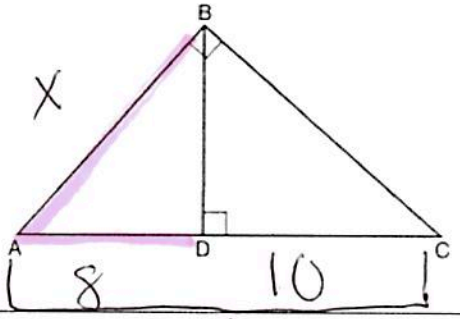



HLLS! $\frac{36}{12} = \frac{12}{x}$

$144 = 36x$

$\boxed{x = 4}$

2) In right triangle $ABC$ shown below, altitude $\overline{BD}$ is drawn to hypotenuse $\overline{AC}$. If $AD = 8$ and $DC = 10$, determine and state the length of $\overline{AB}$.

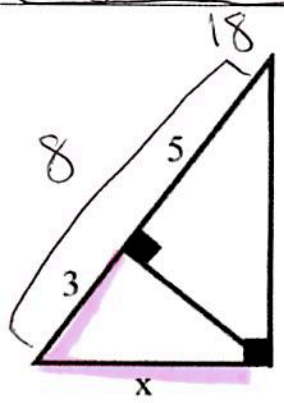



HLLS! $\frac{18}{x} = \frac{x}{8}$

$\sqrt{144} = \sqrt{x^2}$

$\boxed{x = 12}$

3) Given the diagram to the right, solve for x, in simplest radical form.



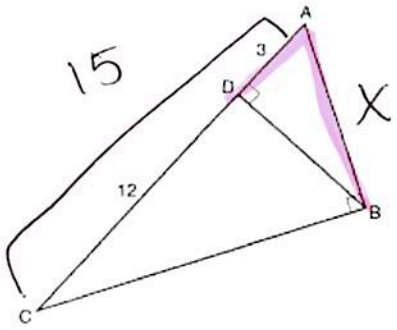

HLLS! $\frac{8}{x} = \frac{x}{3}$

$\sqrt{x^2} = \sqrt{24}$

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

$\boxed{x = 2\sqrt{6}}$

4) In right triangle $ABC$ shown in the diagram below, altitude $\overline{BD}$ is drawn to hypotenuse $\overline{AC}$, $CD = 12$, and $AD = 3$. What is the length of $\overline{AB}$, in simplest radical form?



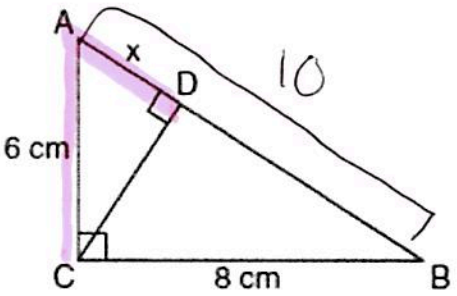

HLLS! $\frac{15}{x} = \frac{x}{3}$

$\sqrt{45} = \sqrt{x^2}$

$\sqrt{9}\sqrt{5}$

$\boxed{x = 3\sqrt{5}}$

7) In the diagram below, the length of the legs $\overline{AC}$ and $\overline{BC}$ of right triangle $ABC$ are 6 cm and 8 cm, respectively. Altitude $\overline{CD}$ is drawn to the hypotenuse of $\triangle ABC$. What is the length of $\overline{AD}$ to the *nearest tenth of a centimeter*?




*need AB FIRST! → $a^2+b^2=c^2$*

$6^2+8^2=c^2$

$\sqrt{100}=\sqrt{c^2}$

$c=10$

Then... HLLS!

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

$36=10x$

$x=3.6$

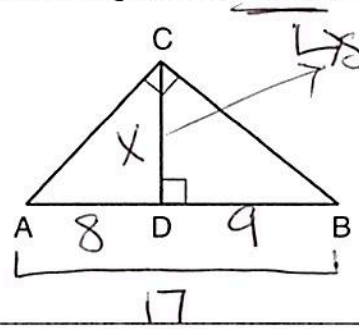
**HOW DO WE KNOW IF WE ARE USING HLLS OR SAAS?**

If the altitude is labeled with a number or variable, then you are using SAAS!

If the altitude has nothing marked on it, then you are using HLLS!

**HLLS & SAAS- MIXED PRACTICE!**

1. In the diagram below, $\overline{CD}$ is the altitude drawn to the hypotenuse $\overline{AB}$ of right triangle $ABC$. If $AD = 8$ and $AB = 17$ find the length of the altitude in simplest radical form.




SAAS!

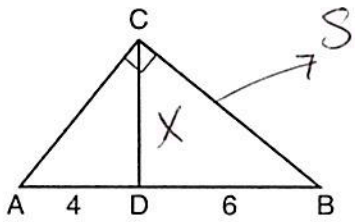
$\frac{8}{x}=\frac{x}{9}$

$\sqrt{72}=\sqrt{x^2}$

$\sqrt{36}\sqrt{2}$

$x=6\sqrt{2}$

2. In the diagram of right triangle $ABC$, $\overline{CD}$ intersects hypotenuse $\overline{AB}$ at $D$. If $AD = 4$ and $DB = 6$, which length of $\overline{AC}$ makes $\overline{CD} \perp \overline{AB}$?




SAAS!

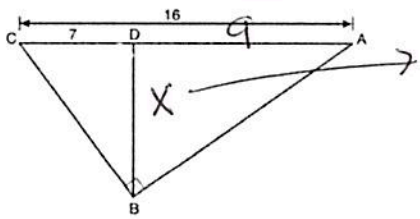
$\frac{4}{x}=\frac{x}{6}$

$\sqrt{x^2}=\sqrt{24}$

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

$x=2\sqrt{6}$

3. In the diagram of right triangle $ABC$, $\overline{BD}$ intersects hypotenuse $\overline{AC}$ at $D$. If $AC = 16$ and $CD = 7$, in simplest radical form, what length of $\overline{BD}$ makes $\overline{BD} \perp \overline{AC}$ ?




SAAS

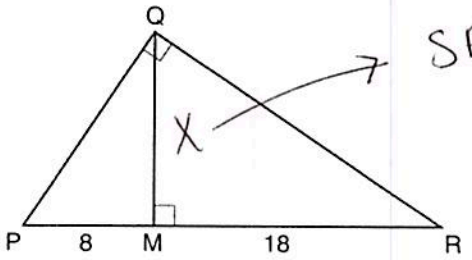
$\frac{7}{x}=\frac{x}{9}$

$\sqrt{63}=\sqrt{x^2}$

$\sqrt{9}\sqrt{7}$

$x=3\sqrt{7}$

4. In the diagram below, $\overline{QM}$ is an altitude of right triangle $PQR$, $PM = 8$, and $RM = 18$. What is the length of $\overline{QM}$?




SAAS!

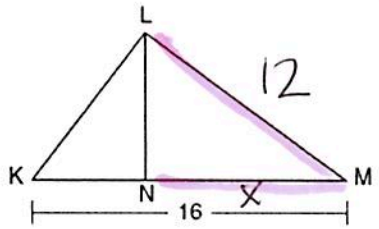
$\frac{8}{X} = \frac{X}{18}$

$\sqrt{144} = \sqrt{X^2}$

$X = 12$

5. Kirstie is testing values that would make triangle $KLM$ a right triangle when $\overline{LN}$ is an altitude, as shown below. If $KM = 16$, and $LM = 12$. Determine the length of $\overline{NM}$.

NO altitude? HLS!

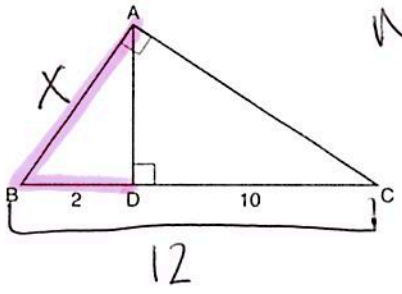



$\frac{16}{12} = \frac{12}{X}$

$16X = 144$

$X = 9$

6. Triangle $ABC$ shown below is a right triangle with $\overline{AD}$ drawn to the hypotenuse $\overline{BC}$. If $BD = 2$ and $DC = 10$, what length of AB, in simplest radical form, makes $\overline{AD} \perp \overline{BC}$?



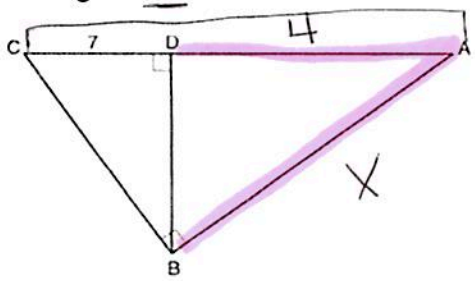

NO alt? HLS!

$\frac{12}{X} = \frac{X}{2}$

$X^2 = 24$

$X = 2\sqrt{6}$

7. In the diagram below of right triangle ABC, altitude BD is drawn to hypotenuse AC. AD=4, and CD=7. What is the length of AB? 11




HLS!

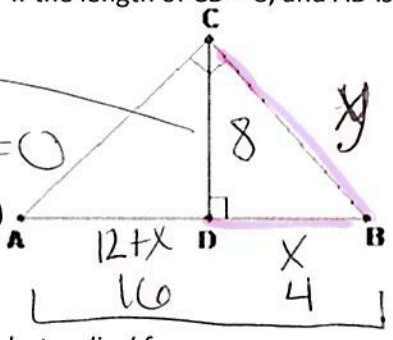
$\frac{11}{X} = \frac{X}{4}$

$\sqrt{X^2} = \sqrt{44}$

$X = \sqrt{4}\sqrt{11}$

$X = 2\sqrt{11}$

8. In right triangle ABC, CD is the altitude drawn to hypotenuse AB. If the length of CD = 8, and AD is 12 units more than DB:




a) Find DB. SAS!

$\frac{12+x}{8} = \frac{8}{x}$

$x(12+x) = 64$

$12x + x^2 = 64$

$x^2 + 12x - 64 = 0$ (a, m)

$(x+16)(x-4)$

$x = -16 \mid x = 4$

b) Using your answers from above, find the length of CB in *simplest radical form.* 20

HLLS!

$\frac{20}{y} = \frac{y}{4}$

$\sqrt{80} = \sqrt{y^2}$

$\sqrt{16}\sqrt{5}$

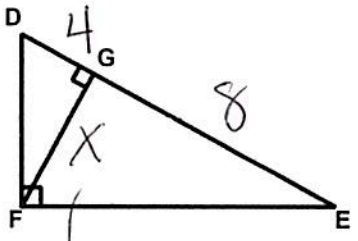
$y = 4\sqrt{5}$

9.

In the diagram of $\Delta DEF$, the altitude from right angle $\angle DFE$ has been drawn to $\overline{DE}$. If $DG = 4$ and $GE = 8$, then which of the following is the length of $\overline{FG}$?

(1) $4\sqrt{2}$ (3) 12

(2) $3\sqrt{10}$ (4) 6




SAS!

$\frac{4}{x} = \frac{x}{8}$

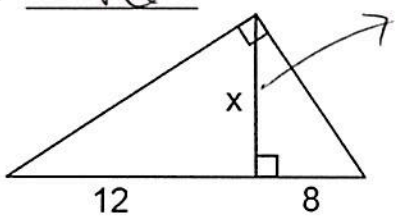
$\sqrt{32} = \sqrt{x^2}$

$\sqrt{16}\sqrt{2}$

$x = 4\sqrt{2}$

10.

x= $4\sqrt{60}$




SAS!

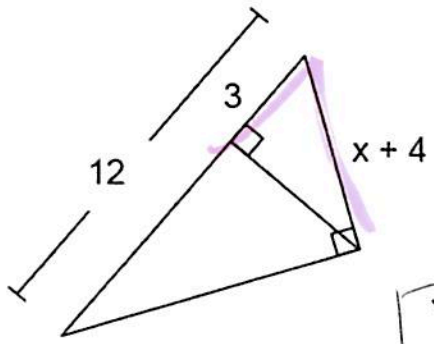
$\frac{12}{x} = \frac{x}{8}$

$\sqrt{x^2} = \sqrt{96}$

$\sqrt{16}\sqrt{60}$

$x = 4\sqrt{60}$

~~XX~~ 11.




HLLS!

$\frac{12}{x+4} = \frac{x+4}{3}$

$(x+4)(x+4) = 36$

$x^2 + 4x + 4x + 16 = 36$

$-36 \quad -36$

$x^2 + 8x - 20 = 0$ (a, m)

$(x+10)(x-2) = 0$

$-10 \mid 2$

$x = 2$