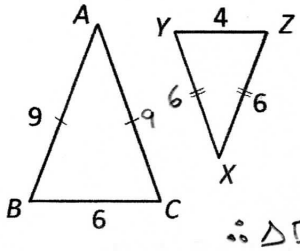
GSE Honors Geometry
Unit 4 – Similarity

Name KEY
Unit Test Review

Name a postulate or theorem that can be used to prove that the two triangles are similar. Then, write a similarity statement.

1.



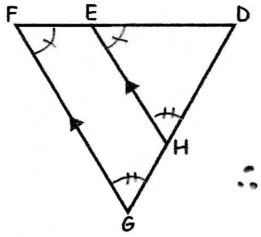
$\frac{BC}{ZY} \stackrel{?}{=} \frac{CA}{YX} \stackrel{?}{=} \frac{AB}{XY}$

$9/6 \stackrel{?}{=} 6/4 \stackrel{?}{=} 6/4$

$3/2 = 3/2 = 3/2$ ✓

$\therefore \triangle BCA \sim \triangle ZYX$ BY SSS

2.



$\angle DEH \cong \angle DFG$

$\angle DHE \cong \angle DGF$

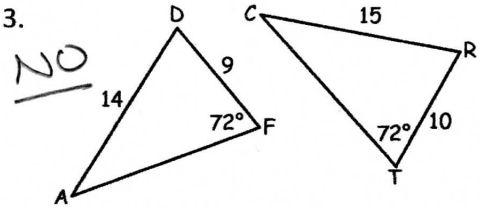
(CORRESPONDING $\angle$'s)

$\therefore \triangle DEH \sim \triangle DFG$ BY AA

Are the triangles similar? If so, state the similarity and the postulate or theorem that justifies your answer.

3.

NO



$\frac{9}{10} \stackrel{?}{=} \frac{14}{15}$

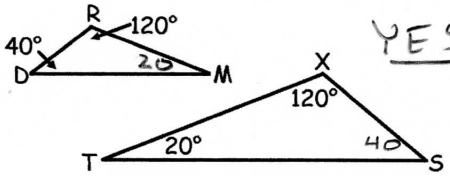
$9(15) \stackrel{?}{=} 10(14)$

$135 \neq 140$

ALSO, GIVEN $\angle$ IS NOT INCLUDED

4.

YES



$\triangle RDM \sim \triangle XST$ BY AA

Name a postulate or theorem that can be used to prove that the triangles are similar.

5. The side lengths of ΔABC are 3, 4, and 6, and the side lengths of ΔXYZ are 6, 8, and 12

$\frac{3}{6} = \frac{4}{8} = \frac{6}{12}$

$1/2 = 1/2 = 1/2$ ✓ SSS

6. In ΔABC, $m\angle A = 15°$ and $m\angle B = 80°$, $m\angle C = 85°$
In ΔXYZ, $m\angle X = 80°$ and $m\angle Z = 85°$, $m\angle Y = 15°$

AA

7. In ΔABC, $m\angle B = 60°$, $AB = 6$ and $BC = 12$
In ΔXYZ, $\underbrace{m\angle Y = 60°}_{\text{INCLUDED ANGLES} \cong}$, $XY = 3$ and $YZ = 6$

$\frac{6}{3} = \frac{12}{6}$

$2 = 2$ ✓

SAS

Tell whether each proportion is correct

8. $\frac{e}{f} = \frac{c}{d}$ NO

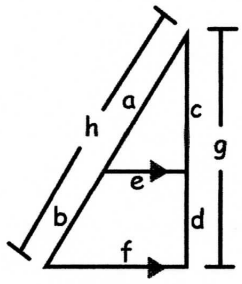
$\frac{e}{f} = \frac{c}{g}$

9. $\frac{b}{a} = \frac{d}{c}$ YES

10. $\frac{b}{h} = \frac{c}{g}$ NO

$\frac{b}{h} = \frac{d}{g}$

11. $\frac{e}{f} = \frac{a}{h}$ YES



Determine the length of each segment

12. $\overline{AG}$

$\frac{AG}{GF} = \frac{AB}{BC}$

$\frac{x}{6} = \frac{3}{4}$

$4x = 18$

$x = 9/2$

13. $\overline{FC}$

$\frac{AB}{AC} = \frac{GB}{FC}$

$\frac{3}{7} = \frac{2}{x}$

$3x = 14$

$x = 14/3$

14. $\overline{ED}$

$\frac{AB}{AD} = \frac{GB}{ED}$

$\frac{3}{10} = \frac{2}{x}$

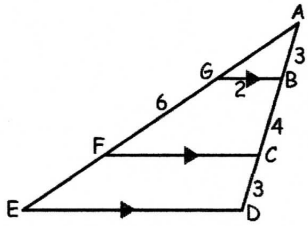
$3x = 20$ $x = 20/3$

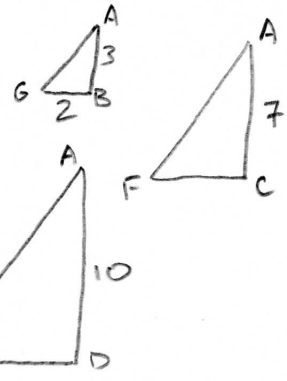
15. $\overline{AE}$

$\frac{AE}{GF} = \frac{AD}{BC}$

$\frac{x}{6} = \frac{10}{4}$ $4x = 60$

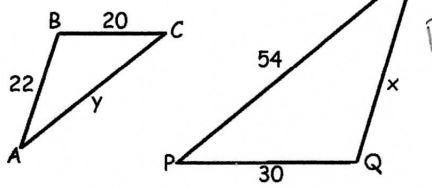
$x = 15$





Find the value of each variable

16. $\Delta ABC \sim \Delta RQP$



$\frac{AB}{RQ} = \frac{BC}{QP}$

$\frac{22}{x} = \frac{20}{30}$

$\frac{22}{x} = \frac{2}{3}$

$2x = 66$

$x = 33$

$\frac{AC}{RP} = \frac{BC}{QP}$

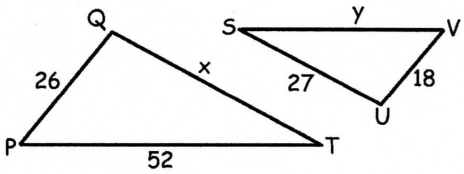
$\frac{y}{54} = \frac{20}{30}$

$\frac{y}{54} = \frac{2}{3}$

$3y = 108$

$y = 36$

17. $\Delta PQT \sim \Delta VUS$



$\frac{PQ}{VU} = \frac{QT}{US}$

$\frac{26}{18} = \frac{x}{27}$

$\frac{13}{9} = \frac{x}{27}$

$9x = 351$

$x = 39$

$\frac{PQ}{VU} = \frac{PT}{VS}$

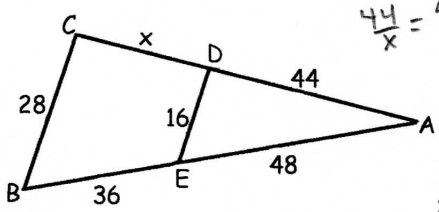
$\frac{26}{18} = \frac{52}{y}$

$\frac{13}{9} = \frac{52}{y}$

$13y = 468$

$y = 36$

18. Given: $\overline{DE} // \overline{CB}$



$\frac{AD}{DC} = \frac{AE}{EB}$

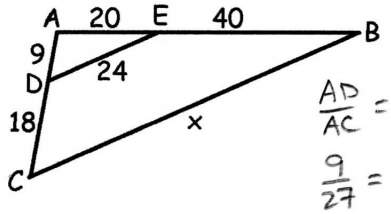
$\frac{44}{x} = \frac{48}{36}$

$\frac{44}{x} = \frac{4}{3}$

$4x = 132$

$x = 33$

19. Given: $\overline{DE} // \overline{CB}$



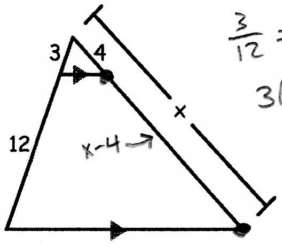
$\frac{AD}{AC} = \frac{DE}{CB}$

$\frac{9}{27} = \frac{24}{x}$

$\frac{1}{3} = \frac{24}{x}$

$x = 72$

20.



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

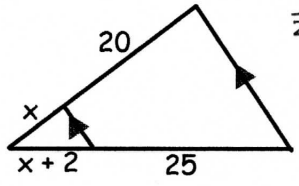
$3(x-4) = 12(4)$

$3x - 12 = 48$

$3x = 60$

$x = 20$

21.



$\frac{x}{20} = \frac{x+2}{25}$

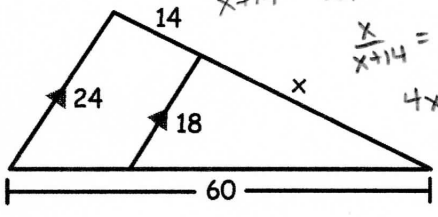
$25x = 20(x+2)$

$25x = 20x + 40$

$5x = 40$

$x = 8$

22.



$\frac{x}{x+14} = \frac{18}{24}$

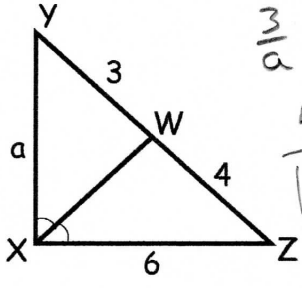
$\frac{x}{x+14} = \frac{3}{4}$

$4x = 3(x+14)$

$4x = 3x + 42$

$x = 42$

23.

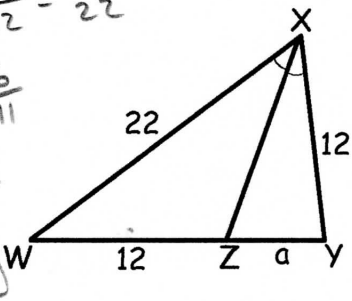


$\frac{3}{a} = \frac{4}{6}$

$4a = 18$

$a = 9/2$

24. $\frac{a}{12} = \frac{12}{22}$

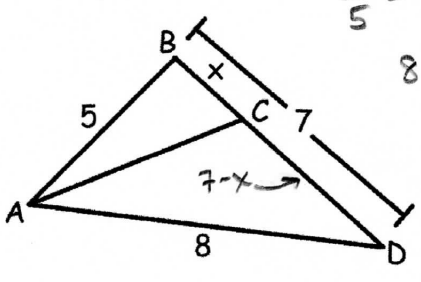


$\frac{a}{12} = \frac{6}{11}$

$11a = 72$

$a = \frac{72}{11}$

25.



$\frac{x}{5} = \frac{7-x}{8}$

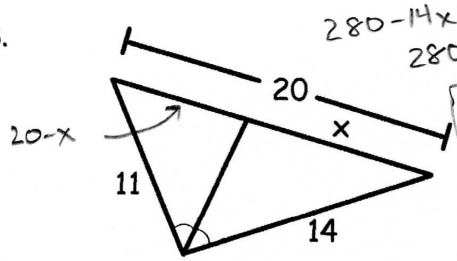
$8x = 5(7-x)$

$8x = 35 - 5x$

$13x = 35$

$x = \frac{35}{13}$

26.



$\frac{20-x}{11} = \frac{x}{14}$

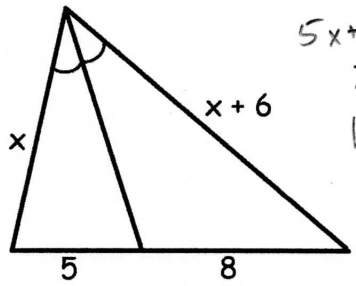
$14(20-x) = 11x$

$280 - 14x = 11x$

$280 = 25x$

$\boxed{x = \frac{56}{5}}$

27.



$\frac{5}{x} = \frac{8}{x+6}$

$5(x+6) = 8x$

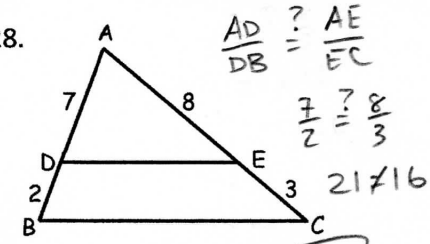
$5x + 30 = 8x$

$30 = 3x$

$\boxed{x = 10}$

Determine whether the given information implies $\overline{BC} \parallel \overline{DE}$

28.



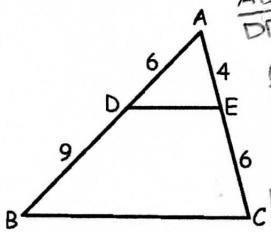
$\frac{AD}{DB} \stackrel{?}{=} \frac{AE}{EC}$

$\frac{7}{2} \stackrel{?}{=} \frac{8}{3}$

$21 \neq 16$

$\boxed{\text{NO}}$

29.



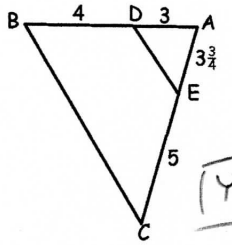
$\frac{AD}{DB} \stackrel{?}{=} \frac{AE}{EC}$

$\frac{6}{9} = \frac{4}{6}$

$36 = 36$ ✓

$\boxed{\text{YES}}$

30.



$\frac{AD}{DB} \stackrel{?}{=} \frac{AE}{EC}$

$\frac{3}{4} \stackrel{?}{=} \frac{15/4}{5}$

$15 = 15$ ✓

$\boxed{\text{YES}}$

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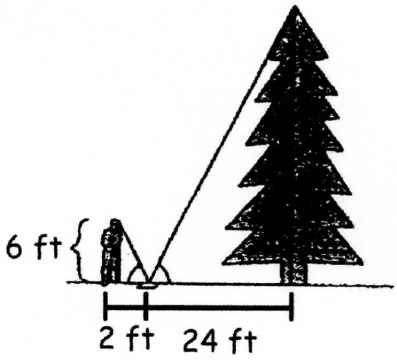
31. To determine the height of a very tall pine tree, you place a mirror on the ground and stand where you can see the top of the tree, as shown.



a. How tall is the tree?

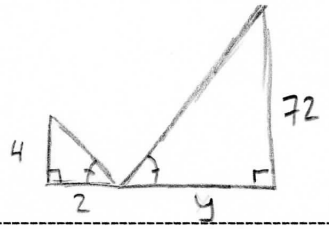
$\frac{2}{6} = \frac{24}{x}$

$2x = 144$

$x = 72$

∴ THE TREE IS 72 ft TALL

b. Your little sister wants to see the top of the tree also. However, she is only 4 feet tall. Leaving the mirror 2 feet from her feet, how far from the base of the tree should the mirror be placed?



$\frac{2}{4} = \frac{y}{72}$

$4y = 144$

$y = 36$

∴ THE MIRROR SHOULD BE PLACED 36 ft FROM THE BASE OF THE TREE

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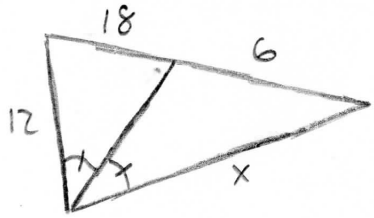
32. The bisector of an angle of a triangle divides the opposite side of the triangle into segments that are 18 in. and 6 in. long. Another side of the triangle is 12 in. long. What are two possible lengths for the 3rd side?

OPTION 1



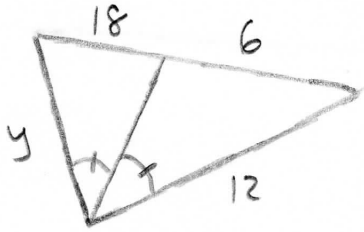
$\frac{18}{12} = \frac{6}{x}$

$\frac{3}{2} = \frac{6}{x}$

$3x = 12$

$\boxed{x = 4}$

OPTION 2



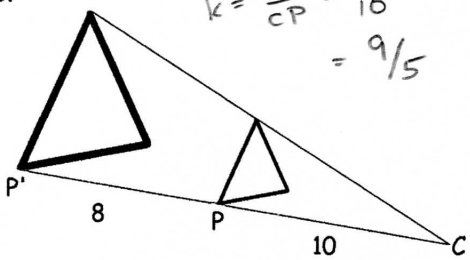
$\frac{18}{y} = \frac{6}{12}$

$\frac{18}{y} = \frac{1}{2}$

$\boxed{y = 36}$

Identify each type of dilation and find the scale factor

33.

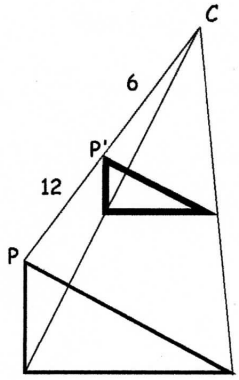


$k = \frac{CP'}{CP} = \frac{18}{10}$

$= 9/5$

ENLARGEMENT

34.

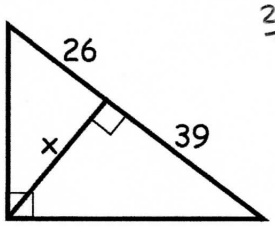


$k = \frac{CP'}{CP} = \frac{6}{18} = \frac{1}{3}$

REDUCTION

Find the value of each variable

35.



$\frac{26}{x} = \frac{x}{39}$

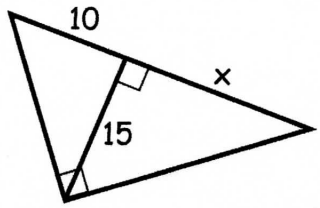
$x^2 = 1014$

$x = \sqrt{1014}$

$x = \sqrt{169 \cdot 6}$

$\boxed{x = 13\sqrt{6}}$

36.



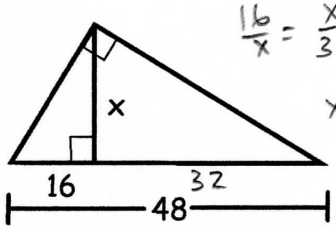
$\frac{10}{15} = \frac{15}{x}$

$\frac{2}{3} = \frac{15}{x}$

$2x = 45$

$\boxed{x = 45/2}$

37.



$\frac{16}{x} = \frac{x}{32}$

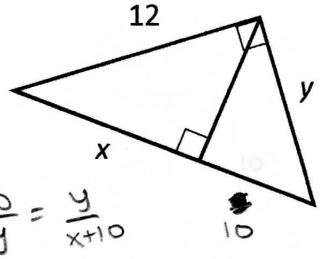
$x^2 = 512$

$x = \sqrt{512}$

$x = \sqrt{256 \cdot 2}$

$\boxed{x = 16\sqrt{2}}$

38.



$\frac{x}{12} = \frac{12}{x+10}$

$x(x+10) = 12(12)$

$x^2 + 10x = 144$

$x^2 + 10x - 144 = 0$

$(x+18)(x-8) = 0$

$x + 18 = 0$ $\quad$ $x - 8 = 0$

$x = -18$ $\quad$ $\boxed{x = 8}$

EXTRANEOUS

$\frac{10}{y} = \frac{y}{x+10}$

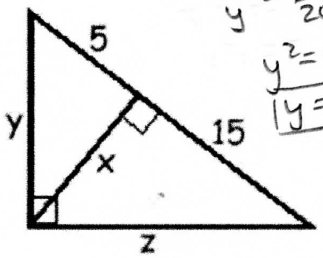
$\frac{10}{y} = \frac{y}{18}$

$y^2 = 180$

$y = \sqrt{180} = \sqrt{36 \cdot 5}$

$\boxed{y = 6\sqrt{5}}$

39.



$\frac{5}{y} = \frac{y}{20}$

$y^2 = 100$

$\boxed{y = 10}$

$\frac{5}{x} = \frac{x}{15}$

$x^2 = 75$

$x = \sqrt{75}$

$x = \sqrt{25 \cdot 3}$

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

$\frac{15}{z} = \frac{z}{20}$

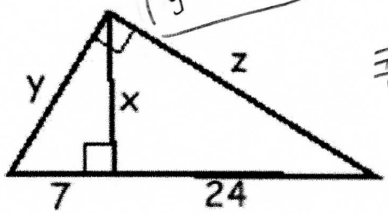
$z^2 = 300$

$z = \sqrt{300}$

$z = \sqrt{100 \cdot 3}$

$\boxed{z = 10\sqrt{3}}$

40.



$\frac{7}{y} = \frac{y}{31}$

$y^2 = 217$

$\boxed{y = \sqrt{217}}$

$\frac{7}{x} = \frac{x}{24}$

$x^2 = 168$

$x = \sqrt{168} = \sqrt{4 \cdot 42}$

$\boxed{x = 2\sqrt{42}}$

$\frac{24}{z} = \frac{z}{31}$

$z^2 = 744$

$z = \sqrt{744} = \sqrt{4 \cdot 186}$

$\boxed{z = 2\sqrt{186}}$