7-3 Similar Triangles

Name Master C
Date _____ Block _____

Similar triangles are 2 triangles that have the following properties:

- Their corresponding angles are congruent.*
- Their corresponding sides are in proportion.*
- The reduced ratio of corresponding sides is called the scale factor.
- The ratio of their perimeters also equals the ratio of corresponding sides.
- The ratio of any corresponding lengths is equal to the scale factor!

  (This includes altitudes, angle bisectors, medians, diagonals, and radii of circles.)

What is the difference between similar triangles and congruent triangles?

~Δs only have corr ∠s ≅, but ≅Δs have both corr. sides & ∠s!

How can you tell if 2 triangles are similar?

Look at the triangles given and compare their angles and sides:

- are the corresponding angles congruent?
- are the corresponding sides proportional?

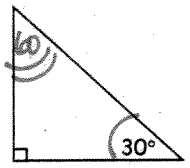
Postulates and Theorems about similar triangles

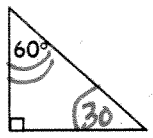
►Similarity of triangles is reflexive, symmetric, and transitive.

- Reflexive: ΔABC ~ ΔABC.
- Symmetric: If ΔABC ~ ΔDEF, then ΔDEF ~ ΔABC.
- Transitive: IfΔABC ~ ΔDEF and ΔDEF ~ ΔGHI, then ΔABC ~ ΔGHI.

►AA ~ Postulate – If 2 angles of one triangle are congruent to 2 angles of another triangle, then the 2 triangles are similar.

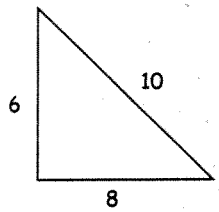
HINT: ***Look for 2 pairs of congruent angles!***

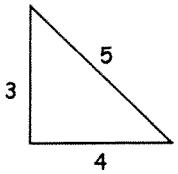




►SSS ~ Theorem – If the 3 pairs of corresponding sides of 2 triangles are proportional, then the triangles are similar.

HINT: ***Write a proportion relating the 3 pairs of sides and see if the proportion is true!***



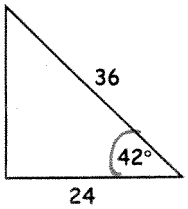


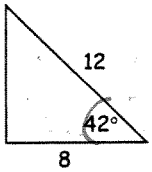
$\frac{6}{3} = \frac{8}{4} = \frac{10}{5}$

2:1 scale factor

►SAS ~ Theorem – If the lengths of 2 sides of one triangle are proportional to the lengths of 2 corresponding sides of another triangle and the included angles are congruent, then the triangles are similar.

HINT: ***If 2 sides and a pair of congruent included angles are given, then write the proportion relating the 2 pairs of corresponding sides and see their ratios are equal!***





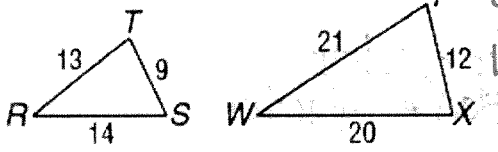
$\frac{24}{8} = \frac{36}{12}$

3:1 scale factor

7.3 Practice with Similar Triangles

Determine whether each pair of triangles is similar. Justify your answer.

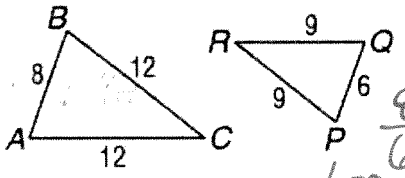
1.



$\frac{9}{12} \neq \frac{13}{20} \neq \frac{14}{21}$

NO

2.

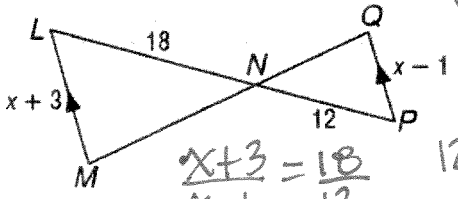


$\frac{8}{6} = \frac{12}{9} = \frac{12}{9}$

Yes, by SSSN

ALGEBRA Identify the similar triangles, and find x and the measures of the indicated sides.

3. $\overline{LM}$ and $\overline{QP}$ (12 and 8)



$\frac{x+3}{x-1} = \frac{18}{12}$

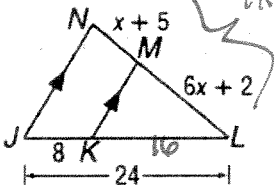
$12x + 36 = 18x - 18$

$36 = 6x - 18$

$54 = 6x$

$x = 9$

4. $\overline{NL}$ and $\overline{ML}$ (21 and 14)



7x+7

$\frac{16}{24} = \frac{6x+2}{7x+7}$

$112x + 112 = 144x + 48$

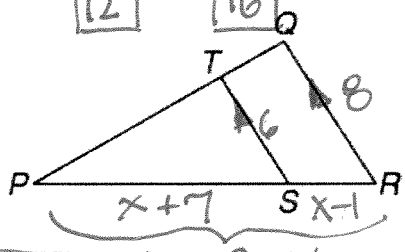
$112 = 32x + 48$

$64 = 32x$

$x = 2$

Use the given information to find each measure.

5. If $\overline{TS} \parallel \overline{QR}$, $TS = 6$, $PS = x + 7$, $QR = 8$, and $SR = x - 1$, find PS (12) and PR (16).



$\frac{6}{8} = \frac{x+7}{2x+6}$

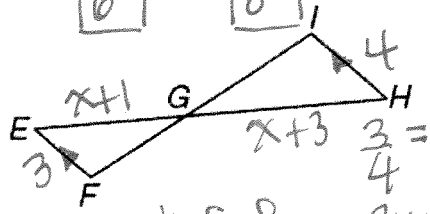
$8x + 56 = 12x + 36$

$56 = 4x + 36$

$20 = 4x$

$x = 5$

6. If $\overline{EF} \parallel \overline{HI}$, $EF = 3$, $EG = x + 1$, $HI = 4$, and $HG = x + 3$, find EG (6) and HG (8).

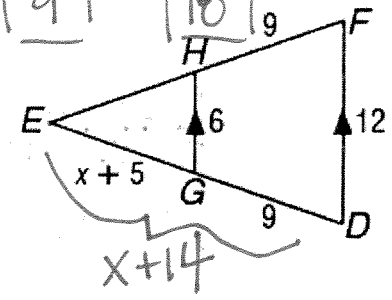


$\frac{3}{4} = \frac{x+1}{x+3}$

$3x + 9 = 4x + 4$

$5 = x$

7. $\overline{EH}$ (9) and $\overline{EF}$ (18)



2x+6

x+14

$\frac{6}{12} = \frac{x+5}{x+14}$

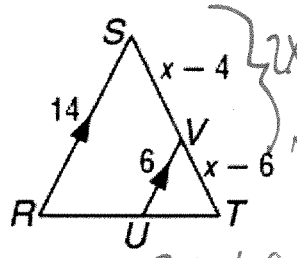
$6x + 84 = 12x + 60$

$84 = 6x + 60$

$24 = 6x$

$x = 4$

8. $\overline{UT}$ and $\overline{RT}$ (can't find)



2x+10

$\frac{x-6}{2x-10} = \frac{6}{14}$

$12x - 60 = 14x - 84$

$24 = 2x$

$12 = x$

INDIRECT MEASUREMENT: A lighthouse casts a 128 foot shadow. A nearby lamp post that measures 5 feet 3 inches casts an 8 foot shadow. Draw a picture and answer the following questions.

9. Write a proportion that can be used to determine the height of the lighthouse.

$\frac{5.25'}{x} = \frac{8'}{128'}$

$8x = 672$

$x = 84$

10. What is the height of the light house?

84 feet

$3'' = \frac{3}{12} = \frac{1}{4} = .25$