Similar Polygons and Similar Triangles

CCSS

You will use the definition of similarity to decide if two triangles are similar.

You will identify similar triangles using the AA Similarity Postulate, SSS and SAS Similarity Theorems

You will use similar triangle theorems to solve problems.
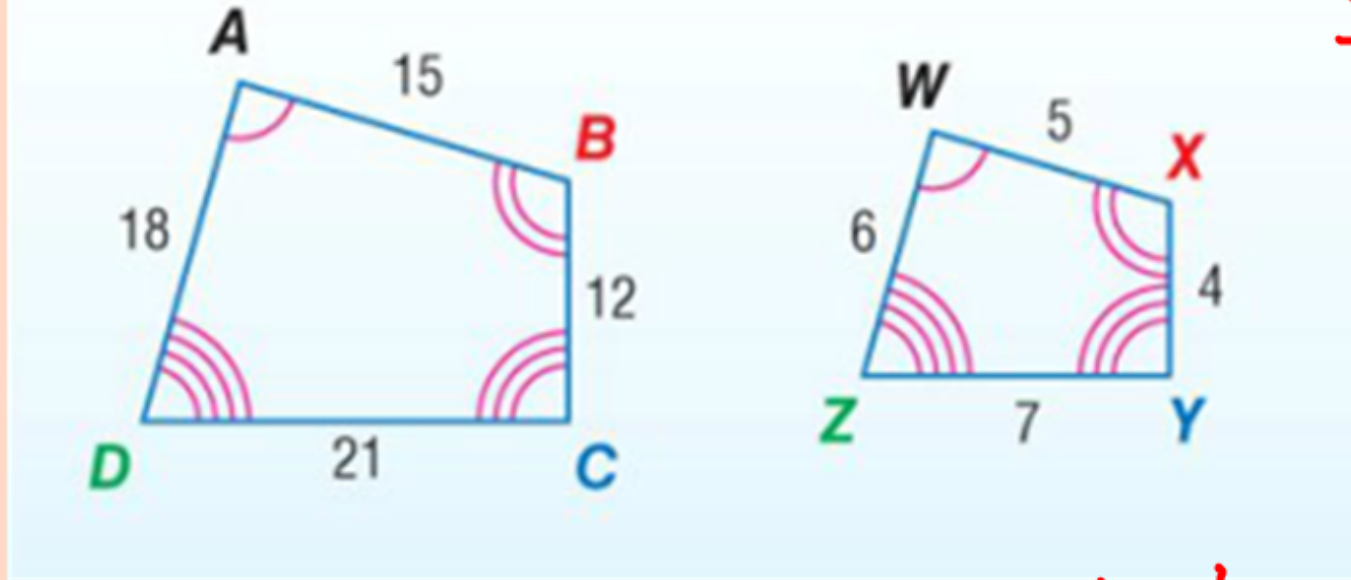
Similar Polygons

~

same shape, but not necessarily same size

1) All corresp $\angle$'s will be $\cong$

2) All corresp sides will be proportional

Scale Factor

Ratio of corresp sides (fraction)

Sim. Statement   ABCD ~ WXYZ

S.F. $\frac{3}{1}$

3:1

A   15   B
18
12
D   21   C

W   5   X
6
4
Z   7   Y

Corresponding Angles $\left(\cong \right)$

$\angle A \cong \angle W$
$\angle C \cong \angle Y$
$\angle D \cong \angle Z$
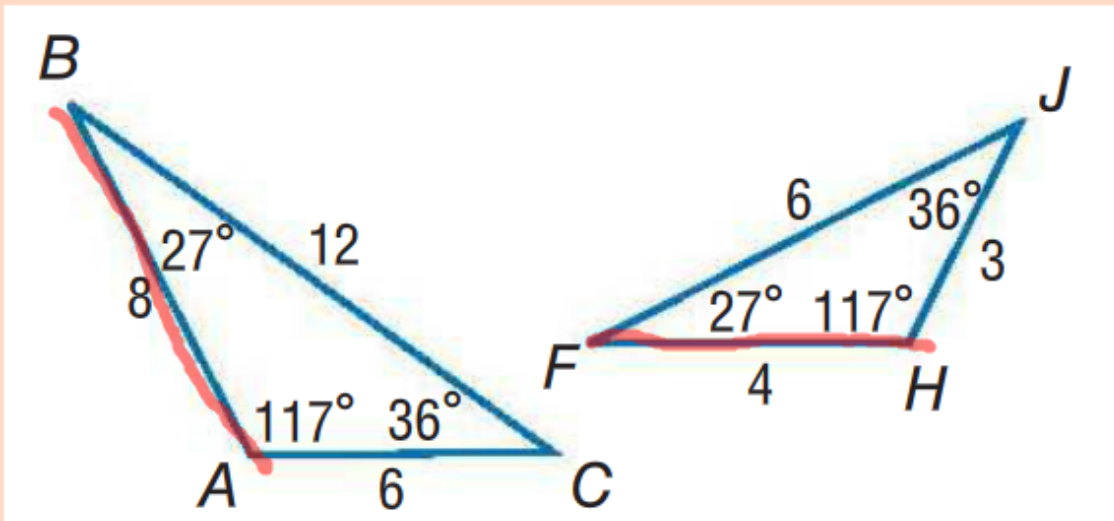$\angle B \cong \angle X$

Proportional
Corresponding Sides

$$\frac{AB}{WX} \overset{?}{=} \frac{BC}{XY} \overset{?}{=} \frac{AD}{WZ} \overset{?}{=} \frac{DC}{ZY}$$

$$\frac{15}{5} ? \frac{12}{4} ? \frac{18}{6} ? \frac{21}{7}$$

✓ $$\frac{3}{1} = \frac{3}{1} = \frac{3}{1} = \frac{3}{1}$$

Determine if the triangles are similar. If so, write the similarity statement and scale factor. If not, explain your reasoning.
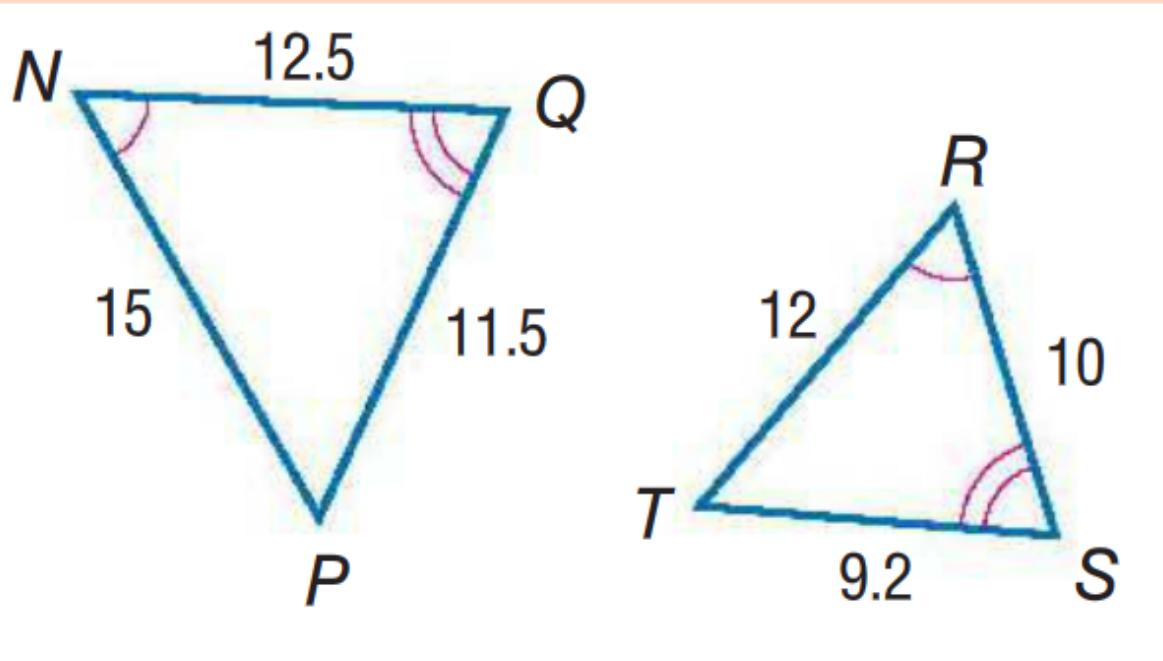

① $\angle B \cong \angle F$
$\angle A \cong \angle H$
$\angle C \cong \angle J$

yes,
$\triangle BAC \sim \triangle FHJ$

S.F. $\frac{2}{1}$

or 2:1

② $\frac{8}{4}$? $\frac{6}{3}$? $\frac{12}{6}$

$\frac{2}{1}$ = $\frac{2}{1}$ = $\frac{2}{1}$ ✓

Determine if the triangles are similar. If so, write the similarity statement and scale factor. If not, explain your reasoning.

$\angle N \cong \angle R$
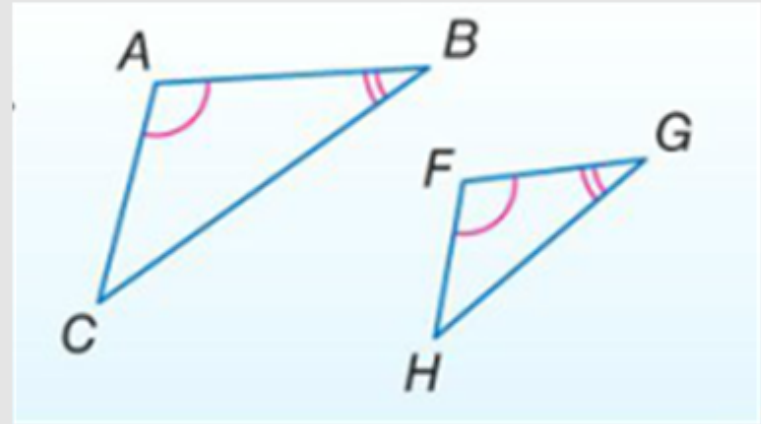
$\angle Q \cong \angle S$

$\angle P \cong \angle T$

yes

$\triangle NQP \sim \triangle RST$

$\dfrac{12.5}{10}$? $\dfrac{15}{12}$? $\dfrac{11.5}{9.2}$ S.F. $\dfrac{5}{4}$

$1.25 = 1.25 = 1.25 \checkmark$

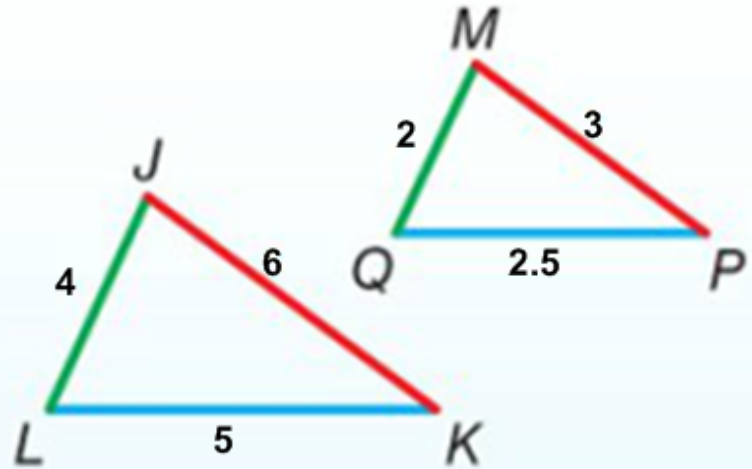# Angle-Angle (AA) Similarity

If 2 pairs of ∠'s
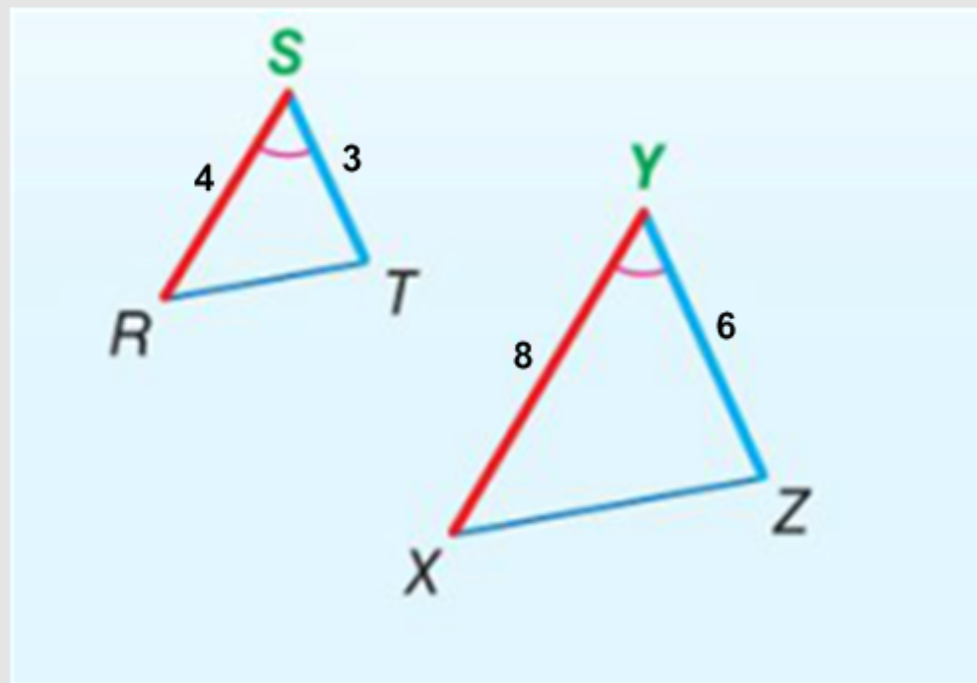are ≅, then
Δ's are ~

Side-Side-Side (SSS) Similarity

If all 3 prs of
corresp sides are prop'l
   then △'s similar

Side-Angle-Side (SAS) Similarity

If 2 prs of
corresp are prop'l
and the included
∠'s are ≅,
 then △'s similar

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

∠S ≅ ∠Y ✓

Determine whether the triangles are similar. If so, write a similarity statement. Explain your reasoning.

∠B ≅ ∠D (A)
∠A ≅ ∠E (A)

yes, AA

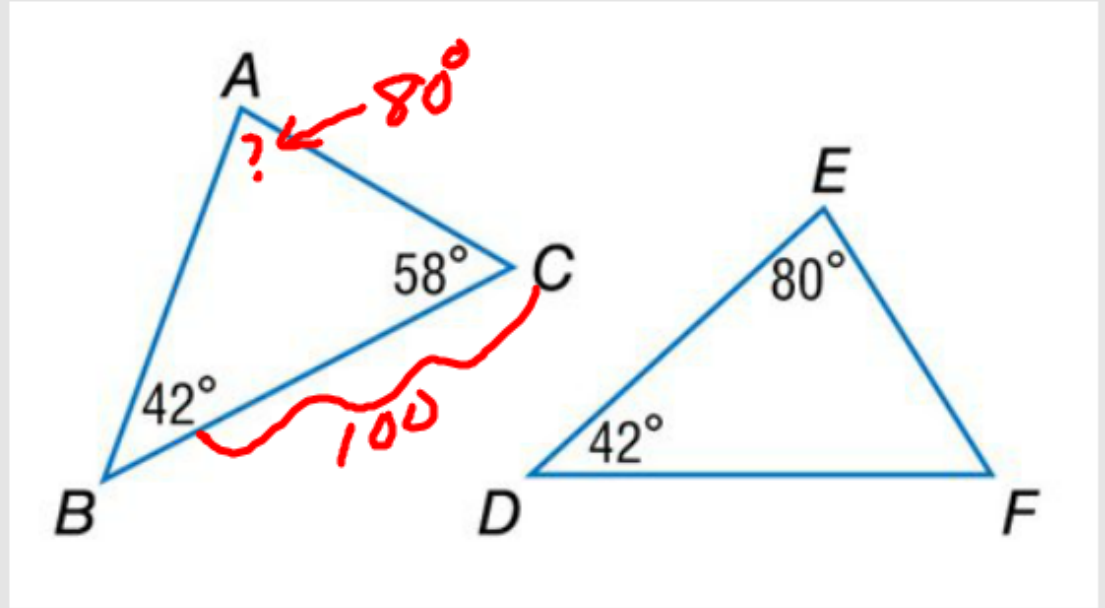△ABC ~ △EDF

A

∠? — 80°

58° C

42°

100

B

E

80°

42°

D

F

Determine whether the triangles are similar. If so, write a similarity statement. Explain your reasoning.

AA ?
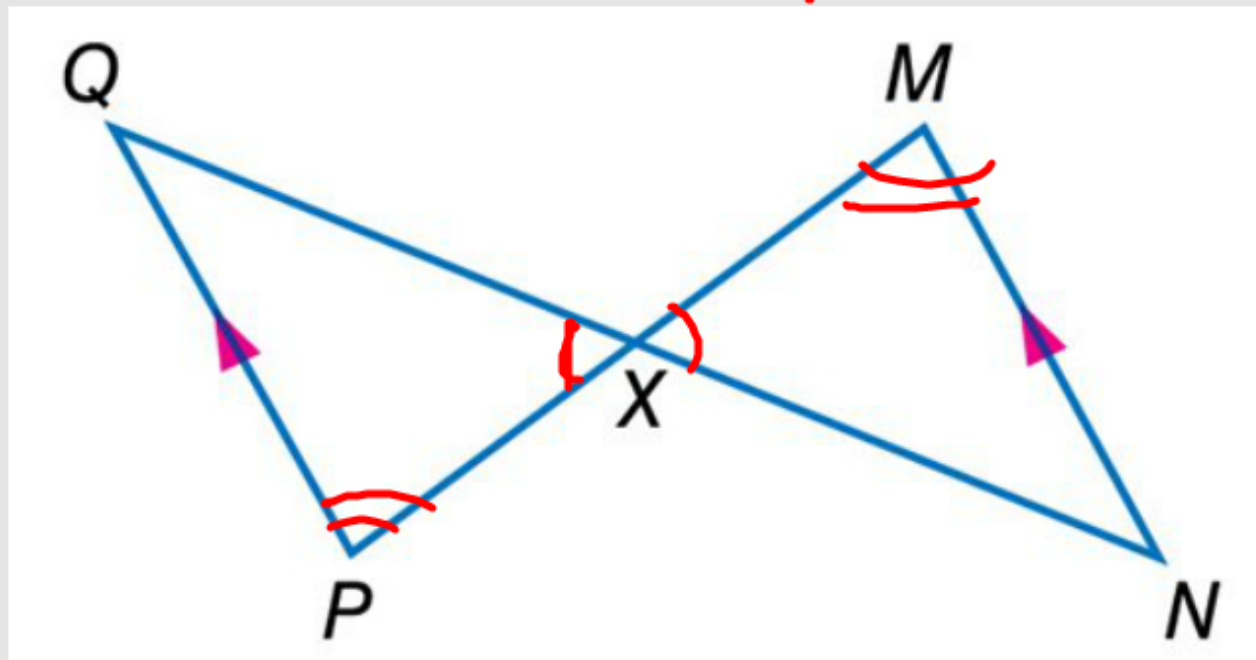
$\angle X \cong \angle X$

$\angle M \cong \angle P$

(alt int $\angle$'s $\cong$)

yes AA, $\triangle QXP \sim \triangle NXM$

Q   M

( )
 X

P   N

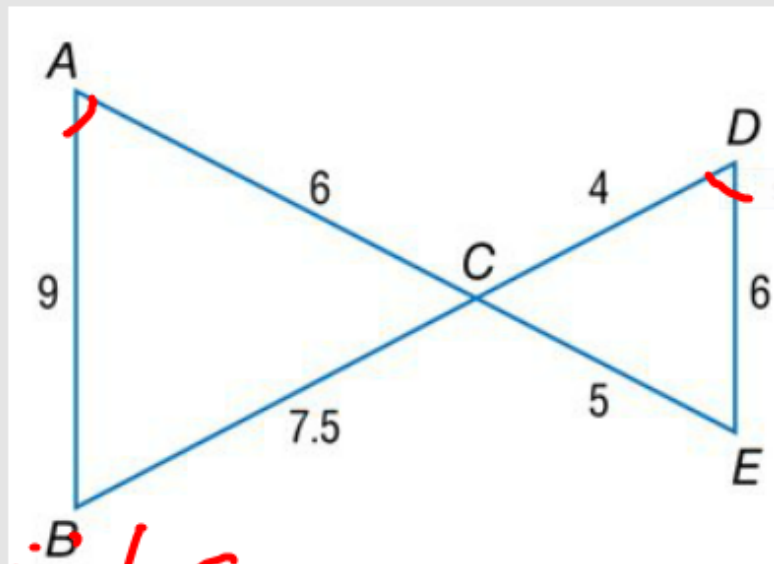Determine whether the triangles are similar. If so, write a similarity statement. Explain your reasoning.
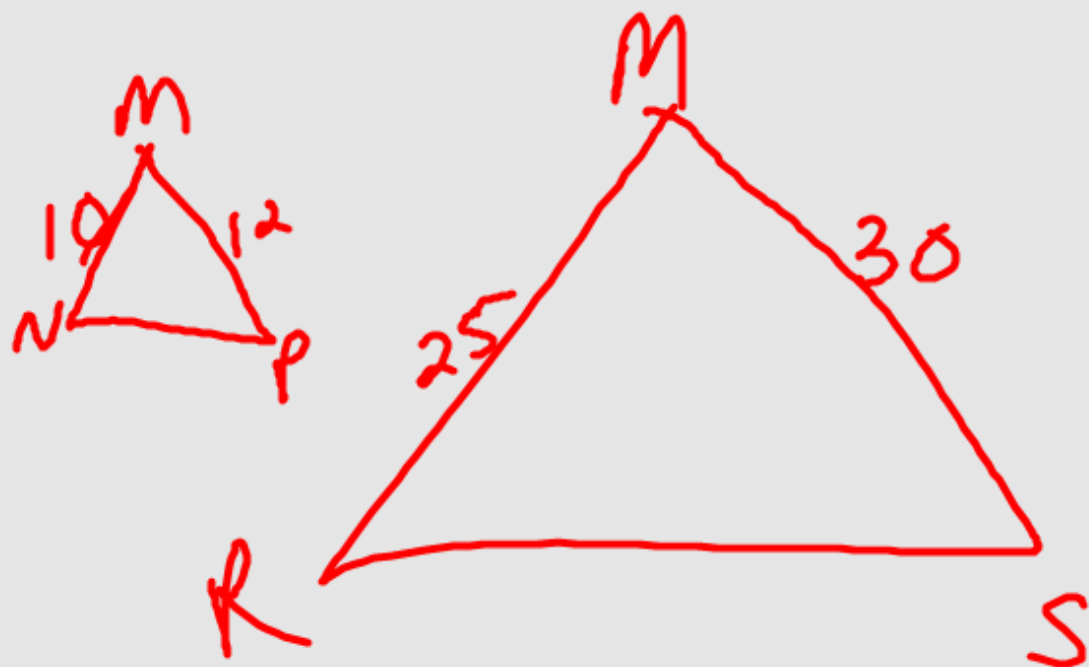
SSS ?

$$\frac{6}{4} \ ? \ \frac{7.5}{5} \ ? \ \frac{9}{6}$$

$$1.5 \ = 1.5 \ = 1.5 \ \checkmark$$

NOT Similar

yes SSS $\triangle ACB \sim \triangle DCE$

A
D
6
4
C
9
6
7.5
5
B
E

Determine whether the triangles are similar. If so, write a similarity statement. Explain your reasoning.
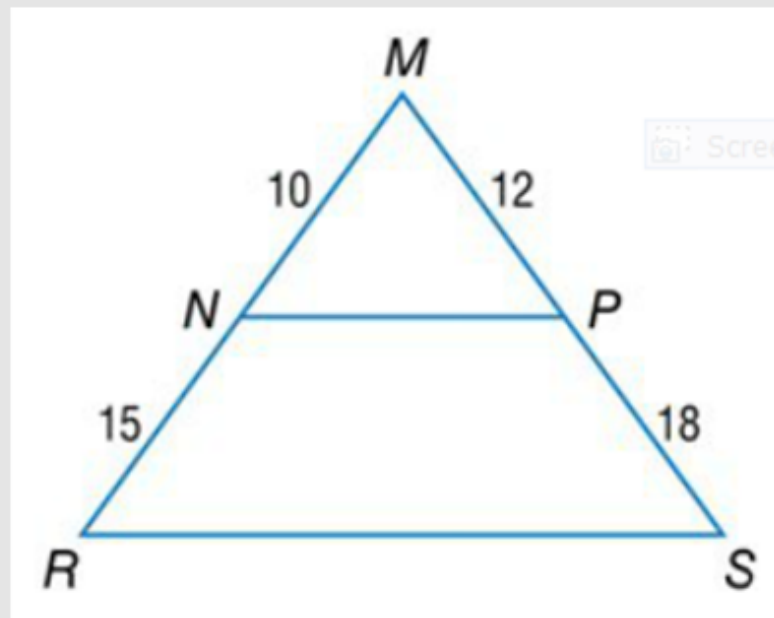

$\angle M \cong \angle M$

$$\frac{10}{25} \ ? \ \frac{12}{30}$$

$.4 = .4 \ \checkmark$

yes SAS $\triangle MNP \sim \triangle MRS$

ALGEBRA Given $\overline{RS} \parallel \overline{UT}$, $RS = 4$, $RQ = x + 3$, $QT = 2x + 10$, $UT = 10$, **find** RQ **and** QT.

$$\frac{10}{4} \Rightarrow \frac{2x+10}{x+3}$$

$$10x + 30 = 8x + 40$$
$$\underline{-8x \qquad\quad -8x}$$

$$2x + 30 = 40$$
$$\underline{-30 \quad -30}$$

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

$$x = 5$$

R

4

$x + 3$

S

Q

U

$2x + 10$

T

10

T
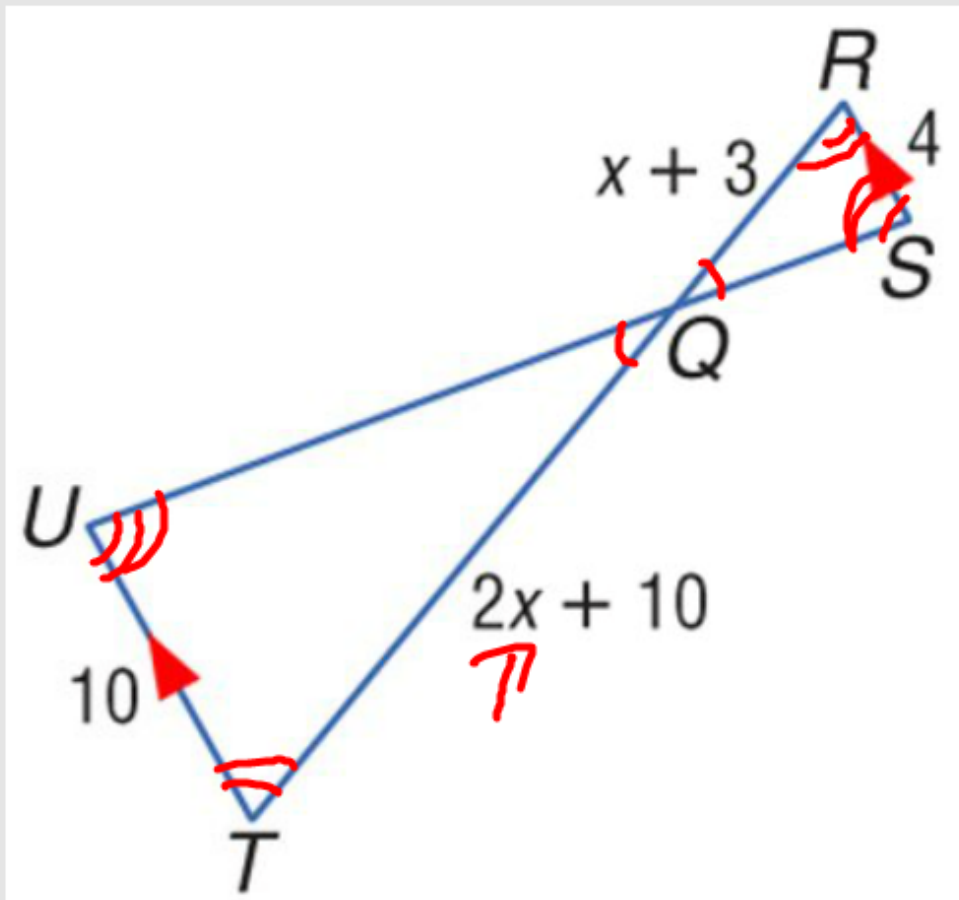
$$RQ = 5 + 3 = \boxed{8}$$
$$QT = 2(5) + 10 = \boxed{20}$$

Josh wanted to measure the height of the Sears Tower in Chicago. He used a 12-foot light pole and measured it's shadow at 1 p.m. The length of the shadow was 2 feet. Then he measured the length of Sears Tower's shadow and it was 242 feet at the same time. what is the height of the Sears Tower?

$$\frac{12}{x} \gtrless \frac{2}{242}$$

$$2x = 12(242)$$

$$\boxed{x = 1450 \text{ ft}}$$

12

2 f.t

x

242