8.8 Similar Triangles, Part 2

Midsegment of Triangles, Proportions of Triangles, Base Angle Theorem

Standards:
G.SRT.4
G.CO.10
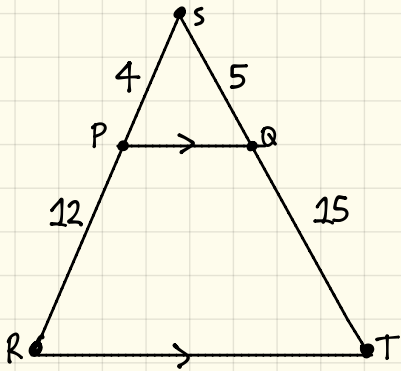
Let's recall characteristics of Similar Triangles:
- Same shape, but possibly different size
- corresponding sides are proportional
- proving similar triangles by AA, SSS, SAS.

Let's consider the diagram below. Prove $\triangle RST \sim \triangle PSQ$.
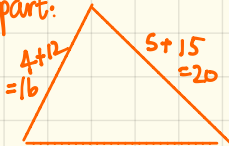

– Are sides proportional?

$$\frac{SP}{SR} = \frac{SQ}{ST} \qquad \frac{4}{16} = \frac{5}{20} \qquad \frac{1}{4} = \frac{1}{4}$$

yes!

– Included angle congruent? yes
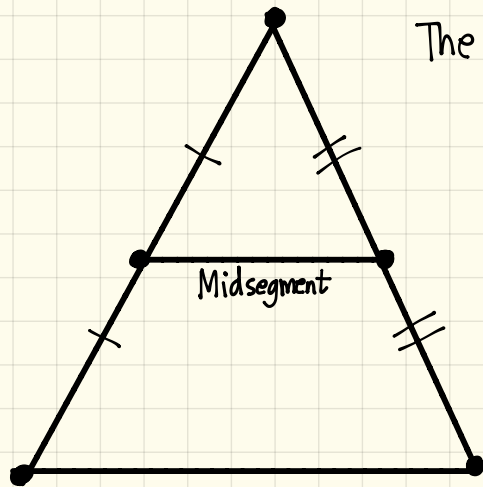 $\angle S \cong \angle S$ (Reflexive Property)

So, SAS. Therefore, $\triangle RST \sim \triangle PSQ$.
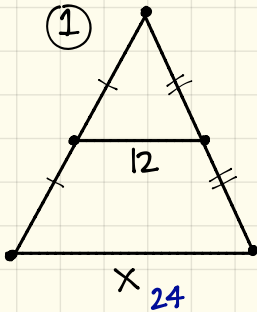
Use could split triangles apart:

note: ">" means parallel.

The midsegment is:
1. Parallel to one side of the triangle
2. Is half of the length of the parallel side
3. 2 midpoints connecting.

Midsegment

EQUATION

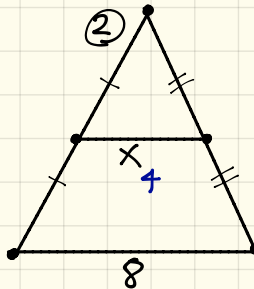$$\text{Midsegment} = \frac{1}{2} \text{ Parallel Side}$$

[Examples] Find the unknown.

① 12

X 24

midseg = $\frac{1}{2}$ PS

$12 = \frac{1}{2}$ PS

$24 = $ PS
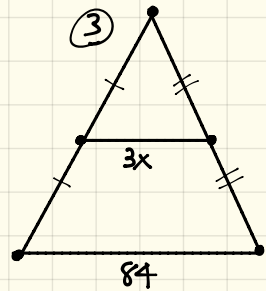
② X 4

8

midseg = $\frac{1}{2}$ PS

midseg = $\frac{1}{2}$ (8)

midseg = 4

③ 3x

84

midseg = $\frac{1}{2}$ PS

$3x = \frac{1}{2}$(84)

$3x = 42$

$x = 14$

④

4

5x - 2
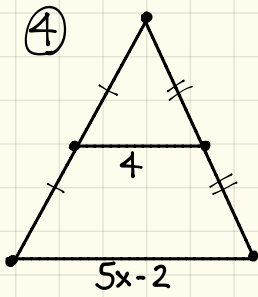
$\text{midseg} = \frac{1}{2} PS$

$4 = \frac{1}{2}(5x-2)$

$4 = \frac{5x}{2} - 1$

$5 = \frac{5x}{2}$

$10 = 5x$

$2 = x$

⑤

z″

22

12
x
55°
11
125°
y°
24
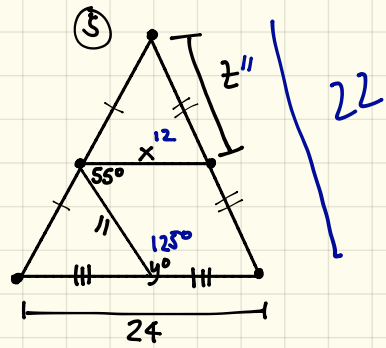
$\text{midseg} = \frac{1}{2} PS$
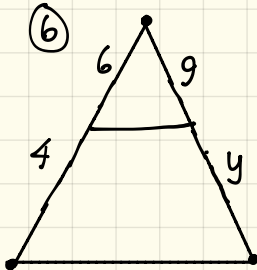
$x = \frac{1}{2}(24)$

$x = 12$

$y + 55 = 180°$

$y = 125°$

$11 = \frac{1}{2} PS$

$22 = PS$

$z = \frac{22}{2} = 11$

⑥

6   9

4   y
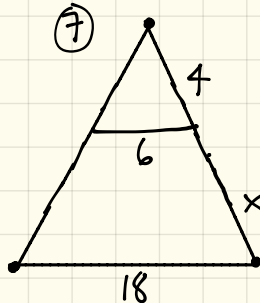
$\frac{6}{10} = \frac{9}{9+y}$

$9(10) = 6(9+y)$

$90 = 54 + 6y$

$36 = 6y$

$6 = y$

⑦

4
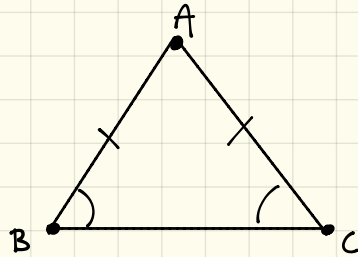
6

x

18

$\frac{4}{6} = \frac{x+4}{18}$
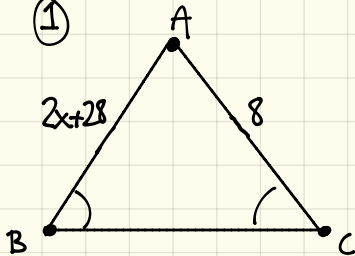
$6(x+4) = 72$

$6x + 24 = 72$

$6x = 48$

$x = 8$

Base Angles (Isosceles Triangle)
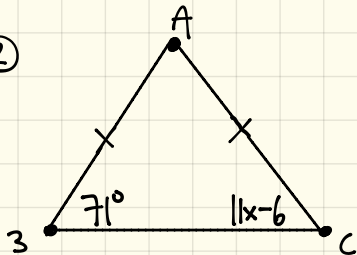
Opposite of the congruent angles
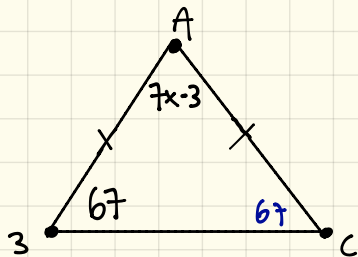are congruent sides

[Examples] Solve for the unknown.

①

$2x + 28 = 8$
$2x = -20$
$x = -10$

②

$11x - 6 = 71$
$11x = 77$
$x = 7$

③

$67 + 67 + ? = 180$
$134 + ? = 180$
$? = 46$

$7x - 3 = 46$
$7x = 49$
$x = 7.$