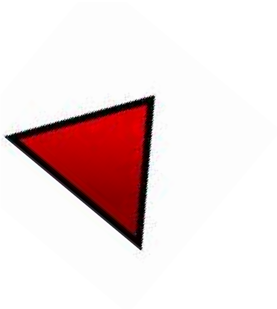
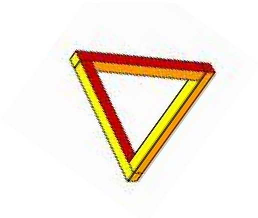
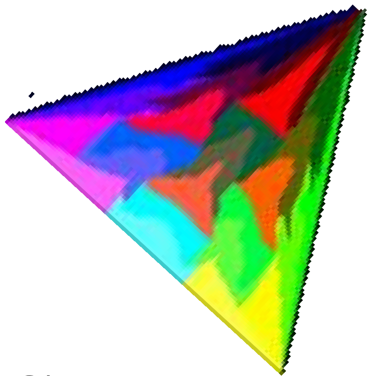
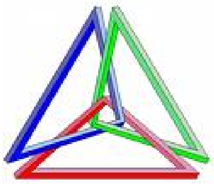
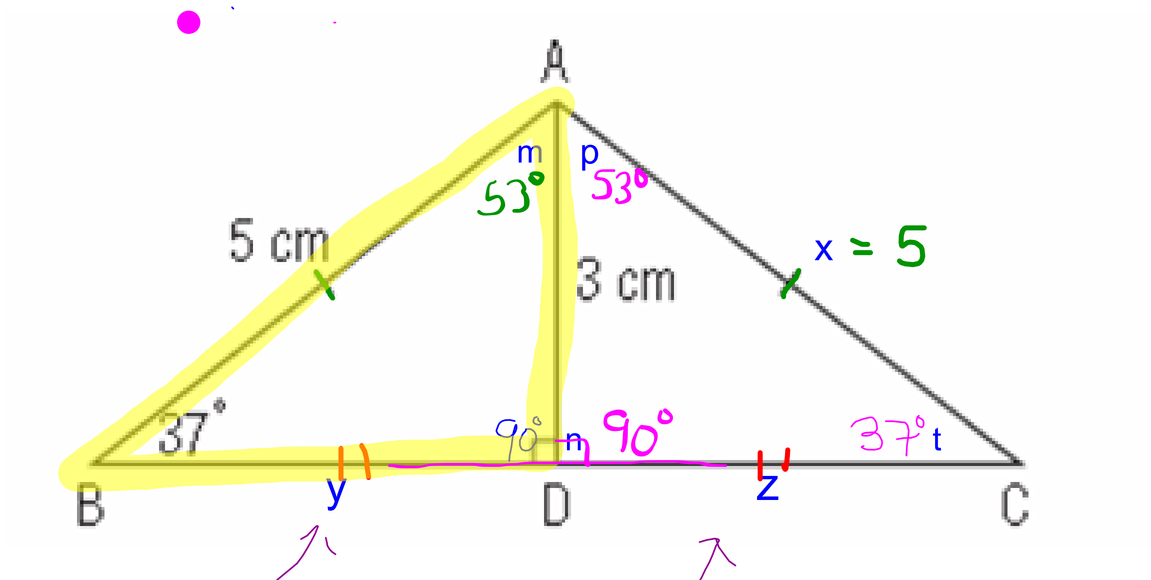






T*riangles*





$$y = \sqrt{5^2 - 3^2}$$

$$y = \sqrt{25 - 9}$$

$$y = \sqrt{16}$$

$$y = 4$$

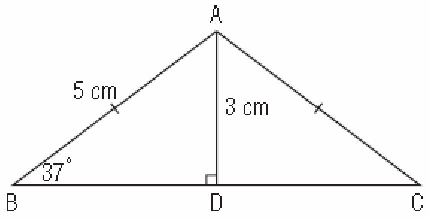
Start Where You Are

What Should I Recall?

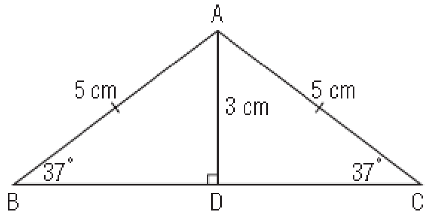
Page 316

Suppose I have to solve this problem:
Determine the unknown measures of the angles and sides in ΔABC.
The given measures are rounded to the nearest whole number.

I think of what I already know about triangles.
I see that AB and AC have the same hatch marks, this means the sides are equal.
AC = AB
So, AC = 5 cm

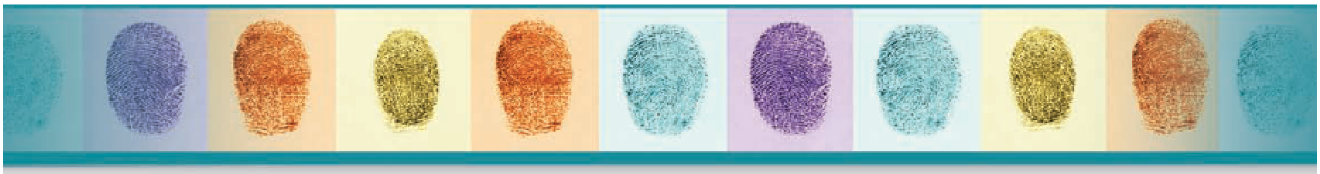


I know that a triangle with 2 equal sides is an isosceles triangle.
So, ΔABC is isosceles.
An isosceles triangle has 2 equal angles that are formed where the equal sides intersect the third side.
I use 3 letters to describe an angle.



So, ∠ACD = ∠ABD
= 37°

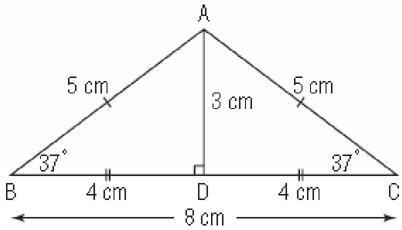
Since ΔABC is isosceles, the height AD is the perpendicular bisector of the base BC.
So, BD = DC and ∠ADB = 90°
I can use the Pythagorean Theorem in ΔABD to calculate the length of BD.



BD = 4 cm
So, BC = 2 × 4 cm
= 8 cm

I know that the sum of the angles in a triangle is 180°.
So, I can calculate the measure of ∠BAC.

$\angle BAC + \angle ACD + \angle ABD = 180°$
$\angle BAC + 37° + 37° = 180°$
$\angle BAC + 74° = 180°$
$\angle BAC + 74° - 74° = 180° - 74°$
$\angle BAC = 106°$

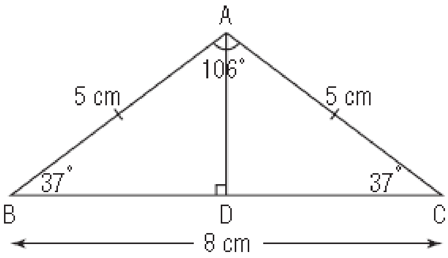


My friend Janelle showed me a different way to calculate.
She recalled that the line AD is a line of symmetry for an isosceles triangle.
So, ΔABD is congruent to ΔACD.

This means that ∠BAD = ∠CAD
Janelle calculated the measure of ∠BAD in ΔABD.

$\angle BAD + 37° + 90° = 180°$
$\angle BAD + 127° = 180°$
$\angle BAD + 127° - 127° = 180° - 127°$
$\angle BAD = 53°$

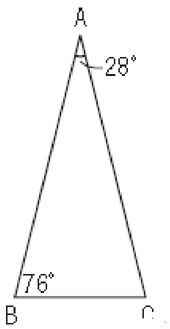
Then, $\angle BAC = 2 \times 53°$
$= 106°$



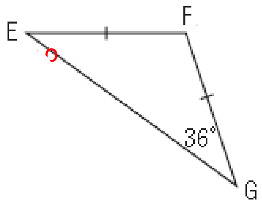
Check

1. Calculate the measure of each angle.

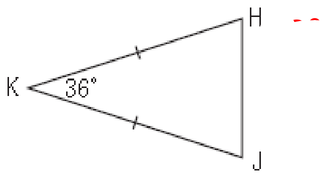
a) ∠ACB



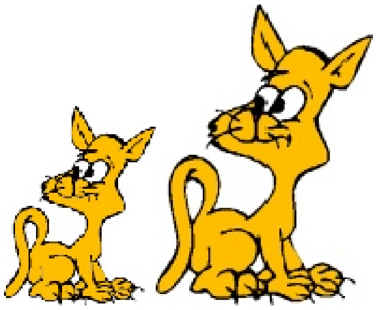
b) ∠GEF and ∠GFE



c) ∠HJK and ∠KHJ




Section 7.4
Similar Triangles



The cat on the right is an enlargement of the cat on the left. They are exactly the same shape, but they are NOT the same size.

These cats are similar figures.

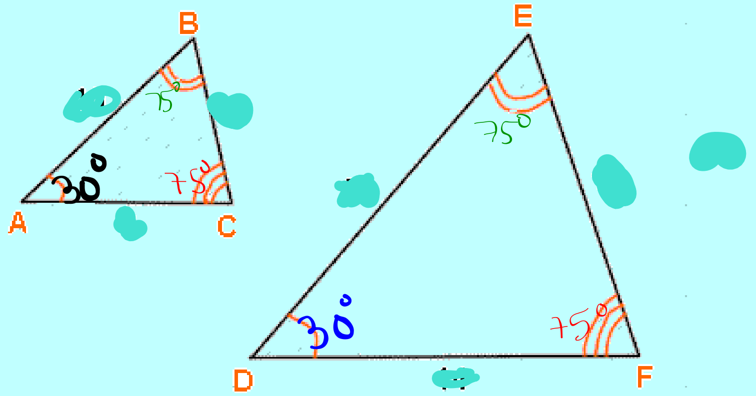
Objects, such as these two cats, that have the same shape, but do not have the same size, are said to be "similar".

The mathematical symbol used to denote similar is ~ .

~

Similar Symbol

~

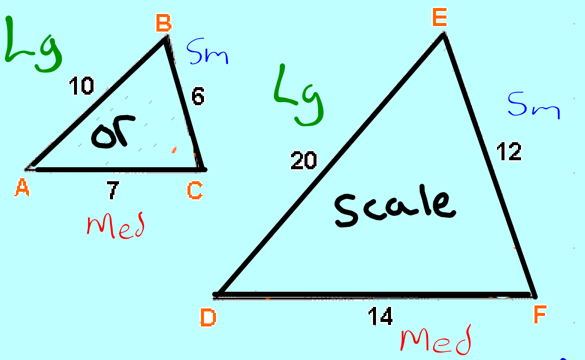


$\angle A = \angle D$

$\angle B = \angle E$

$\angle C = \angle F$

$\therefore \Delta ABC \sim \Delta DEF$ (AAA)



$\therefore \Delta ABC \sim \Delta DEF$ (SSS)

$SF = \frac{S}{O}$

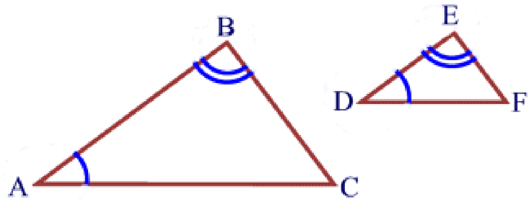
Lg	Med	Sm
$\frac{AB}{DE}$	$\frac{AC}{DF}$	$\frac{BC}{EF}$
$\frac{20}{10}$	$\frac{14}{7}$	$\frac{12}{6}$
2 =	2 =	2

Definition: Two triangles are **similar** if and only if the corresponding sides are in proportion and the corresponding angles are congruent.

There are three accepted methods of proving triangles similar:

AAA To show two triangles are similar, it is sufficient to show that two angles of one triangle are congruent (equal) to two angles of the other triangle.

Theorem: If two angles of one triangle are congruent to two angles of another triangle, the triangles are similar.



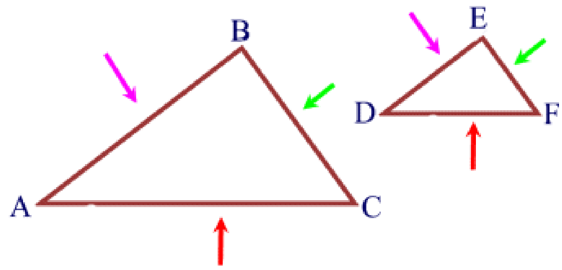
If: $\angle A \cong \angle D$

$\angle B \cong \angle E$

Then: $\triangle ABC \sim \triangle DEF$

SSS for similarity *BE CAREFUL!!* SSS for similar triangles is NOT the same theorem as we used for congruent triangles. To show triangles are similar, it is sufficient to show that the three sets of corresponding sides are in proportion.

Theorem: If the three sets of corresponding sides of two triangles are in proportion, the triangles are similar.

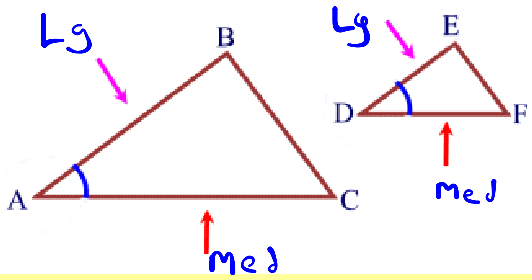


If: $\frac{AB}{DE} = \frac{AC}{DF} = \frac{BC}{EF}$

Then: $\triangle ABC \sim \triangle DEF$

SAS for similarity *BE CAREFUL!!* SAS for similar triangles is NOT the same theorem as we used for congruent triangles. To show triangles are similar, it is sufficient to show that two sets of corresponding sides are in proportion and the angles they include are congruent.

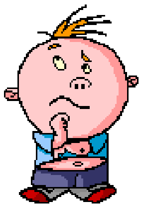
Theorem: If an angle of one triangle is congruent to the corresponding angle of another triangle and the lengths of the sides including these angles are in proportion, the triangles are similar.



If: $\angle A \cong \angle D$

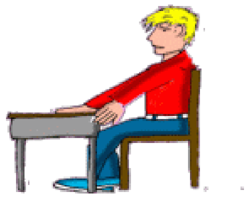
$\frac{AB}{DE} = \frac{AC}{DF}$

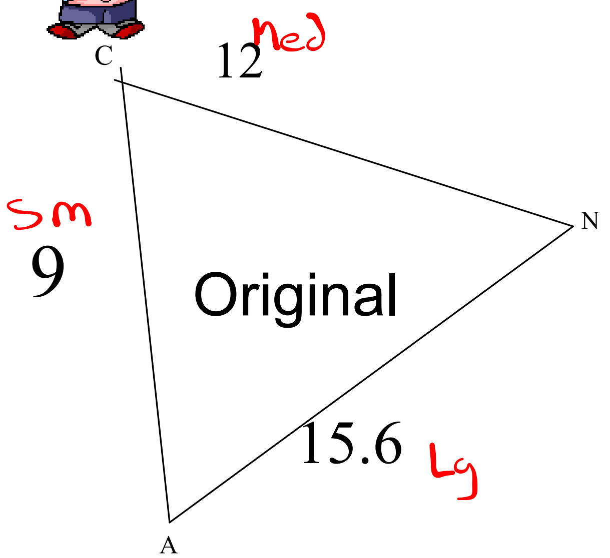
Then: $\triangle ABC \sim \triangle DEF$ (SAS)

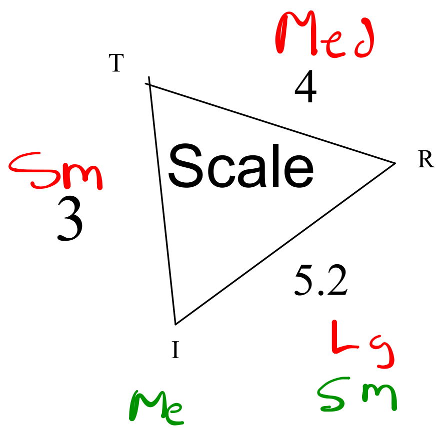


Are these triangles similar?

Triangles are just polygons







Let's Compare sides

Set up ratios of sides

$$\frac{IR}{AN} = \frac{RT}{NC} = \frac{TI}{CA}$$

(Lg, Me, Sm)

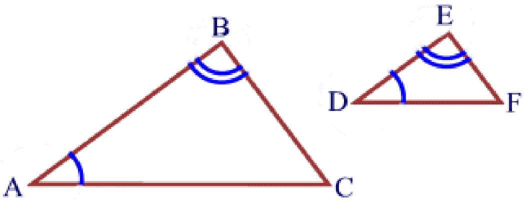
$$\frac{5.2}{15.6} = \frac{4}{12} = \frac{3}{9}$$

$$0.\overline{3} = 0.\overline{3} = 0.\overline{3}$$

$\therefore \triangle IRT \sim \triangle ANC$ (SSS)

Once the triangles are similar:

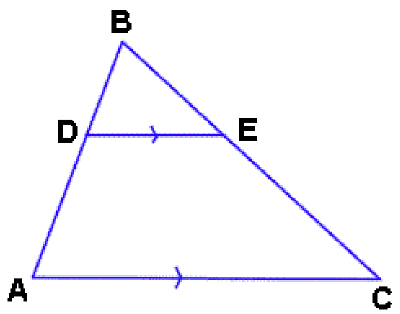
Theorem: The corresponding sides of similar triangles are in proportion.



$$If:\ \Delta ABC \sim \Delta DEF$$

$$Then:\ \frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}$$

Dealing with overlapping triangles:



Many problems involving similar triangles have one triangle ON TOP OF (overlapping) another triangle. Since $\overline{DE}$ is marked to be parallel to $\overline{AC}$, we know that we have <*BDE* congruent to <*DAC* (by corresponding angles). <*B* is shared by both triangles, so the two triangles are similar by AA.

There is an additional theorem that can be used when working with overlapping triangles:

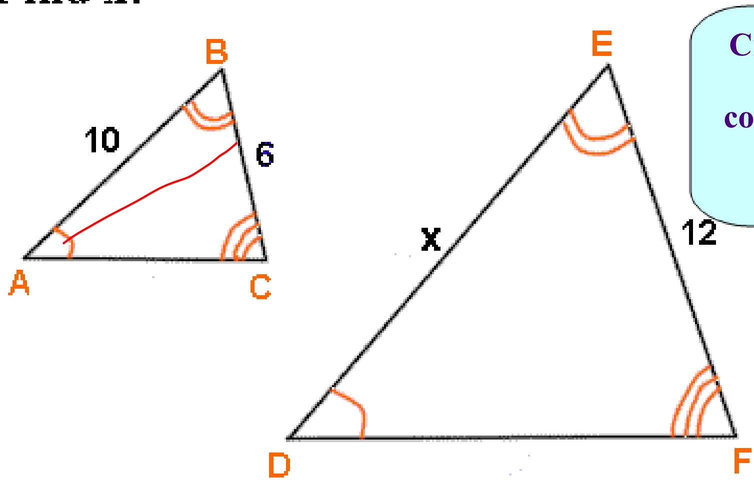
Additional Theorem: If a line is parallel to one side of a triangle and intersects the other two sides of the triangle, the line divides these two sides proportionally.

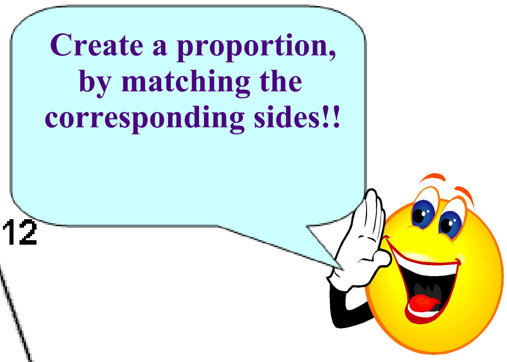
$$If: \overline{DE} \parallel \overline{AC}$$

$$Then: \frac{BD}{DA} = \frac{BE}{EC}$$

WHAT YOU HAVE TO INCLUDE ON A TEST

Find x:





Write the Similarity Statement:

$\angle A = \angle D$

$\angle B = \angle E$

$\angle C = \angle F$

$\triangle ABC \sim \triangle DEF$ (AAA)

Fill in the ratios:

$$\frac{AB}{DE} = \frac{BC}{EF}$$

Solve:

$$\frac{10}{x} = \frac{6}{12}$$

$$120 = 6x$$

$$x = 20$$

Homework

Page 349 - 350

4) ab Show all work
5)ab Show all work
6)ab Show all work