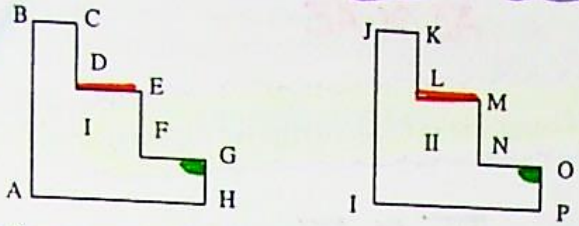
Geometry Worksheet: 3.1 Congruent Figures Date:

Defn: **Congruent Figures** – 2 figures are ≅ if the have the same size and the same shape.



Note: if you cut both figures out and place one atop the other, all parts would line up. We call the "lined-up" parts *corresponding parts*.

1. Which segment in figure II above corresponds with DE? LM

2. Which angle in figure I above corresponds with ∠O? ∠G

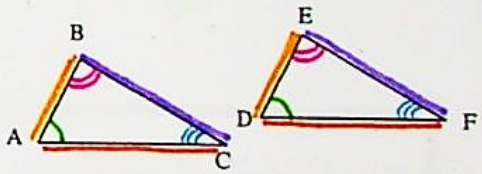
Defn: **Congruent Triangle** – 2 triangles all of whose 6 pairs of corresponding parts are ≅.

COND: If 2 Δs are ≅, then their 6 pairs of corresponding parts are ≅.

3. Given: $\Delta ABC \cong \Delta DEF$

What 6 conclusions could you draw?

1. $\angle A \cong \angle D$
2. $\angle B \cong \angle E$
3. $\angle C \cong \angle F$
4. $\overline{AB} \cong \overline{DE}$
5. $\overline{BC} \cong \overline{EF}$
6. $\overline{AC} \cong \overline{DF}$



4. No diagram needed!

Given: $\Delta FAT \cong \Delta PIG$

What 6 conclusions could you draw?

1. $\angle F \cong \angle P$
2. $\angle A \cong \angle I$
3. $\angle T \cong \angle G$
4. $\overline{FA} \cong \overline{PI}$
5. $\overline{AT} \cong \overline{IG}$
6. $\overline{FT} \cong \overline{PG}$

$\overline{FAT}$ $\overline{PIG}$

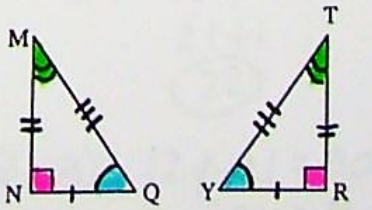
5. Given: diagram as shown

Complete: $\Delta MNQ \cong \Delta$ TRY

Give 5 other possible ways of stating that the 2 triangles are congruent.

1. $\Delta MNQ \cong \Delta TRY$
2. $\Delta MQN \cong \Delta TYR$
3. $\Delta NQM \cong \Delta RYT$
4. $\Delta NMQ \cong \Delta RTY$
5. $\Delta QMN \cong \Delta YTR$
6. $\Delta QNM \cong \Delta YRT$

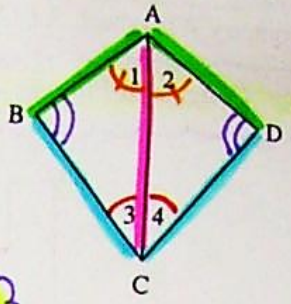
6 ways total!



(1) $\left(\frac{3}{1st} \cdot \frac{2}{2nd} \cdot \frac{1}{3rd} = 6 \text{ ways}\right)$

6. Given: $\Delta ABC \cong \Delta ADC$
What 6 conclusions could you draw?

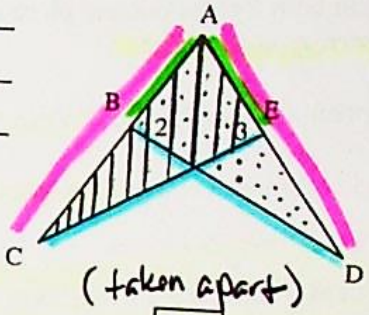
1. $\angle 1 \cong \angle 2$
2. $\angle B \cong \angle D$
3. $\angle 3 \cong \angle 4$
4. $\overline{AB} \cong \overline{AD}$
5. $\overline{BC} \cong \overline{DC}$
6. $\overline{AC} \cong \overline{AC}$



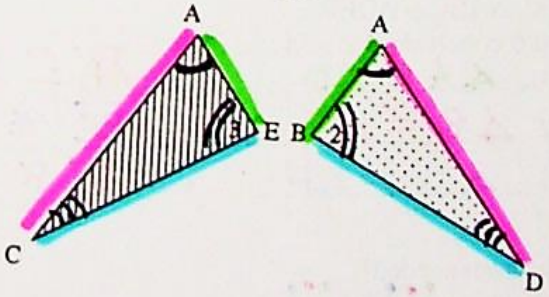
Postulate: any segment or angle is congruent to itself. (**Reflexive Property**)

7. Given: $\Delta AEC \cong \Delta ABD$

1. $\angle A \cong \angle A$
2. $\angle AEC \cong \angle ABD$
3. $\angle C \cong \angle D$
4. $\overline{AE} \cong \overline{AB}$
5. $\overline{AC} \cong \overline{AD}$
6. $\overline{CE} \cong \overline{DB}$



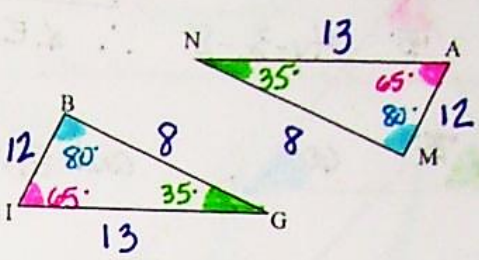
(taken apart)



Geometry: 3.1 - Congruent Figures

Congruent basically means "same shape, same size", but for two polygons to be congruent, all **corresponding parts (sides & angles) must be congruent.**

1. Given: $\Delta BIG \cong \Delta MAN$, $\angle B = 80°$, $\angle N = 35°$, AM = 12, IG = 13, and BG = 8. Find:



$\angle I$ 65° $\angle G$ 35°

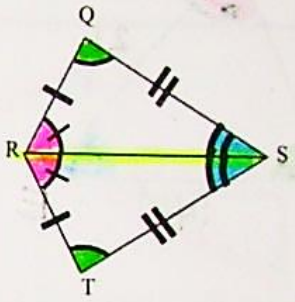
$\angle M$ 80° $\angle A$ 65°

BI 13 AN 13 MN 8

2. Are the 2 triangles shown to the right congruent? yes

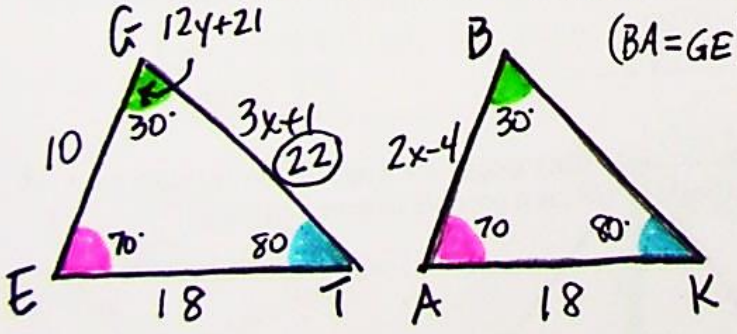
Are all 3 pairs of angles congruent? yes

Are all 3 pairs of sides congruent? yes



The Reflexive Property - Any segment is ≅ to itself | Any angle is ≅ to itself

3. **Given:** $\Delta GET \cong \Delta BAK$, GE = 10, AK = 18, $\angle E = 70°$, $\angle K = 80°$, $GT = (3x+1)$, $BA = (2x-4)$, $\angle G = (12y+21)°$. Find x, y, and the perimeter of ΔBAK.



$(BA = GE)$: $2x - 4 = 10$

$2x = 14$

$\boxed{x = 7}$

$GT = 3(7)+1$

$21+1$

(22)

$180 - (70+80)$

$180 - (150)$

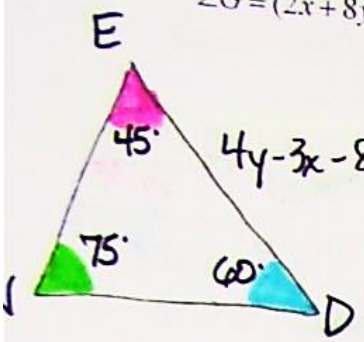
$\boxed{\angle G \cong \angle B = 30}$

$(\angle G \cong \angle B)$: $12y + 21 = 30$

$12y = 9$

$\boxed{y = \frac{9}{12} = \frac{3}{4}}$

4. **Given:** $\Delta END \cong \Delta GTL$, $\angle E = 45°$, $\angle N = 75°$, $\angle D = 60°$, GT = 17, GL = 21, TL = 14, $\angle G = (2x + 8y + 11)°$, and ED = (4y - 3x - 8). Find x and y.



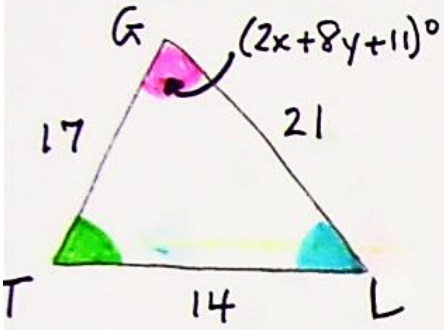
Given: $\Delta END \cong \Delta GTL$

$\therefore \angle E \cong \angle G$, so $2x + 8y + 11 = 45$

$2x + 8y = 34$

and $\overline{ED} \cong \overline{GL}$, so $4y - 3x - 8 = 21$

$4y - 3x = 29$



System

$2x + 8y = 34 \Rightarrow \frac{2x+8y=34}{2} = x + 4y = 17$

$4y - 3x = 29 \Longrightarrow -3x + 4y = 29$

Solve

$x + 4y = 17$

$-(-3x + 4y = 29)$

$x + 4y = 17$

$+3x - 4y = -29$

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

$x = -3$

$x + 4y = 17$

$(-3) + 4y = 17$

$4y = 20$

$\frac{4y}{4} = \frac{20}{4}$

$y = 5$

5. **Think about it:**

a) If I give you 3 segments of lengths 8, 12, and 22, can you make a triangle? NO

Is $8 + 12 > 22$? NO

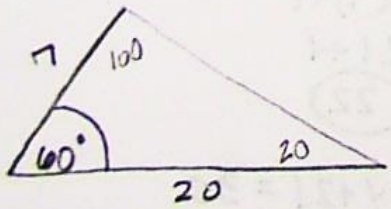
$20 \not> 22$

b) If I give you 3 segments of lengths 5, 8, and 10, can you make a triangle? YES

Is $5 + 8 > 10$? yes! Is $8 + 10 > 5$? yes! Is $5 + 10 > 8$? yes!

Can you make more than one triangle? NO

c) If I give you 2 segments of lengths 7 and 20, and I don't specify the length of the 3rd side, but I tell you the sides 7 and 20 must meet at an angle of 60°, is it possible to have a triangle? Yes



Can you make more than one triangle with these conditions?

No