

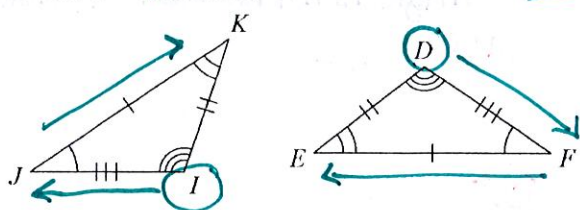
Congruency and Similarity

Topic: Corresponding Parts**Things to Remember:**

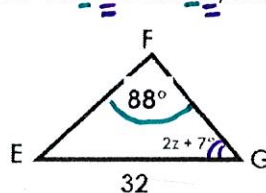
- ✓ Triangle statement must have the SAME ORDER (follow congruent marks!)

Examples:

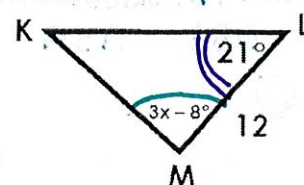
1. $\triangle DFE \cong \triangle IJK$ Go in the same order!



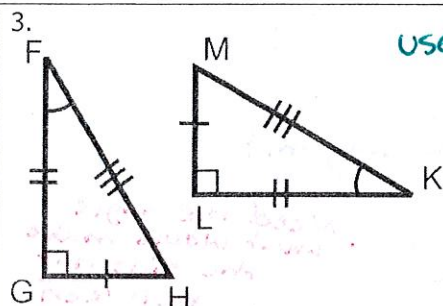
2. $\triangle EFG \cong \triangle KML$, find x and z .



$$\begin{aligned} 88 &= 3x - 8 \\ +8 &+8 \\ \hline 96 &= 3x \\ \frac{96}{3} &= \frac{3x}{3} \\ \hline 32 &= x \end{aligned}$$



$$\begin{aligned} 2z + 7 &= 21 \\ -7 &-7 \\ \hline 2z &= 14 \\ \frac{2z}{2} &= \frac{14}{2} \\ \hline z &= 7 \end{aligned}$$



use matching pieces!

- $\angle G \cong \angle L$
- $\overline{MK} \cong \overline{FH}$
- $\angle HFG \cong \angle MKL$
- $\overline{HG} \cong \overline{ML}$

4. $\triangle MON \cong \triangle YET$

use matching pieces!

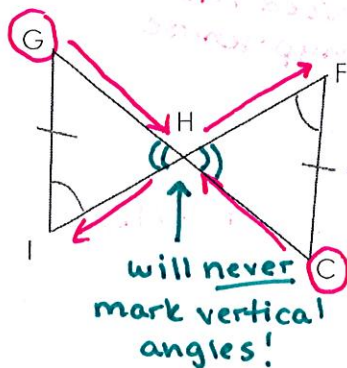
- $\angle N \cong \angle T$
- $\overline{ET} \cong \overline{ON}$
- $\angle ONM \cong \angle ETY$
- $\overline{NM} \cong \overline{TY}$

Topic: Triangle Congruency**Things to Remember:**

- ✓ Triangles can be congruent 5 different ways: SSS, SAS, AAS, ASA, and HL

Examples:

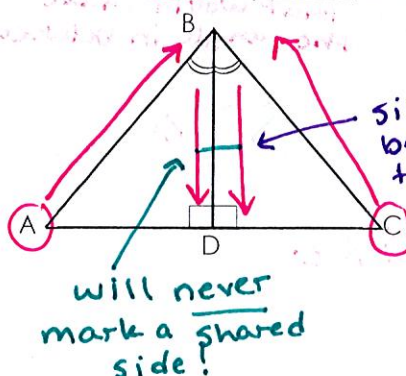
5. $\triangle GHI \cong \triangle CHF$ by AAS Go in the same order!



side is not between the two angles

will never mark vertical angles!

6. $\triangle ABD \cong \triangle CBD$ by ASA Go in the same order!



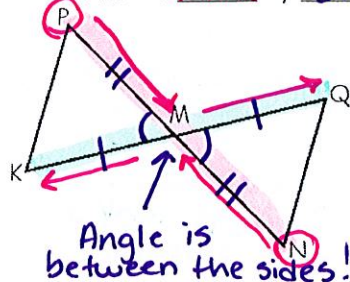
side is between the two angles

will never mark a shared side!

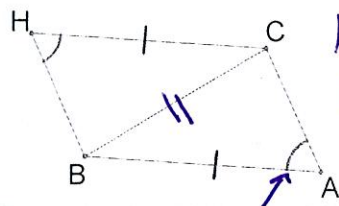
splits in two equal pieces

7. \overline{PN} and \overline{KQ} bisect each other.

$\triangle PMK \cong \triangle NMQ$ by SAS



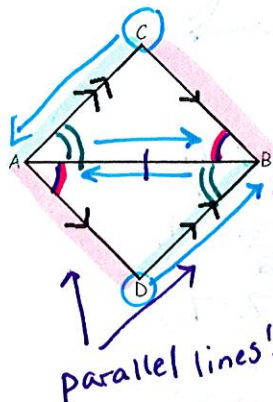
8. Are these triangles congruent? Why or why not?



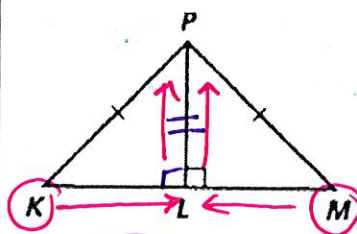
NO,
ASS!

Angle is not between the sides!

9. $\triangle CAB \cong \triangle DBA$ by ASA



10. $\triangle KLP \cong \triangle MLP$ by HL



(ASS) \rightarrow HL
since there's a
right angle!

11. Given: $\angle A \cong \angle X$ and $\angle C \cong \angle Z$.

Mark on the diagram!!

What OTHER piece of information is needed to show $\triangle ABC$ and $\triangle XYZ$ by ASA?



$AC \cong XZ$

12. Given: $BC \cong YZ$ and $\angle C \cong \angle Z$

Mark the diagram!

What OTHER piece of information is needed to show $\triangle ABC$ and $\triangle XYZ$ by AAS?

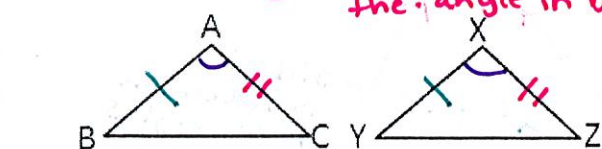


$\angle A \cong \angle X$

13. Given: $\angle A \cong \angle X$ and $BA \cong YX$

Mark the diagram!

What OTHER piece of information is needed to show $\triangle ABC$ and $\triangle XYZ$ by SAS?

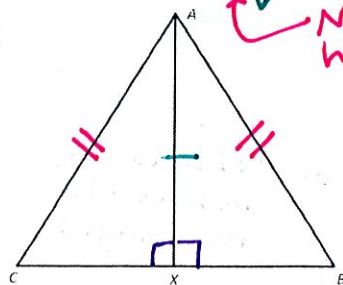


$AC \cong XZ$

14. Given: $\angle CXA$ and $\angle BXA$ are right angles

Mark the diagram!

What OTHER piece of information is needed to show $\triangle CXA$ and $\triangle BXA$ by HL?



$CA \cong AB$

Topic: Proofs

Things to Remember:

- ✓ State what is given FIRST
- ✓ MARK YOUR DIAGRAM!
- ✓ Step 1 – Write down the givens
- ✓ Step 2 – Make any marks that you know are congruent (reflexive property, vertical angles, alternate interior angles)
- ✓ Step 3 – **BUILD OFF YOUR GIVENS; YOU CANNOT ASSUME ANYTHING IF IT IS NOT TOLD TO YOU!!!**
- ✓ Step 4 – Statement will always be showing the Triangles are \cong (SSS, SAS, ASA, AAS, HL)
- ✓ Step 5 – AFTER two triangles are congruent, then you can use CPCTC

Examples:

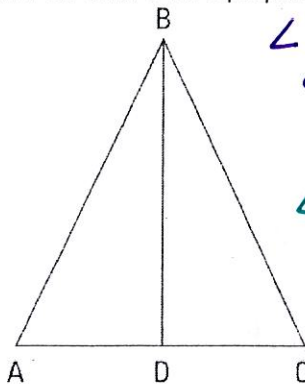
SSS SAS ASA AAS HL CPCTC Vertical Angles are \cong

Reflexive Property Alternate Interior Angles \cong All Right Angles are \cong

Transitive Property Definition of a Midpoint Given

Definition of Bisector Definition of Perpendicular Definition of congruence

15. If BD and CA are perpendicular, what can you assume?



$\angle BDA$ and $\angle CDA$
are right angles

THEN

$\angle BDA \cong \angle CDA$

16. Using the figure on the left, if BD bisects AC, what can you assume?

$AD \cong DC$

splits
a side

17. Using the figure on the left, if BD bisects $\angle ABC$, what can you assume?

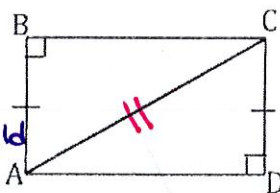
$\angle ABD \cong \angle CBD$

splits
an angle

18. Given: $\overline{AB} \cong \overline{DC}$, $\overline{AB} \perp \overline{BC}$,
and $\overline{CD} \perp \overline{AD}$

Prove: $\triangle ABC \cong \triangle CDA$

All things you should
get without thinking

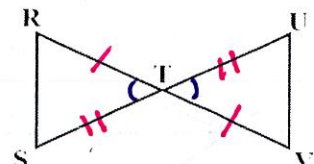


Statements	Reasons
1. $\overline{AB} \cong \overline{DC}$	1. Given
2. $\overline{AB} \perp \overline{BC}$	2. Given
3. $\overline{CD} \perp \overline{AD}$	3. Given
4. $\angle ABC$ & $\angle CDA$ are right angles	4. Def. of perp.
5. $\angle ABC \cong \angle CDA$	5. All right \angle s are \cong
6. $\overline{AC} \cong \overline{AC}$	6. Reflexive Prop
7. $\triangle ABC \cong \triangle CDA$	7. HL

19. Given: \overline{RV} and \overline{SU} bisect
each other

Prove: $\angle TSR \cong \angle TUV$

↑ parts



Statements	Reasons
1. \overline{RV} & \overline{SU} bisect each other	1. Given
2. $\overline{RT} \cong \overline{TV}$	2. Def. of bisector
3. $\overline{ST} \cong \overline{TU}$	3. Def. of bisector
4. $\angle RTS \cong \angle UTV$	4. vert. \angle s are \cong
5. $\triangle RTS \cong \triangle UTV$	5. SAS
6. $\angle TSR \cong \angle TUV$	6. CPCTC ↑ Triangles

Topic: Dilations**Things to Remember:**

- ✓ Dilations needs TWO components: scale factor (k) and a center of dilation
- ✓ $K = \text{scale factor}$
- ✓ $K > 1 \rightarrow \text{Enlargement}$
- ✓ $K < 1 \rightarrow \text{Reduction}$
- ✓ $K = 1 \rightarrow \text{Congruence}$

Examples:

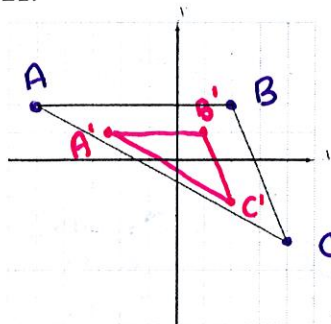
20. Describe what type of dilation would occur with each k-value and **WHY**.

a. $k = \frac{3}{4}$ Reduction $\frac{3}{4} < 1$

c. $k = \frac{8}{7}$ Enlargement $\frac{8}{7} > 1$

d. $k = 0.99998$ Reduction $0.99998 < 1$

21.



$A(-5, 2)$ $A'(-2.5, 1)$
 $B(2, 2)$ $B'(1, 1)$
 $C(4, -3)$ $C'(2, -1.5)$

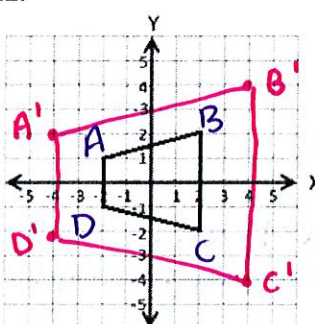
a. Label the vertices ABC.

b. Dilate with $k = 1/2$ centered at the origin.

c. What type of dilation occurred?

reduction

22.



$A(-2, 1)$ $A'(4, 2)$
 $B(2, 2)$ $B'(4, 4)$
 $C(2, -2)$ $C'(4, -4)$
 $D(-2, -1)$ $D'(-4, -2)$

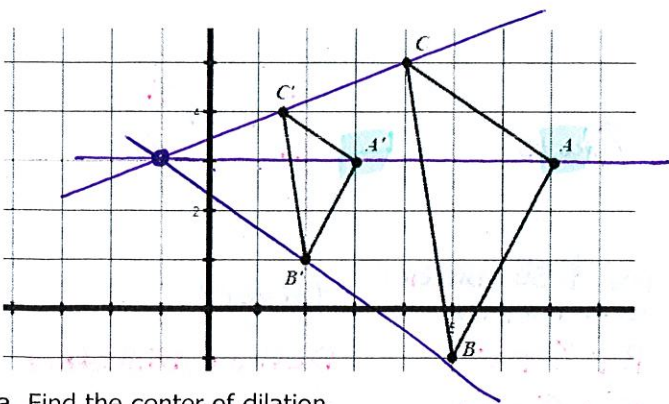
a. Label the vertices ABCD.

b. Dilate with $k = 2$ centered at the origin.

c. What type of dilation occurred?

enlargement

23.



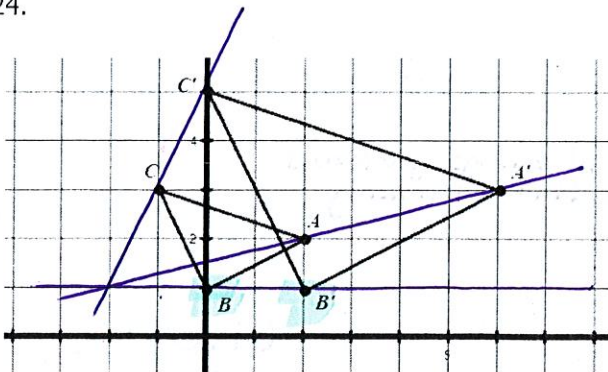
a. Find the center of dilation.

$(-1, 3)$

b. Calculate the scale factor.

$\frac{A'B'}{AB} = \frac{4}{8} \rightarrow \frac{1}{2}$

24.



a. Find the center of dilation.

$(-2, 1)$

b. Calculate the scale factor.

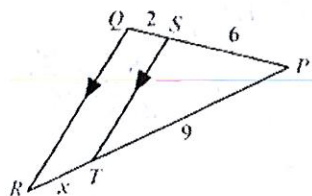
$\frac{B'B'}{BB'} = \frac{4}{2} \rightarrow 2$

Topic: Triangle Proportionality**Things to Remember:**

- ✓ $\frac{\text{top}}{\text{bottom}} = \frac{\text{top}}{\text{bottom}}$ OR ANYWAY THAT KEEPS THE SAME ORDER!!
- ✓ ONLY WHEN TWO SIDES ARE PARALLEL

Examples

25. Solve for x.

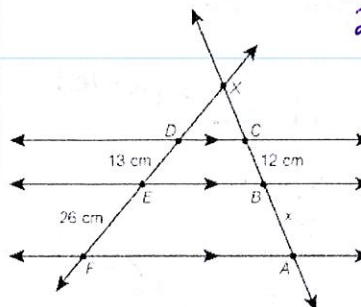


$$\frac{6}{2} = \frac{9}{x}$$

$$\frac{18}{6} = \frac{6x}{6}$$

$$3 = x$$

26. Solve for x



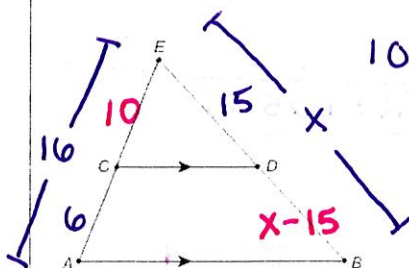
$$\frac{13}{26} = \frac{12}{x}$$

$$\frac{13x}{13} = \frac{312}{13}$$

$$x = 24 \text{ cm}$$

27. $AE = 16$, $CA = 6$, and $ED = 15$

Solve for EB.



$$\frac{10}{6} = \frac{15}{x-15}$$

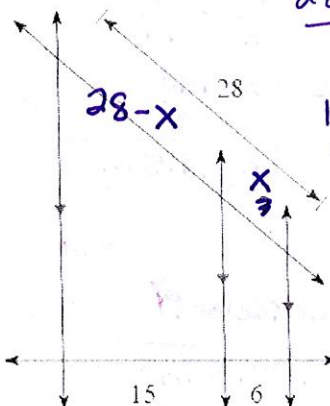
$$10x - 150 = 90$$

$$+150 +150$$

$$\frac{10x}{10} = \frac{240}{10}$$

$$x = 24$$

28. Solve for the missing length



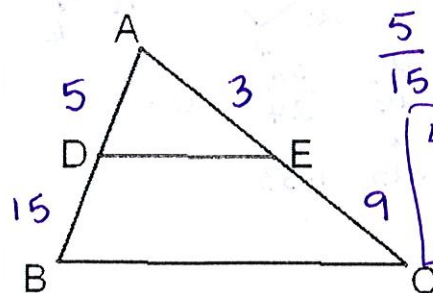
$$\frac{28-x}{x} = \frac{15}{6}$$

$$15x = 168 - 6x$$

$$+6x +6x$$

$$\frac{21x}{21} = \frac{168}{21}$$

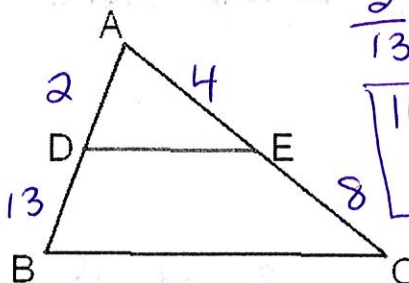
$$x = 8$$

29. Determine if \overline{DE} is parallel to \overline{BC} $AD = 5$, $DB = 15$, $AE = 3$, and $EC = 9$ 

$$\frac{5}{15} \neq \frac{3}{9}$$

$$45 = 45$$

yes!

30. Determine if \overline{DE} is parallel to \overline{BC} $AD = 2$, $DB = 13$, $AE = 4$, and $EC = 8$ 

$$\frac{2}{13} \neq \frac{4}{8}$$

$$16 = 52$$

No!

Topic: Similar Figures**Things to Remember:**

- ✓ ALL angles are congruent
- ✓ ALL sides are proportional (have the same scale factor)
- ✓ There are ONLY 3 ways to prove two triangles are similar: SSS Similarity, SAS Similarity, and AA Similarity

31. Given $\triangle EBD \sim \triangle CBA$
Solve for ED.

Not parallel, separate!

$$\frac{36}{x} = \frac{32}{24}$$

$$\frac{32x}{32} = \frac{864}{32}$$

$$x = 27$$

32. Given $\triangle EDC \sim \triangle BAC$
Solve for x.

Use matching sides.

$$\frac{x}{6} = \frac{12.8}{8}$$

$$\frac{8x}{8} = \frac{76.8}{8}$$

$$x = 9.6$$

33. Solve for x if the large triangle is similar to the smaller triangle.

separate!

$$\frac{x}{2} = \frac{15}{5}$$

$$\frac{5x}{5} = \frac{30}{5}$$

$$x = 6$$

34. Solve for x and y.

$$\frac{y}{5} = \frac{8}{7}$$

$$\frac{35}{8} = \frac{8y}{8}$$

$$4.375 = y$$

$$\frac{x}{3.5} = \frac{8}{5}$$

$$\frac{5x}{5} = \frac{28}{5}$$

$$x = 5.6$$

35. A telephone pole is 10 meters tall casts a shadow 8 meters long. A tree nearby casts a shadow 14 meters long. How tall is the tree?

$$\frac{10}{x} = \frac{8}{14}$$

$$\frac{8x}{8} = \frac{140}{8}$$

$$x = 17.5 \text{ m}$$

36. A map has a scale of 3 cm : 18 miles. If Marietta and Kennesaw are 7.5 miles apart, how many centimeters are the two cities apart on the map?

$$\frac{3 \text{ cm}}{18 \text{ mi}} = \frac{x}{7.5 \text{ mi}}$$

$$\frac{18x}{18} = \frac{22.5}{18}$$

$$x = 1.25 \text{ mi}$$

37. The area of an old picture is 24.5 in^2 . If you want to enlarge the picture 3 times, what would the area be of the new picture?

area changes by (scale factor)²

OLD

$$(24.5)(3)^2 = 220.5 \text{ in}^2$$

38. Triangles IJK and TUV are similar. The length of the sides of IJK are 40, 50, and 24. The length of the longest side of TUV is 275, what is the perimeter of TUV?

NEW perimeter changes by scale factor

scale factor \rightarrow perimeter of $\triangle IJK \rightarrow$ NEW perimeter

$$\frac{275}{50} = 5.5$$

$$40 + 50 + 24 = 114$$

$$114(5.5) = 627$$

39. Determine if the triangles are similar. If the figures are similar, write a similarity statement.

yes, AA Similarity

$$\triangle ACB \sim \triangle DFE$$

40. Determine if the triangles are similar. If the figures are similar, write a similarity statement.

No!

41. Determine if the triangles are similar. If the figures are similar, write a similarity statement.

yes, SSS Similarity

$$\triangle ABC \sim \triangle DFE$$

42. Determine if the triangles are similar. If the figures are similar, write a similarity statement.

yes, SAS Similarity

$$\triangle AEB \sim \triangle ADC$$