

Unit 1 Test Review
Similarity, Congruence, and Proofs

Theorems about Lines and Angles

1. Name the relationship and then find the missing angle measures by solving for x.

a.

$2(76) + 10 = 162$

$(2x+10)^\circ$

$(86+x)^\circ = 86 + 76 = 162$

$$\begin{array}{r} 2x + 10 = 86 + x \\ -x \quad -10 \quad -10 \quad -x \\ \hline x = 76 \end{array}$$

b.

54°

126°

$(4x+6)^\circ$

$(11x-6)^\circ$

$4x + 6 + 11x - 6 = 180$

$15x = 180$

$x = 12$

c.

52°

$(4x+24)^\circ$

$(7x+3)^\circ$

52°

$$\begin{array}{r} 4x + 24 = 7x + 3 \\ -4x \quad -3 \quad -4x \quad -3 \\ \hline 21 = 3x \\ \frac{21}{3} \quad \frac{3x}{3} \quad x = 7 \end{array}$$

d.

$(6x+7)^\circ = 6(15) + 7 = 97^\circ$

$(3x+38)^\circ = 3(15) + 38 = 83^\circ$

$$\begin{array}{r} 6x + 7 + 3x + 38 = 180 \\ 9x + 45 = 180 \\ -45 \quad -45 \\ \hline 9x = 135 \\ \frac{9x}{9} = \frac{135}{9} \quad x = 15 \end{array}$$

2. The measure of one angle is 38 more than three times its supplement. Find the measure of each angle.

$$\begin{array}{l} \angle 1 = x \\ \angle 2 = 3x + 38 \end{array} \left. \begin{array}{l} \\ \\ \end{array} \right\} \begin{array}{l} 4x + 38 = 180 \\ -38 \quad -38 \\ \hline 4x = 142 \\ \frac{4x}{4} = \frac{142}{4} \\ x = 35.5 \end{array} \rightarrow \text{plug in } \begin{array}{l} \angle 1 = x = 35.5^\circ \\ \angle 2 = 3x + 38 = 144.5^\circ \end{array}$$

3. Determine what steps are missing from the following proofs.



Prove: $\angle 1 \cong \angle 3$

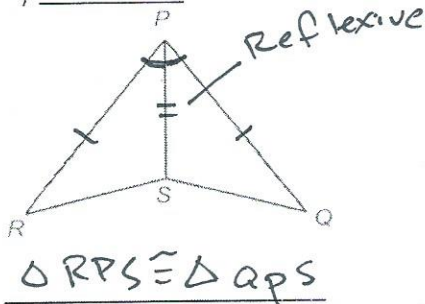
Statement	Justification
1. $m\angle 1 + m\angle 2 = 180$	1. Linear Pair
2. $m\angle 2 + m\angle 3 = 180$	2. Linear Pair
3. $m\angle 1 + m\angle 3 = 180$	3. Substitution
4.	4. Definition of congruent angles

$$\begin{array}{r} m\angle 1 + m\angle 2 = m\angle 2 + m\angle 3 \\ -m\angle 2 \quad -m\angle 2 \\ \hline m\angle 1 \cong m\angle 3 \end{array}$$

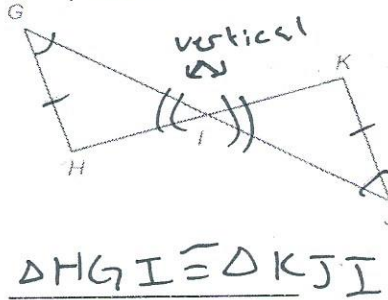
Congruent Triangles

Determine whether each pair of triangles is congruent. If so, write a congruence statement, and explain why the triangles are congruent.

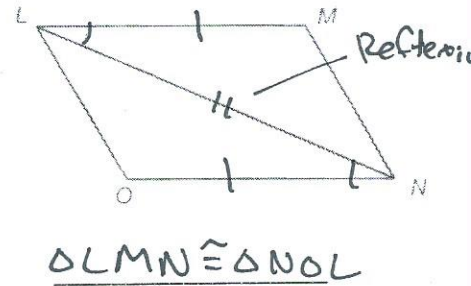
4) SAS



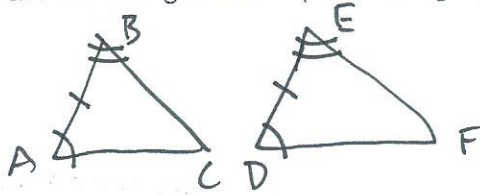
5) AAS



6) SAS

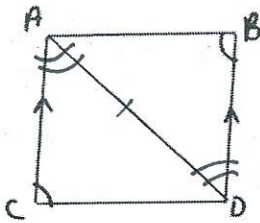


7) For $\triangle ABC$ and $\triangle DEF$ the following is given: $\angle A \cong \angle D$, $\angle B \cong \angle E$, $\overline{AB} \cong \overline{DE}$. Sketch a picture to determine if the two triangles can be proven congruent. If so, create a two column proof.

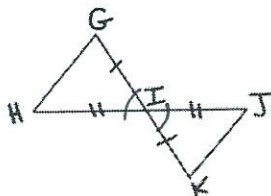


$\angle A \cong \angle D$	Given
$\angle B \cong \angle E$	Given
$\overline{AB} \cong \overline{DE}$	Given
$\triangle ABC \cong \triangle DEF$	SSS

8. Complete the following proofs.



Statement	Reason
1. $\overline{AC} \parallel \overline{DB}$	1. Given
2. $\angle C \cong \angle B$	2. Given
3. $\angle CAD \cong \angle BDA$	3. Alternate Interior \angle 's
4. $\overline{AD} \cong \overline{AD}$	4. Reflexive Property
5. $\triangle ACD \cong \triangle BDA$	5. AAS

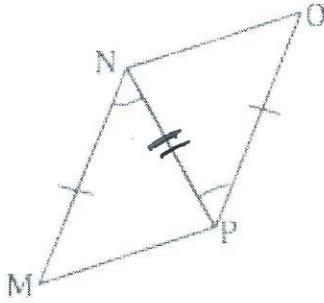


Statement	Reason
1. $\overline{GI} \cong \overline{KI}$	1. Given
2. $\overline{HI} \cong \overline{JI}$	2. Given
3. $\angle GIH \cong \angle KIJ$	3. vertical \angle 's
4. $\triangle GIH \cong \triangle KIJ$	4. SAS

Corresponding
 CPCTC: congruent parts of congruent triangles are congruent.

9. Complete the following proofs.

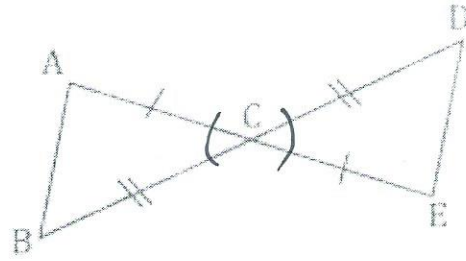
Given: $\angle MNP \cong \angle OPN$, and $\overline{MN} \cong \overline{OP}$



Prove: $\overline{MP} \cong \overline{NO}$

Statements	Reasons
1. $\angle MNP \cong \angle OPN$	1. Given
2. $\overline{MN} \cong \overline{OP}$	2. Given
3. $\overline{NP} \cong \overline{NP}$	3. Reflexive
4. $\triangle MNP \cong \triangle OPN$	4. SAS
5. $\overline{MP} \cong \overline{NO}$	5. CPCTC

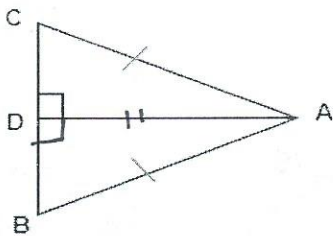
Given: $\overline{AC} \cong \overline{CE}$, $\overline{DC} \cong \overline{BC}$



Prove: $\angle B \cong \angle D$

Statements	Reasons
1. $\overline{AC} \cong \overline{CE}$	1. Given
2. $\overline{DC} \cong \overline{BC}$	2. Given
3. $\angle ACB \cong \angle DCE$	3. Vertical
4. $\triangle ABC \cong \triangle DEC$	4. SAS
5. $\angle B \cong \angle D$	5. CPCTC

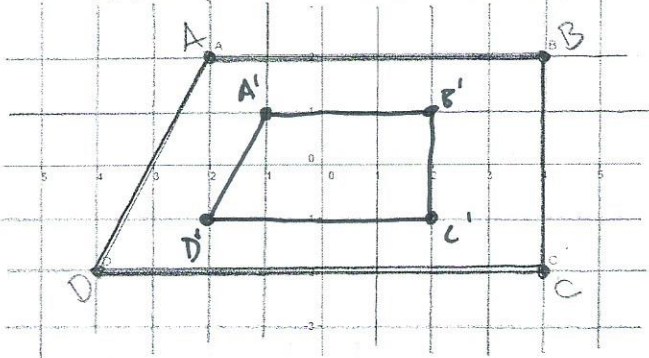
10. Write either a two-column proof or a paragraph proof to show that the base angles in an isosceles triangle are congruent. In other words, show that $\angle C \cong \angle B$.



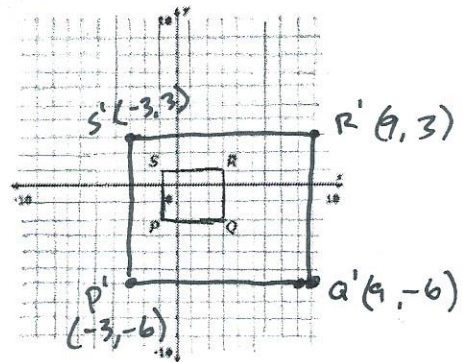
Statement	Reason
$\overline{AC} \cong \overline{AB}$	Given
$\angle ADC \cong \angle ADB$	Right Angle Congruency
$\overline{AD} \cong \overline{AD}$	Reflexive Prop
$\triangle ADC \cong \triangle ADB$	HL
$\angle C \cong \angle B$	CPCTC

Dilations

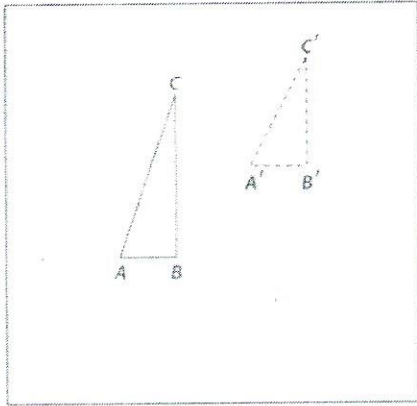
11. Dilate the figure with a scale factor of $\frac{1}{2}$ and the center at the (0,0). Then list the location of the dilated points.



12. Write the coordinates of the vertices after a dilation with a scale factor of 3, centered at the origin.



13. Are the two figures below congruent, similar, or neither?



- a. Similar, $\triangle ABC$ has undergone a vertical stretch
- b. Congruent, $\triangle ABC$ has undergone a vertical and horizontal shift.
- c. Similar, $\triangle ABC$ has undergone a vertical compression
- d. Not congruent nor similar, $\triangle ABC$ has undergone a vertical compression

Similar Triangles

14. The following shapes are similar. Find the scale factor, the measure of each side, and the measure of each angle if possible.

$Sf = \frac{5}{10} = \frac{1}{2}$

$Sf = \frac{6}{2} = 3$

15. In the following diagram, $AC \parallel DE$. Find the length of side BE.

$\frac{4}{6} = \frac{x}{8}$
 $32 = 6x$
 $x = 5.3$
 or $\frac{4}{x} = \frac{6}{8}$

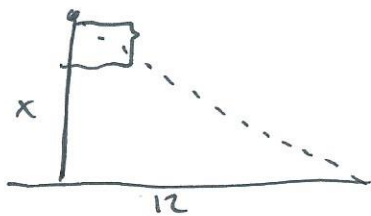
16. Find the length of HG.

$\frac{x}{50} = \frac{20}{45}$
 $45x = 1000$
 $x = 22.2$

16. Determine if the following triangles can be proven similar. If they can, tell by which theorem.

<p>$\frac{60}{6} = 10$ $\frac{40}{4} = 10$ $\frac{50}{5} = 10$</p> <p>Proportionate sides means similar</p>	<p>congruent \angle's means similar</p>	<p>$\frac{7}{14} = \frac{1}{2}$ $\frac{5}{10} = \frac{1}{2}$</p> <p>Proportionate sides</p>
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17. A flagpole casts a shadow 12 feet long at the same time that a vertical sign 8 feet tall casts a shadow 3 feet long. Sketch a picture and then use similar triangles to find the height of the flagpole.

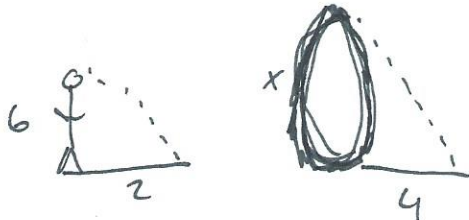


$$\frac{8}{x} = \frac{3}{12}$$

$$96 = 3x$$

$$x = 32 \text{ feet}$$

18. Mentone, Indiana claims to have the world's largest egg sculpture. A 6-foot tall person standing next to the egg sculpture casts a shadow that is 2 feet long. If the egg casts a shadow that is 4 feet long, how tall is the sculpture?



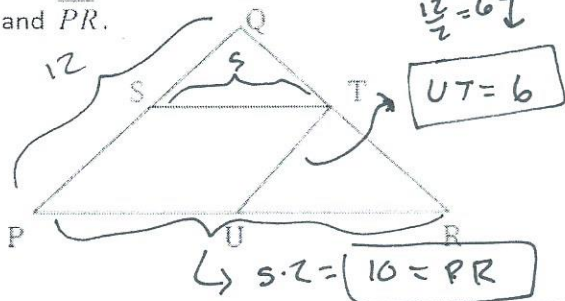
$$\frac{6}{x} = \frac{2}{4}$$

$$24 = 2x$$

$$x = 12 \text{ feet}$$

Triangle Midsegment Theorem

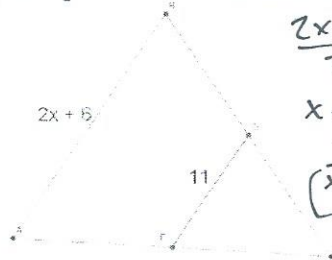
19. In the diagram, \overline{ST} and \overline{UT} are midsegments. If \overline{PQ} is 12cm and \overline{ST} is 5cm, find the length of \overline{UT} and \overline{PR} .



$$UT = 6$$

$$5 \cdot 2 = 10 = PR$$

20. In the diagram to the right, line \overline{DE} is a midsegment. Find the value of x .



$$\frac{2x+6}{2} = 11 \quad \text{or} \quad 11 \cdot 2 = 2x+6$$

$$x+3 = 11$$

$$x = 8$$

$$22 = 2x+6$$

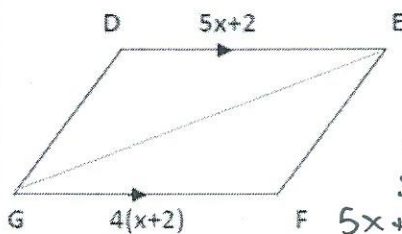
$$-6 \quad -6$$

$$16 = 2x$$

$$x = 8$$

Properties of Parallelograms

21. $\triangle GDE \cong \triangle EFG$. Find the length of \overline{DE} .



Opposite sides are congruent so...

$$5x+2 = 4(x+2)$$

$$5x+2 = 4x+8$$

$$-4x \quad -4x$$

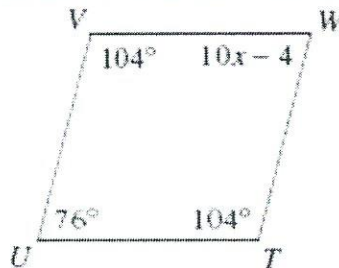
$$x = 6$$

Plug in

$$5(6)+2 = 32$$

$$4(6+2) = 32$$

22. $\triangle VWT \cong \triangle TUV$. Find the value of x .



Opposite angles are congruent so...

$$76 = 10x-4$$

$$+4 \quad +4$$

$$80 = 10x$$

$$\overline{10} \quad \overline{10}$$

$$x = 8$$