

**Rigid Motions:**

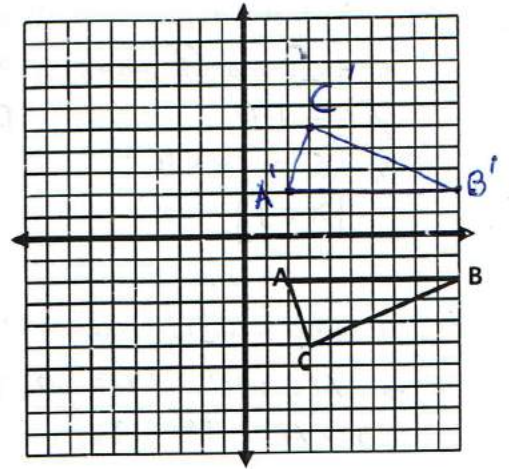
1. Given  $\triangle ABC$  with coordinates  $A(2, -2)$ ,  $B(10, -2)$ ,  $C(3, -5)$ .

a. Graph its image after it is reflected in the x-axis and label it  $\triangle A'B'C'$ .

b. Is  $\triangle ABC \cong \triangle A'B'C'$ ? Yes

Explain how you know without needing to calculate the lengths of sides or measure the angles.

*Reflection is a rigid motion, and rigid motions produce congruent figures.*



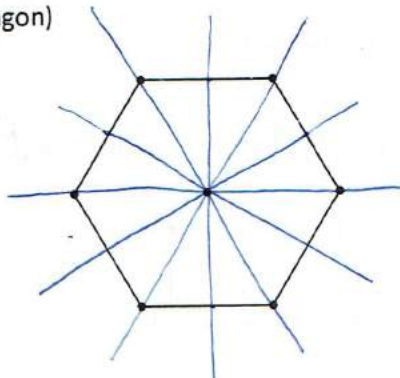
c. Which transformations are rigid motions?

trans., ref., rot.

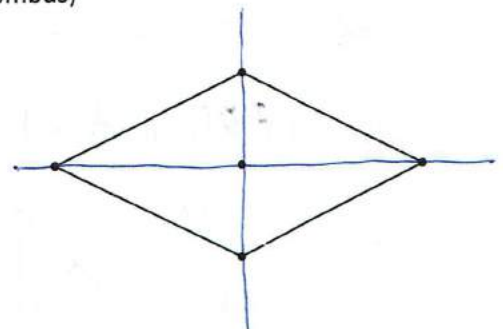
**Symmetry in Polygons:**

2. List the number of degrees that each polygon can be rotated to map onto itself. Include all possibilities up to  $360^\circ$ . Then draw all lines of symmetry for each polygon.

a.  $60^\circ, 120^\circ, 180^\circ, 240^\circ, 300^\circ, 360^\circ$   
(regular hexagon)



b.  $180^\circ, 360^\circ$   
(rhombus)



**Shortcuts for Proving Triangles Congruent:**

3. List the 5 shortcuts for proving triangles congruent:

SSS, SAS, ASA, AAS, HL

**CPCTC** – If two triangles are congruent, then their corresponding parts (sides and angles) are Congruent.

4. Knowing that corresponding parts are congruent, you can set up and solve equations to find values:

a.  $\triangle ABC \cong \triangle PQR$ ,  $AB = x + 5$ ,  $PQ = 2x + 4$ ,  $QR = 3x + 7$ . Find BC.

$$AB = PQ$$

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

$$\boxed{x = 1}$$

$$BC = QR = 3(1) + 7 = 10$$

$$\boxed{BC = 10}$$

b.  $\triangle LMN \cong \triangle XYZ$ ,  $m\angle L = 42 - 9x$ ,  $m\angle N = 40$ ,  $m\angle Y = -2x + 10$ . Find  $m\angle X$ .

$$m\angle M = 180^\circ - (42 - 9x) - 40$$

$$m\angle M = 98 + 9x$$

$$m\angle M = m\angle Y$$

$$98 + 9x = -2x + 10$$

$$11x = -88$$

$$\boxed{x = -8}$$

$$m\angle X = m\angle L$$

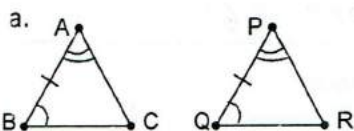
$$m\angle X = 42 - 9(-8) = 42 + 72 = 114$$

$$\boxed{m\angle X = 114}$$

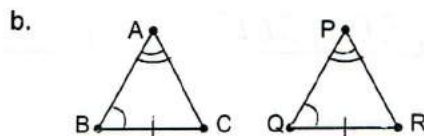
**More Shortcuts for Proving Triangles are Congruent (SSS, SAS, ASA, AAS, HL)**

- Each "A" is a pair of congruent Angles, each "S" is a pair of congruent Sides
- To use HL, use must first establish there are right triangles. The "H" represents the hypotenuses and the "L" represents one of the legs from each triangle.
- Don't forget that triangles can overlap and share angles or sides.
- Vertical angles are congruent.

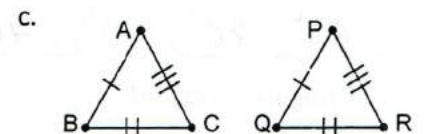
5. Complete each of the following.



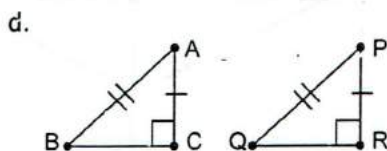
$$\triangle ABC \cong \triangle PQR \text{ by } \underline{ASA}$$



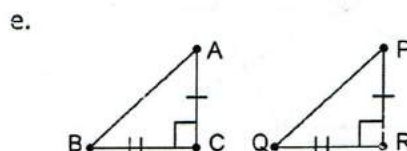
$$\triangle ABC \cong \triangle PQR \text{ by } \underline{AAS}$$



$$\triangle ABC \cong \triangle PQR \text{ by } \underline{SSS}$$



$$\triangle ABC \cong \triangle PQR \text{ by } \underline{HL}$$



$$\triangle ABC \cong \triangle PQR \text{ by } \underline{SAS}$$

**Proofs:** A main focus of this unit was writing flow proofs to prove geometric relationships. Be sure to study the proofs you have written throughout the unit as well as the related picture questions in the supplemental packet.