**Activity 2.3.6 Equilateral Triangles**

Recall these definitions:

 **Equilateral triangle:** A triangle in which all three sides are congruent.

 **Isosceles triangle:** A triangle with at least one pair of congruent sides.

 **Scalene triangle:** A triangle with no pair of congruent sides.

From these definitions, it is clear that equilateral triangles can also be classified as isosceles triangles. The same way that a square is a special type of rectangle, the equilateral triangle is a special type of an isosceles triangle.

Let’s use the Isosceles Triangle Theorem and its Converse to discover properties of equilateral triangles.



1. Given ∆*XYZ* is equilateral; that is *XY* = *YZ* = *ZX*.

 a. Choose two sides of $∆XYZ$. \_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_

 What must be true about the angles opposite these sides?

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Why? (State the theorem or express in your own words)

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b. Now choose two different sides of $∆XYZ.$ \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_

What must be true about the angles opposite these sides? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Why? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

c. What is true about the angles of an equilateral triangle? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. Given ∆*LMN* with m$∠NLM $= m$∠LMN$ = m$∠MNL$. Since the measures of the angles are equal, we could call this triangle “equiangular.”

 a. Choose two angles from $∆LMN$. \_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_

 What must be true about the sides opposite these angles?

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Why? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b. Now choose two different angles from $∆LMN. $ \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What must be true about the sides opposite these angles? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Why? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

c. What is true about the sides of an equiangular triangle? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**3. Fill the missing reasons in the proof of the Equilateral Triangle Theorem**

Given: $\overbar{AB}$ $≅$ $\overbar{AC}$ $≅$ $\overbar{BC}$

Prove: $∠A ≅∠B ≅ ∠C$

Statements Reason

1. $\overbar{AB}$ $≅$ $\overbar{AC}$ 1. Given
2. $∠C≅∠B$ 2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Theorem
3. $\overbar{AC}$ $≅$ $\overbar{BC}$ 3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. $∠B≅∠A$ 4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. $∠C≅∠A$ 5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_ Propetry
6. $∠A ≅∠B ≅ ∠C$ 6. Summarizing lines 2, 4, and 5

**Fill in the blanks to complete the Equilateral Triangle Theorem:**

If all \_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_ of a triangle are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, then all \_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_ are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**4.. Fill the missing reasons in the proof of the Equilateral Triangle Converse.**

Given: $∠A ≅∠B ≅ ∠C$

Prove: $\overbar{AB}$ $≅$ $\overbar{AC}$ $≅$ $\overbar{BC}$

**Statement Reason**

1. $∠A ≅∠B$ 1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. $\overbar{BC} ≅ \overbar{AC} $ 2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. $∠B ≅ ∠C$ 3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. $\overbar{AC}$ $≅$ $\overbar{AB}$ 4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. $\overbar{AB}$ $≅$ $\overbar{BC}$ 5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
6. $\overbar{AB}$ $≅$ $\overbar{AC}$ $≅$ $\overbar{BC}$ 6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Fill in the blanks to complete the Converse of the Equilateral Triangle Theorem**

If all \_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_ of a triangle are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, then all \_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_ are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.