Honors Geometry
Unit 2 Similarity, Congruence & Proofs
Triangle Relationships

MCC9-12.G.CO.10 Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180 degrees; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.

1

Relationships Between Sides & Angles Theorem

- **Longer Side Theorem:** If one side of a triangle is longer than another side, then the angle opposite the longer side is larger than the angle opposite the shorter side.

- **Larger Angle Theorem:** If one angle of a triangle is larger than another angle, then the side opposite the larger angle is longer the side opposite the smaller angle.

2

Examples: Write the measurements of each triangle in order from least to greatest.
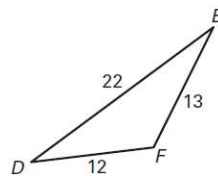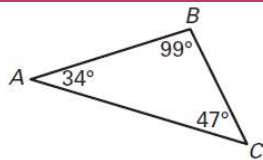
3

Possible Side Lengths

- **Triangle Inequality Theorem:** The sum of the lengths of any two sides of a triangle is greater than the length of the third side.
- Examples: Is it possible to construct a triangle with the given side lengths? Justify.
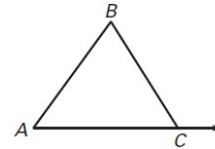   1. 5, 7, 13   2. 6, 9, 12

4

Example

- A triangle has one side of length 14 another of length 10. Describe the possible lengths of the third side.
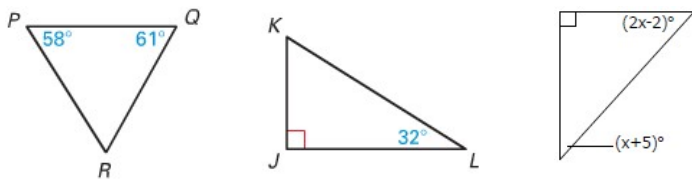
Angle Theorems

- **Triangle Sum Theorem:** The sum of the measures of the interior angles of a triangle is 180°
- **Corollary to the Triangle Sum Theorem:** The acute angles of a right triangle are complementary (sum to 90°)
- **Exterior Angle Theorem:** The measure of an exterior angle of a triangle is equal to the sum of measures of the two nonadjacent interior angles.
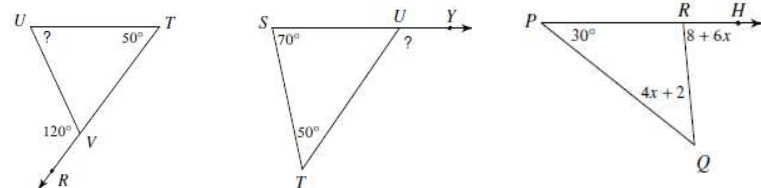
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