

Geometry CC - Unit 1
Lesson 5: Relationships in Triangles

Name: _____
Date: _____

Ordering Angles

The angles of a triangle can be put in order by comparing the sides.
 *The smallest angle is always opposite the Smallest side
 *The largest angle is always opposite the largest side

Order the angles from least to greatest:
 $\angle A < \angle C < \angle B$

Ordering Sides

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Order the sides from least to greatest:
 $ED < DF < EF$

Examples:

1) Write an inequality for the side lengths.

$AC < BC < AB$

2) Write an inequality for the side lengths.

$WY < XY < WX$

3) In $\triangle PQR$, $m\angle P < m\angle R < m\angle Q$. Write an inequality for the side lengths.
(Hint: draw a picture)

$PQ < PR < QR$

4) In $\triangle ABC$, $\overline{BC} < \overline{AB} < \overline{AC}$. Write an inequality for the angle measures.
(Hint: draw a picture)

$\angle A < \angle C < \angle B$

Triangle Inequality Theorem:
The sum of the lengths of any two sides of a triangle MUST be greater than the length of the third side.

Triangle Inequality Theorem

The sum of the lengths of any two sides of a triangle is greater than the length of the third side.

$a + b > c$
 $a + c > b$
 $b + c > a$

Examples:
Determine whether each set of lengths can represent the side lengths of a triangle.

1) (4, 4, 8) $4+4=8$ No
 $4+4=8$ $0 < 8 < 8$
 $4+4=8$ No

2) (4, 23, 20) $23-14=9$ Yes
 $23+14=37$
 $9 < 14 < 37$

3) (3, 9, 9) $9-3=6$ Yes
 $9+3=12$ $6 < 12 < 9$
 $9+3=12$ Yes

4) (4, 13) $13-4=9$ No
 $13+4=17$
 $9 < 14 < 17$

5) Two sides of a triangle have lengths 7 and 10, respectively. Find the range of values for the third side.
 $10-7=3$ $3 < x < 17$
 $10+7=17$

6) Two sides of a triangle have lengths 13 and 40, respectively. Find the range of values for the third side.
 $40-13=27$ $27 < x < 53$
 $40+13=53$

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HOMEWORK

1) _____
Which set of numbers represents the lengths of the sides of a triangle?
 (6, 17, 13) $13-6=7$
 (6, 17, 23) $17-6=11$
 (16, 24, 7) $17-6=11$
 (26, 6, 15) $17+6=23$

2) _____
Sara is building a triangular pen for her pet rabbit. If two of the sides measure 8 feet and 15 feet, the length of the third side could be:
 13 ft $15-8=7$
 1 ft $15+8=23$
 3 ft $7 < 23 < 23$
 23 ft

3) _____
In $\triangle RST$, $m\angle R = 58$ and $m\angle S = 73$. Which inequality is true?
 $RT < TS < RS$
 $RS < RT < TS$
 $RS < RS < TS$
 $TS < TS < RT$

4) _____
In $\triangle ABC$, $AB = 7$, $BC = 8$, and $AC = 9$. Which list has the angles of $\triangle ABC$ in order from smallest to largest?
 $\angle A, \angle B, \angle C$
 $\angle B, \angle A, \angle C$
 $\angle C, \angle B, \angle A$
 $\angle C, \angle A, \angle B$