

Inequalities in One Triangle

Unequal Sides Theorem: If the lengths of the sides of a triangle are not equal, then the angles opposite these sides are also not equal and the larger angle is opposite the longer side.

Unequal Angles Theorem: If the measure of the three angles of a triangle is not equal, the sides opposite the angles are also not equal and the longer side is opposite the larger angle.

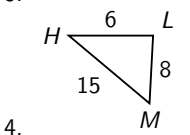
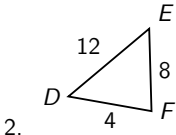
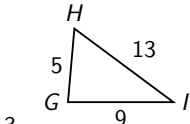
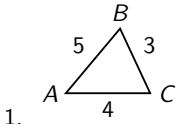
Triangle Inequality Theorem: The sum of the length of the two sides of a triangle is greater than the third side.

The Exterior Angle Theorem 1: The measure of an exterior angle of a triangle is greater than the measure of either remote interior angle.

The Exterior Angle Theorem 2: The measure of the exterior angle of a triangle is equal to the sum of the measures of the two remote interior angles.

Practice Exercises

A. Arrange the angles of the triangles in increasing order.



B. Find the measure of the third angle of the triangle, then arrange the sides in increasing order.

- 1. $m\angle A = 56^\circ$; $m\angle B = 87^\circ$; $m\angle C = \underline{\hspace{1cm}}$
- 2. $m\angle P = 106^\circ$; $m\angle V = 19^\circ$; $m\angle C = \underline{\hspace{1cm}}$
- 3. $m\angle B = 29^\circ$; $m\angle P = 72^\circ$; $m\angle F = \underline{\hspace{1cm}}$
- 4. $m\angle G = 97^\circ$; $m\angle E = 64^\circ$; $m\angle O = \underline{\hspace{1cm}}$
- 5. $m\angle M = 68^\circ$; $m\angle A = 22^\circ$; $m\angle T = \underline{\hspace{1cm}}$

C. Write Yes if the given measure can form a triangle or No if not.

- 1. 8, 14, 9
- 2. 13, 25, 12
- 3. 3.6, 4.8, 9.0
- 4. 15, 20, 36
- 5. 6.5, 9.6, 2.9

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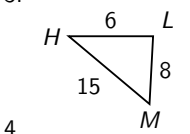
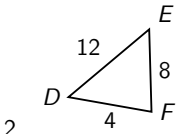
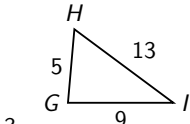
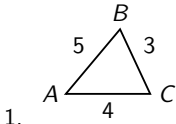
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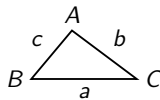
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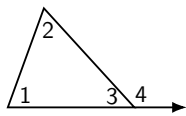
D. Give the range of the possible length of the third side of $\triangle ABC$.

- 1. $a = 9$ $b = 7$
- 2. $b = 12$ $c = 29$
- 3. $a = 15.2$ $b = 19.8$
- 4. $a = 128.25$ $c = 74.5$
- 5. $a = 8\frac{2}{5}$ $c = 5\frac{1}{2}$



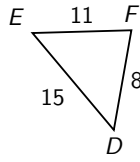
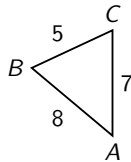
E. Find the measure of the indicated angle.

- 1. $m\angle 1 = 48^\circ$; $m\angle 2 = 46^\circ$; $m\angle 4 = \underline{\hspace{1cm}}$
- 2. $m\angle 1 = 29^\circ$; $m\angle 2 = 52^\circ$; $m\angle 4 = \underline{\hspace{1cm}}$
- 3. $m\angle 2 = 18^\circ$; $m\angle 4 = 127^\circ$; $m\angle 1 = \underline{\hspace{1cm}}$
- 4. $m\angle 4 = 109^\circ$; $m\angle 1 = 86^\circ$; $m\angle 2 = \underline{\hspace{1cm}}$
- 5. $m\angle 1 = (x + 5)^\circ$; $m\angle 2 = (2x + 51)^\circ$; $m\angle 4 = (5x - 10)^\circ$;
 $x = \underline{\hspace{1cm}}$



Problem Set

A. Arrange the angles of the triangles in increasing order.



B. Find the measure of the third angle of the triangle, then arrange the sides in increasing order.

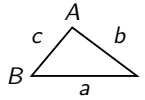
- 1. $m\angle A = 40^\circ$; $m\angle B = 89^\circ$; $m\angle C = \underline{\hspace{1cm}}$
- 2. $m\angle P = 117^\circ$; $m\angle V = 27^\circ$; $m\angle C = \underline{\hspace{1cm}}$
- 3. $m\angle B = 38^\circ$; $m\angle P = 92^\circ$; $m\angle F = \underline{\hspace{1cm}}$

C. Write Yes if the given measure can form a triangle or No if not.

- 1. 6, 17, 12
- 2. 14, 33, 19
- 3. 3.7, 5.2, 8.5

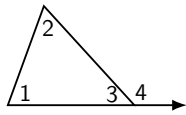
D. Give the range of the possible length of the third side of $\triangle ABC$.

- 1. $a = 5$ $b = 12$
- 2. $a = 17.4$ $b = 28.1$
- 3. $a = 7\frac{1}{4}$ $c = 3\frac{1}{2}$



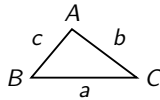
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- 1. $m\angle 1 = 57^\circ$; $m\angle 2 = 54^\circ$; $m\angle 4 = \underline{\hspace{1cm}}$
- 2. $m\angle 2 = 37^\circ$; $m\angle 4 = 150^\circ$; $m\angle 1 = \underline{\hspace{1cm}}$
- 3. $m\angle 1 = (2x + 7)^\circ$; $m\angle 2 = (x + 31)^\circ$; $m\angle 4 = (6x - 4)^\circ$;
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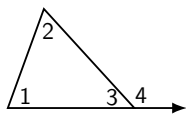
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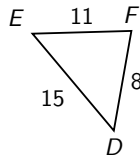
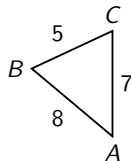
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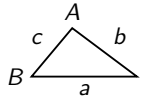
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