ALBERT

Name _____ Date _____

Triangle Theorems Worksheet

Geometry · Common Core HSG-CO.C.10

> Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180°; 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.

Practice

Builds the skill step by step.

1. Two angles of a triangle measure 50° and 60°. What is the third angle?

2. Each base angle of an isosceles triangle measures 40°. What is the vertex angle?

3. A midsegment of a triangle is parallel to a side that is 14 cm long. How long is the midsegment?

4. Two remote interior angles of a triangle measure 35° and 75°. What is the exterior angle at the third vertex?

5. In $\triangle ABC$, $AB = AC$ and $m\angle B = 65°$. What is $m\angle C$?

6. A midsegment of a triangle is 9 units long. How long is the side it is parallel to?

7. What is the point where the three medians of a triangle meet called?

   A. the incenter

   B. the circumcenter

   C. the orthocenter

   D. the centroid

8. The angles of a triangle measure x°, 2x° and 3x°. What is the largest angle?

9. What is the measure of each angle of an equilateral triangle?

10. The centroid divides each median in a 2 : 1 ratio. A median is 12 units long. How far is the centroid from the vertex?

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On Level

Grade-level practice.

1. An isosceles triangle has a vertex angle of $3x°$ and base angles of $(x + 20)°$ each. What is x?

2. In $\triangle ABC$, DE joins the midpoints of AB and AC. $DE = 2x - 1$ and $BC = 3x + 4$. What is x?

3. G is the centroid of $\triangle ABC$, and M is the midpoint of BC. $AG = 10$. How long is median AM?

4. Prove that the angles of $\triangle ABC$ add to 180°. Start by drawing the line through A parallel to BC.

5. An exterior angle of a triangle measures $(4x + 10)°$. Its remote interior angles measure $(x + 30)°$ and $(2x + 10)°$. What is x?

6. A triangle has sides 6, 8 and 10. The midpoints of its sides are joined to make a smaller triangle. What is the perimeter of the smaller triangle?

7. In $\triangle ABC$, $AB = AC$. Which angles must be congruent?

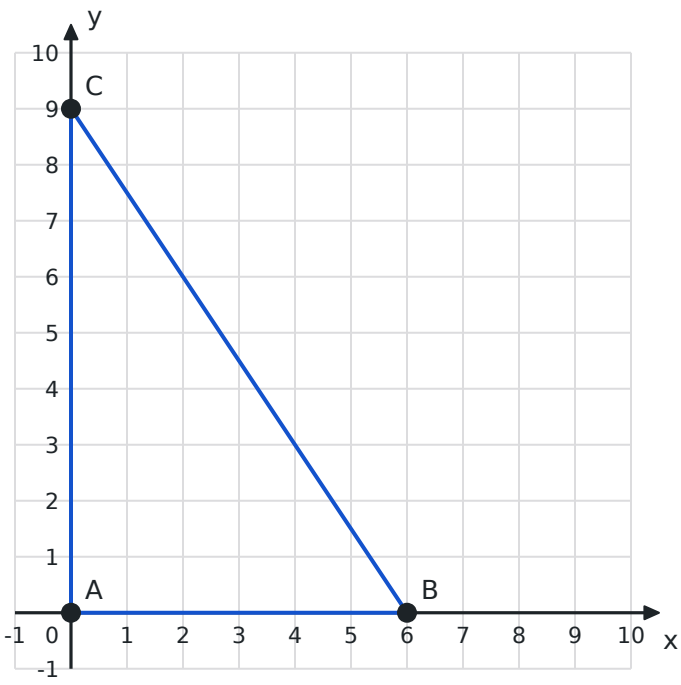
   A. $\angle B$ and $\angle C$

   B. $\angle A$ and $\angle B$

   C. $\angle A$ and $\angle C$

   D. all three angles

8. What is the centroid of the triangle with vertices A(0, 0), B(6, 0) and C(0, 9)?



9. Each base angle of an isosceles triangle measures $(2x + 6)°$, and the vertex angle measures $4x°$. What is x?

10. The angles of a triangle are in the ratio 2 : 3 : 4. What is the smallest angle?

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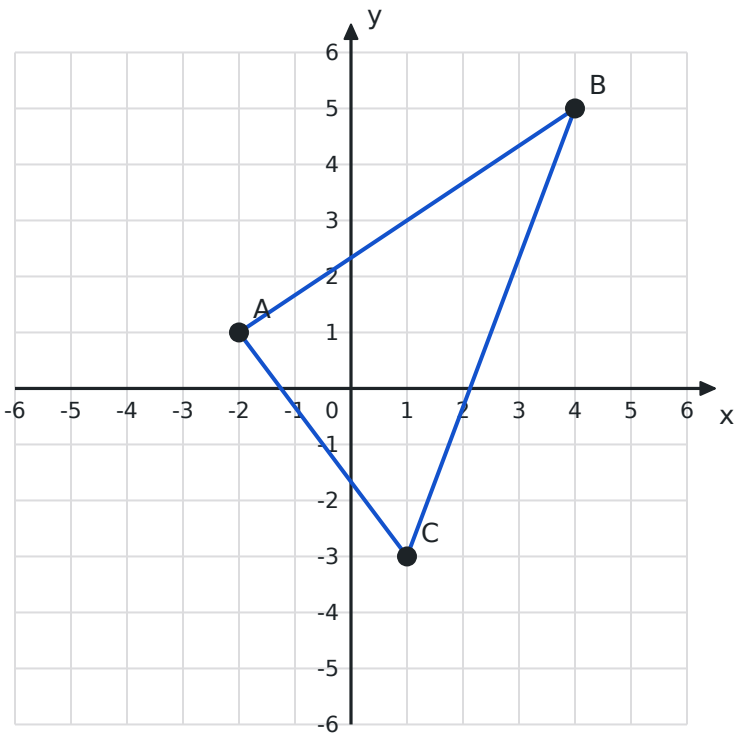
Challenge

Multi-step and word problems that stretch it.

1. In $\triangle ABC$, $AB = AC$. Prove that $\angle B \cong \angle C$.

2. In $\triangle ABC$, D(1, 2) and E(4, 6) are the midpoints of AB and AC. How long is BC?

3. What is the centroid of the triangle with vertices A(−2, 1), B(4, 5) and C(1, −3)?



4. In △ABC, B is (0, 0) and C is (8, 4). DE is the midsegment parallel to BC. What is the slope of DE?

5. An isosceles right triangle has a right angle at the vertex. What is the measure of an exterior angle at one of the base vertices?

6. G is the centroid of △ABC, and median AM is 21 units long. How long is GM?

7. An equilateral triangle has sides of 12. Its three midsegments form a smaller triangle. How long is each side of the smaller triangle?

8. What is the sum of the exterior angles of a triangle, one at each vertex?

9. In $\triangle ABC$, $AB = AC = 10$ and $BC = 12$. What is the length of the altitude from A to BC?

10. The angles of a triangle measure $(x + 10)°$, $2x°$ and $(3x - 40)°$. What is the largest angle?