

Triangle Theorems and Triangle Centers

Grade 10 – Geometry math · Test · Standards: G-CO.C.10, G-C.A.3

Name: _____ Date: _____ Class: _____

Eight questions, 20 points, 45 minutes. Show your work, name each theorem you use and label every answer. Figures are not drawn to scale.

Standards: G-CO.C.10, G-C.A.3 · **Level:** Grade 10 Geometry

Time: 45 minutes · 8 questions · Total: 20 points · Calculator: as allowed by your teacher

Question 1 Isosceles and exterior angle (2 points)

An isosceles triangle has a vertex angle of 56° .

- Find each base angle. (1 point)
- Find the exterior angle at one base vertex. (1 point)

Question 2 Exterior angle equation (3 points)

In the figure, the exterior angle at C measures $(7x - 9)^\circ$, and the remote interior angles measure $(3x + 12)^\circ$ and $(2x + 19)^\circ$.

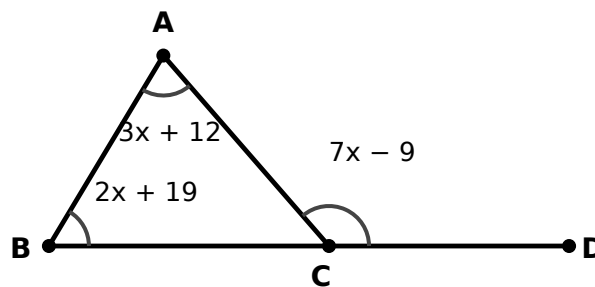


Figure for Question 2.

- Find x . (1 point)
- Find the exterior angle. (1 point)
- Find both remote interior angles. (1 point)

Question 3 Midsegment equation (2 points)

MN is a midsegment of $\triangle ABC$, parallel to BC . $MN = 5x - 3$ and $BC = 7x + 9$. Find x and BC .

Question 4 Centroid (3 points)

Triangle DEF has $D(-3, 5)$, $E(9, 1)$ and $F(0, -6)$.

- Find the x -coordinate of the centroid. (1 point)
- Find the y -coordinate of the centroid. (1 point)
- A median of a triangle is 24 units long. How far is the centroid from the vertex on that median? (1 point)

Question 5 Circumscribed circle (3 points)

Triangle PQR has $P(0, 0)$, $Q(8, 0)$ and $R(0, 6)$.

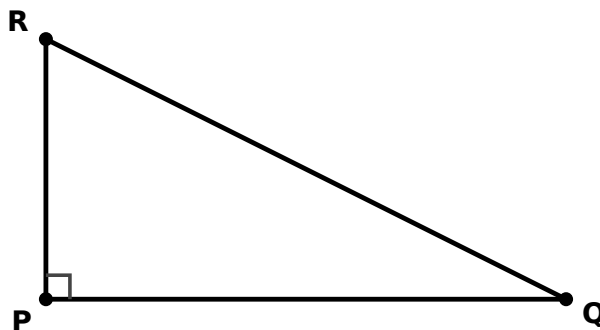


Figure for Question 5.

- Which vertex has the right angle? (1 point)
- Find the circumcenter. (1 point)
- Find the radius of the circumscribed circle. (1 point)

Question 6 Prove a perpendicular (3 points)

Given: $AB \cong AC$, and D is the midpoint of BC . Prove: $AD \perp BC$.

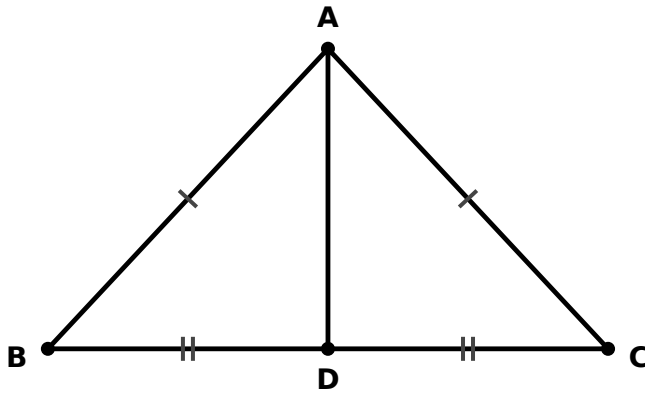


Figure for Question 6.

Question 7 Inradius of a right triangle (2 points)

A right triangle has legs 5 and 12 and hypotenuse 13. Its area equals the inradius times the semiperimeter.

- Find the semiperimeter. (1 point)
- Find the radius of the inscribed circle. (1 point)

Question 8 Garden planning (2 points)

A triangular community garden has a water spigot that must be the same distance from all three corners, and a bench that must be the same distance from all three edges. Name the triangle center used for each.