

Relationships in Triangles: math test, Grade 10 – download the PDF

Suggested time: 45 minutes. Out of 20 points. Calculator allowed only when the problem says so.

1

Midsegment

/ 3 pts

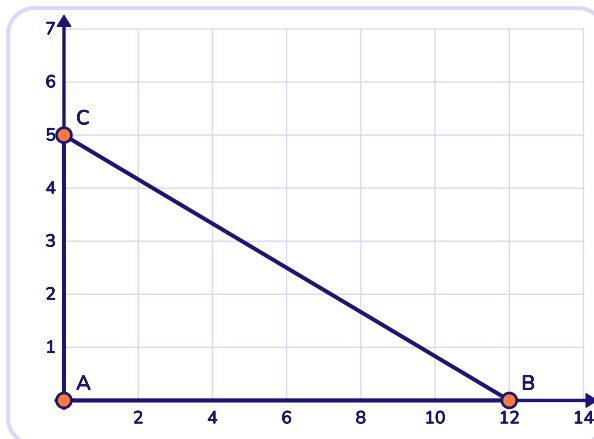
In triangle ABC , D and E are the midpoints of $\overline{AB}$ and $\overline{AC}$. We know $DE = 2x + 7$, $BC = 6x - 2$, $AB = 30$ cm and $AC = 38$ cm.

- Find x .
- Find DE and BC .
- Find the perimeter of triangle ADE .

2 Centers of a right triangle

/ 4 pts

A right triangle has vertices $A(0, 0)$, $B(12, 0)$ and $C(0, 5)$, as shown.



- Find the length of the hypotenuse $\overline{BC}$.
- Find the circumcenter and the circumradius.
- Find the centroid.
- Find the inradius, then the incenter, which is at distance r from both legs.

3 Triangle inequality

/ 3 pts

- Can sides of **8**, **9** and **17** form a triangle? Justify.
- Can sides of **12**, **15** and **20** form a triangle? Justify.
- Two sides measure **13** in and **6** in. Give the possible lengths of the third side.

4 Angles and sides

/ 3 pts

In triangle KLM , $\angle K = (4x)^\circ$, $\angle L = (5x - 5)^\circ$ and $\angle M = (3x + 5)^\circ$.

- Find x .
- Find the three angle measures.
- Order the sides KL , LM and KM from shortest to longest.

5 Medians and the centroid

/ 4 pts

- a. G is the centroid of triangle ABC and $\overline{AD}$ is a median. If $AG = 3x + 3$ and $GD = x + 5$, find x , then AD .
- b. Triangle PQR has vertices $P(-4, 3)$, $Q(8, -1)$ and $R(2, 10)$. Find its centroid.

6 Perpendicular bisector and the right center

/ 3 pts

Point P is on the perpendicular bisector of $\overline{AB}$. We know $PA = 7y - 9$ and $PB = 4y + 12$.

- a. Find y .
- b. Find PA .
- c. Three cabins form a triangle. Which triangle center is the same distance from all three cabins?



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