

LESSON 163

- A midsegment is half the length of the third side.
 $PQ = AC/2 = 16/8 = 8$
- A midsegment is parallel to the third side, so $\overline{PQ} \parallel \overline{AC}$.
Corresponding \angle s on \parallel lines are \cong , so $\angle A \cong \angle BPQ$.
 $m\angle A = m\angle BPQ = 180 - m\angle APQ = 180 - 118 = 62^\circ$
- A midsegment is half the length of the third side.
perimeter of $\triangle PQR = PQ + QR + PR$
 $= AB/2 + BC/2 + AC/2$
 $= 7 + 8 + 9 = 24$
- Any point on the perpendicular bisector of a segment is equidistant from the endpoints of the segment.
 $x + 7 = 4x + 1; x = 2$
- An angle bisector divides an angle into two congruent angles. Angles in a triangle add up to 180° .
 $90 + 2(29) + (5x - 3) = 180; x = 7$
- A median divides the side to which it is drawn into two congruent segments.
 $7 - x = 2x - 5; x = 4$
- An altitude forms right angles with the side to which it is drawn. Angles in a triangle add up to 180° .
 $90 + 53 + (8x - 3) = 180; x = 5$
- A) 4, B) 3, C) 1, D) 2
- A) incenter, B) circumcenter
- A centroid divides a median in the ratio 2:1.
 $KT = (2/3)KN = (2/3)(15) = 10$
 $TN = (1/3)KN = (1/3)(15) = 5$
- $\overline{XP}, \overline{YP}, \overline{ZQ}$
- \overline{AD} and \overline{BE} are medians. The centroid is K .
- $\overline{AB}, \overline{BF},$ and \overline{CB} are altitudes. The orthocenter is B .
- C; $5 + 5 > 10$ is false. The sum of two sides of a triangle must be greater than the third side.
- The longer side has the larger opposite angle.
 $m\angle P < m\angle Q < m\angle R$ because $QR < PR < PQ$.
- Angles in a triangle add up to 180° .
 $m\angle D = 180 - 98 - 39 = 43^\circ$
The larger angle has the longer opposite side.
 $DE < EF < DF$ because $m\angle F < m\angle D < m\angle E$.
- The sum of two sides of a triangle must be greater than the third side. Let x be the third side.
 $x + 10 > 15$ $x + 15 > 10$ $10 + 15 > x$
 $x > 5$ $x > -5$ $x < 25$
Combine the inequalities to get $5 < x < 25$. So, the third side must be longer than 5 and shorter than 25.

- $25 - 5x > 15$ because $45^\circ > 36^\circ$ (Hinge Theorem [53.1]).
 $25 - 5x > 0$ because side lengths must be positive.
Solve each inequality to get $x < 2$ and $x < 5$.
Combine the two inequalities to get $x < 2$.
2. Definition of median
3. Definition of midpoint
4. Reflexive Property
5. SSS
6. CPCTC
7. Definition of bisect (or angle bisector)
- Statements (Reasons)
1. $m\angle C = 90^\circ$ (Given)
2. $m\angle A + m\angle B + m\angle C = 180^\circ$ (Angles in a triangle add up to 180° . See the Triangle Sum Theorem [32.1].)
3. $m\angle A + m\angle B = 180 - m\angle C$ (Subtraction Property)
4. $m\angle A + m\angle B = 180 - 90$ (Substitution Property)
5. $m\angle A + m\angle B = 90$ (Simplify)
6. $m\angle A < 90, m\angle B < 90$ (Definition of less than)
7. $m\angle A < m\angle C, m\angle B < m\angle C$ (Substitution Property)
8. $BC < AB, AC < AB$ (The larger angle has the longer opposite side. See Theorem 52.2.)