Lesson 5.6 - Midsegments of Triangles

AGENDA
- Homework Check & Review
- Lesson notes & guided practice

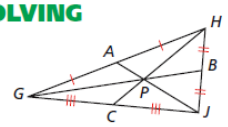
HOMEWORK:
- p. 324-25: #11-16,18-20, 24,26
- Proofs E and F

Day 5 HW Answers: p. 318: #12-16, 21-26,29-32, 37, 43

PRACTICE AND PROBLEM SOLVING

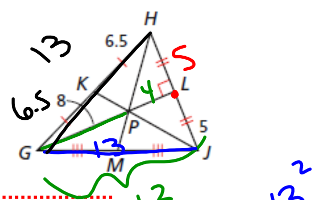
$PA = 2.9$, and $HC = 10.8$. Find each length.

12. PC 3.6
13. HP 7.2
14. JA 8.7
15. JP 5.8



Find each measure.

21. GL 12 ✓
22. PL 4 ✓
23. HL 5 ✓
24. GJ 13
25. perimeter of $\triangle GHJ$ 36 units
26. area of $\triangle GHJ$ 60 square units



Algebra Find the centroid of a triangle with the given vertices.

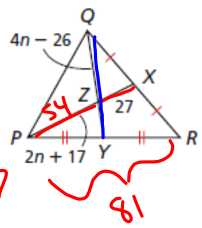
28. $X(8, -1)$, $Y(2, 7)$, $Z(5, -3)$ (5, 1)

Details on slide 3

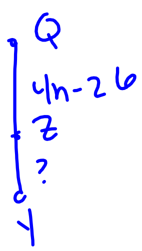
Find each length.

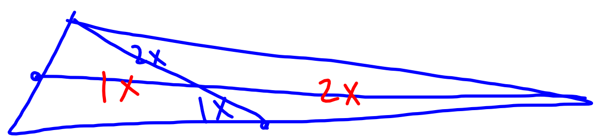
29. PZ 54 ✓
30. PX 81 ✓
31. QZ 48
32. YZ 24

QY = 72 by subbing in n=$^{37}/_2$ value from PZ



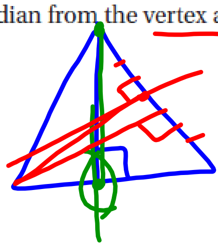
$54 = 2n + 17$





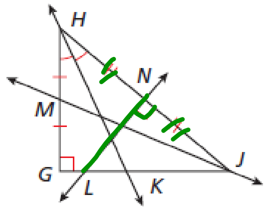
16. **Design** In the plan for a table, the triangular top has coordinates (0, 10), (4, 0), and (8, 14). The tabletop will rest on a single support placed beneath it. Where should the support be attached so that the table is balanced? (4, 8)

37. In an isosceles triangle, the altitude and median from the vertex angle are the same line as the bisector of the vertex angle. A



43. In the diagram, which of the following correctly describes $\overline{LN}$?

Ⓐ Altitude
Ⓑ Angle bisector
Ⓒ Median
Ⓓ Perpendicular bisector

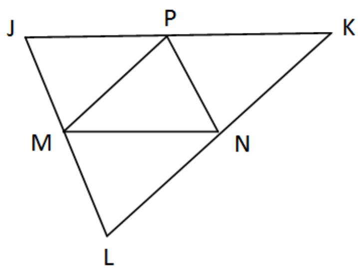


$$\left(\frac{x_1+x_2+x_3}{3}, \frac{y_1+y_2+y_3}{3}\right)$$

BIS OF $\overline{HJ}$

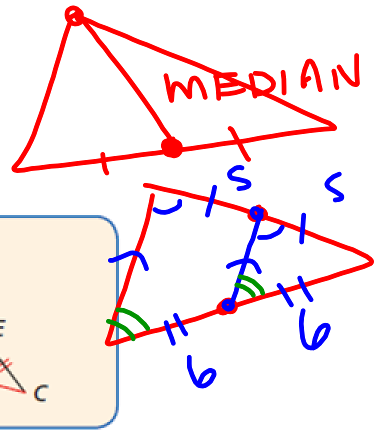
Defn: A **midsegment** is the segment that joins the midpoints of 2 sides of a triangle. Example: _______

A **midsegment triangle** is the triangle formed by all three midsegments. Example: __________



Triangle Midsegment Theorem

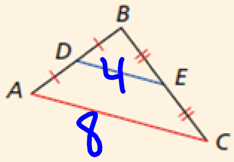
A midsegment of a triangle is parallel to its opposite side & it is ½ the length of that side.



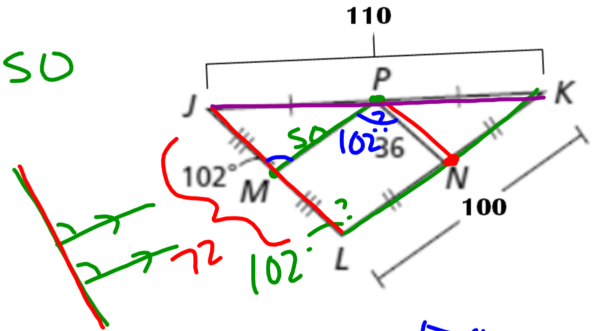
Theorem 5-4-1 Triangle Midsegment Theorem

A midsegment of a triangle is parallel to a side of the triangle, and its length is half the length of that side.

$\overline{DE} \parallel \overline{AC}$, $DE = \frac{1}{2}AC$



Example 1: Given the drawing at right, find



a) PM $= \frac{1}{2}LK$

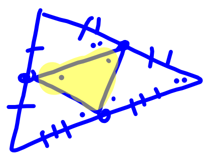
$= \frac{1}{2}(100) = 50$

b) $m\angle MLK$ $\parallel \rightarrow$ CORR ∠'s ≅

$102°$

c) JL $2(PN) = JL$

$2(36) = 72$



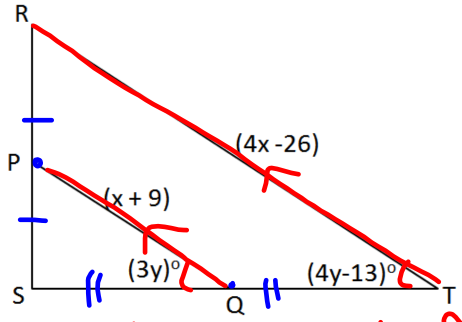
d) $m\angle NPM$ $\parallel \rightarrow$ ALT INT ∠'s ≅

e) Perimeter of ΔJKL $110 + 100 + 72 = 282$

f) Perimeter of ΔNMP $\frac{1}{2}P_{\Delta JKL} = 141$

$$\begin{array}{r} 36 \\ 50 \\ +\,55 \\ \hline 141 \end{array}$$

Example 2: $\overline{PQ}$ is the midsegment of $\triangle RST$. Find x & y.



$PQ = \frac{1}{2} RT$

$2PQ = RT$

$2(x+9) = (4x-26)$

$2x+18 = 4x-26$

$44 = 2x$

$22 = x$

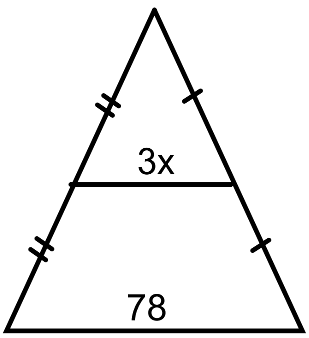
|| → CORR ∠'s ≅

$3y = 4y - 13$

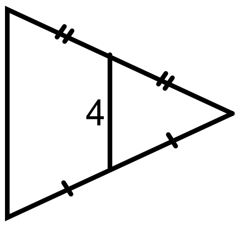
$y = 13$

TRY THESE TWO

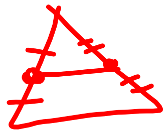
1)



2)



Midsegment Proof You may prove a segment is a midsegment by one of two methods:



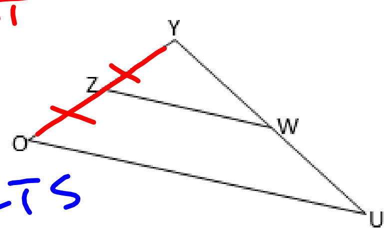
- **Definition:** Prove the endpoints are midpoints of the triangle's sides.
  - Ways to know you have a midpoint:
    - 2 ≅ HALVES
    - MEDIANS
    - BISECTOR
    - GIVEN
- **Properties:** Prove the segment is **half the length** of the triangle side that it **parallel to** – this is usually in the coordinate plane

DISTANCE SLOPE

→ MIDPOINT → MIDPOINT

Ex1) Given: W bisects $\overline{YU}$; $\overline{YWU}$; $\overline{YZ} \cong \overline{ZO}$; $\overline{YZO}$

Prove: $\overline{WZ}$ is a midsegment in ΔYOU



SINCE IT'S GIVEN W BISECTS $\overline{YU}$ & $\overline{YWU}$, THEN W IS THE MIDPOINT OF $\overline{YU}$.

SINCE IT'S GIVEN $\overline{YZ} \cong \overline{ZO}$ & $\overline{YZO}$, THEN Z IS THE MIDPOINT OF $\overline{YO}$.

BY DEFINITION, $\overline{WZ}$ IS MIDSEGMENT OF ΔYOU.

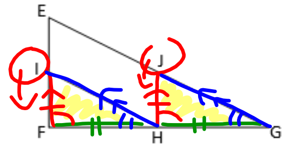
MIDPOINTS 1:2

||

Ex 2) Given: $\overline{IH}$ is a midsegment of ΔEFG; $\overline{FGH}$

$\overline{IF} \cong \overline{JH}$; $\overline{EIF} \parallel \overline{JH}$ CORR ∡'S ≅

Prove: $\Delta IFH \cong \Delta JHG$



S: $\boxed{\overline{IF} \cong \overline{JH}}$ GIVEN

A: $\boxed{\overline{EIF} \parallel \overline{JH}}$ GIVEN

↓

$\boxed{\measuredangle F \cong \measuredangle JHG}$ || → CORR ∡'S ≅

S: $\boxed{\overline{IH} \text{ MIDSEGMENT } \Delta EFG}$ GIVEN

↓

$\boxed{H \text{ MIDPOINT } \overline{FG}}$ DEFN OF MIDSEGMENT

↓

$\boxed{\overline{FH} \cong \overline{GH}}$ MIDPOINT → 2 ≅ HALVES

$\Delta IFH \cong \Delta JHG$

BY SAS ≅ SAS

Midsegment Proof You may prove a segment is a midsegment by one of two methods:

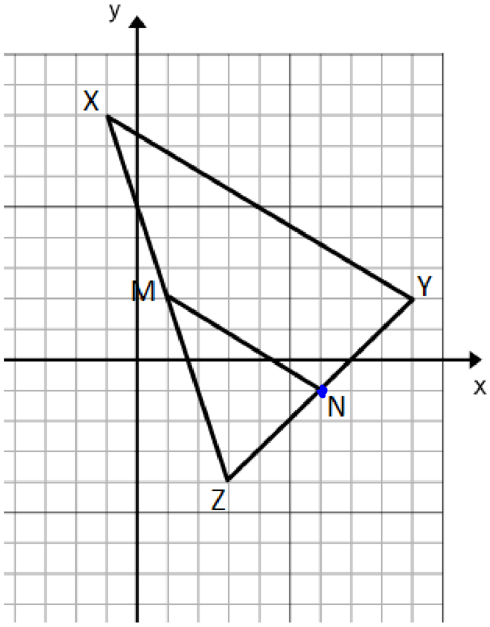
- **Definition:** Prove the endpoints are midpoints of the triangle's sides.
- **Properties:** Prove the segment is **half (using distance formula) the length** of the triangle side that it is **parallel** to (slope = → parallel). This is a conjunction.

Ex: Given: X(-1,8), Y(9,2), Z(3,-4)
M(1,2) and N(6,-1)

Prove: $\overline{MN}$ is a midsegment of ΔXYZ

Calculations:

	Midpoint
$\overline{XZ}$	
$\overline{ZY}$	



Statements:

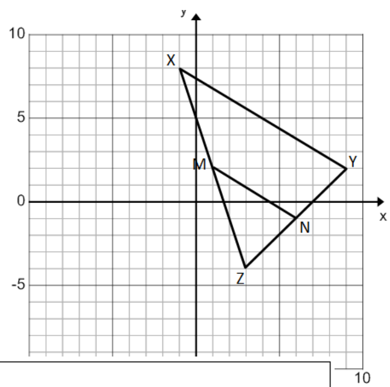
- **Defn:** Since the midpoint of $\overline{XZ}$ is ________ and M is given as ________, then M is the midpoint of $\overline{XZ}$. Since the midpoint of $\overline{ZY}$ is ________ and N is given as ________, then N is the midpoint of $\overline{ZY}$. Since the segment $\overline{MN}$ joins the midpoints M and N, then $\overline{MN}$ is a midsegment of ΔJKL by ____________________.

Given: X(-1,8), Y(9,2), Z(3,-4)
M(1,2) and N(6,-1)

Calculations:

Prove: $\overline{MN}$ is a midsegment of ΔXYZ

	Slope
$\overline{MN}$	
$\overline{XY}$	



Length (distance)

Statements:

- **Properties:** Since the slopes $m\overline{MN} =$ $= m\overline{XY}$, then ______________. Since MN=_____ and XY=_____, then ____________ Since $\overline{MN}$ is **half the length** of the segment it is **parallel to**, then $\overline{MN}$ is midsegment of ΔXYZ.