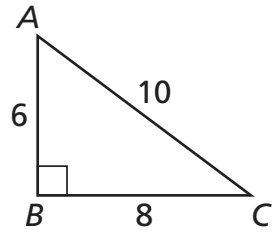
6.4 Start Thinking

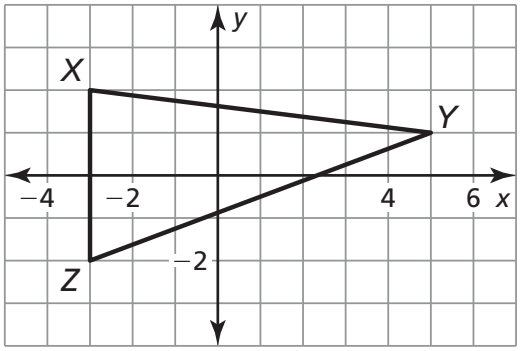
Copy the triangle and construct the midpoint M of $\overline{AB}$. Then from point M, construct a line segment parallel to $\overline{BC}$. This line segment should intersect $\overline{AC}$ at a point N. What is the relationship between the measure of $\overline{MN}$ and the measure of $\overline{BC}$?



6.4 Warm Up

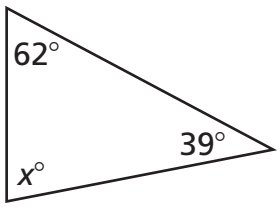
Use the diagram to determine the following.

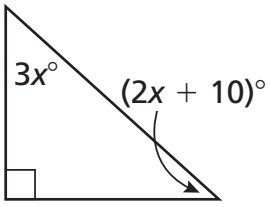
1. Find the midpoint of $\overline{XZ}$.
2. Find the midpoint of $\overline{XY}$.
3. Find the measure of $\overline{ZY}$.
4. Find the measure of $\overline{XY}$.

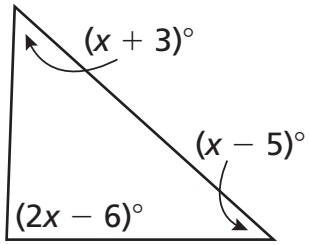


6.4 Cumulative Review Warm Up

Find the measure of the unknown angle(s) in the triangle.

1. 

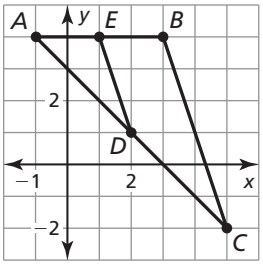
2. 

3. 

Name _____ Date _____

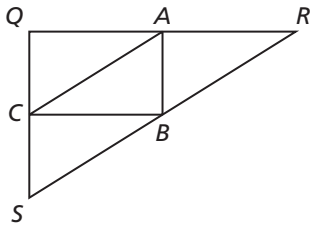
6.4 Practice A

In Exercises 1–5, use the graph of $\triangle ABC$.

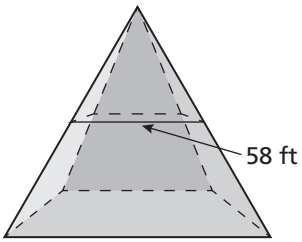


1. In $\triangle ABC$, show that the midsegment $\overline{ED}$ is parallel to $\overline{BC}$ and that $ED = \frac{1}{2}BC$.
2. Find the coordinates of the endpoints of midsegment $\overline{EF}$, which is opposite $\overline{AC}$.
3. Show that $\overline{EF}$ is parallel to $\overline{AC}$ and that $EF = \frac{1}{2}AC$.
4. State the coordinates of the endpoints of midsegment $\overline{DF}$.
5. Show that $\overline{DF}$ is parallel to $\overline{AB}$ and $DF = \frac{1}{2}AB$.

In Exercises 6–11, use $\triangle QRS$ where *A*, *B*, and *C* are the midpoints of the sides.



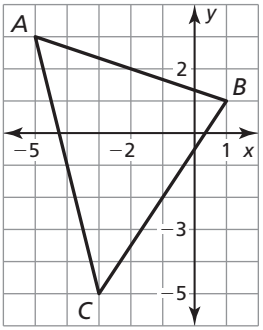
6. When $AB = 16$, what is QS?
7. When $SR = 68$, what is CA?
8. When $SR = 46$, what is BR?
9. When $CA = 3x - 1$ and $SR = 5x + 4$, what is CA?
10. When $QS = 6x$ and $CS = 5x - 8$, what is AB?
11. When $QR = 5x + 2$ and $CB = 2x + 5$, what is AR?
12. Your friend claims that because each midsegment is half as long as the corresponding side of the triangle, the perimeter of the midsegment triangle is half the perimeter of the original triangle. Is your friend correct? Explain your reasoning.
13. A building has the shape of a pyramid with a square base. The midsegment parallel to the ground of each triangular face of the pyramid has a length of 58 feet. Find the length of the base the pyramid.



Name_____ Date _____

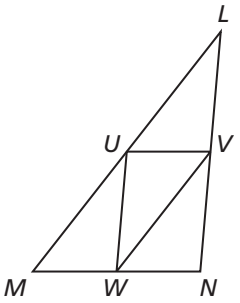
6.4 Practice B

In Exercises 1–4, use the graph of $\triangle ABC$.

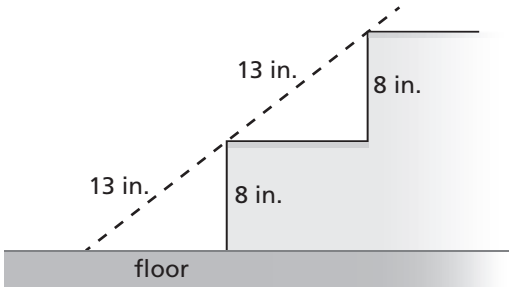


1. Find the coordinates of the midpoint D of $\overline{AB}$, the midpoint E of $\overline{CB}$, and the midpoint F of $\overline{AC}$.
2. Graph the midsegment triangle, $\triangle DEF$.
3. Show that $\overline{FD} \parallel \overline{CB}$, $\overline{FE} \parallel \overline{AB}$, and $\overline{DE} \parallel \overline{AC}$.
4. Show that $FD = \frac{1}{2}CB$, $FE = \frac{1}{2}AB$, and $DE = \frac{1}{2}AC$.

In Exercises 5–8, use $\triangle LMN$. where *U*, *V*, and *W* are the midpoints of the sides.



5. When $LV = 9$, what is UW?
6. When $LU = 2(x - 5)$ and $VW = 8 - x$, what is LM?
7. When $NL = 2x(12 + x)$ and $UW = (x + 4)^2$, what is LV?
8. When $UV = 2y + 14$ and $MN = 13 - y$, what is WN?
9. The bottom two steps of a stairwell are shown. Explain how to use the given measures to verify that the bottom step is parallel to the floor.



10. Your friend claims that a triangle with side lengths of a, b, and c will have half the area of a triangle with side lengths of $2a$, $2b$, and $2c$. Is your friend correct? Explain your reasoning.

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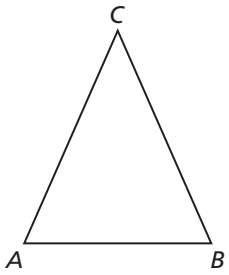
6.4 Enrichment and Extension

The Triangle Midsegment Theorem

1. In $\triangle ABC$, the length of $\overline{AB}$ is 24. In the triangle, a succession of midsegments are formed.



a. At Stage 1, draw the midsegment of $\triangle ABC$. Label it $\overline{DE}$.
At Stage 2, draw the midsegment of $\triangle DEC$. Label it $\overline{FG}$.
At Stage 3, draw the midsegment of $\triangle FGC$. Label it $\overline{HJ}$.

b. Copy and complete the table showing the length of the midsegment at each stage.

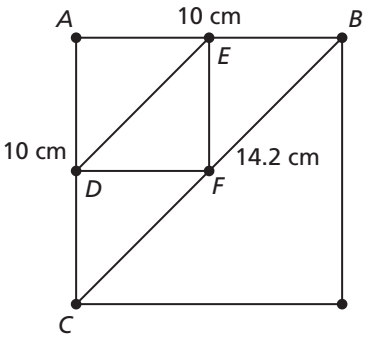
Stage *n*	0	1	2	3	4	5
Midsegment length	24					

c. From part (b), let y represent length of the midsegment at Stage n. Construct a scatter plot for the data given in the table. Then find a function that gives the length of the midsegment at Stage n.

d. Find a function that gives the length of the midsegment at Stage n, if the length of $\overline{AB}$ is w.

2. In $\triangle GHJ$, $K(2, 3)$ is the midpoint of $\overline{GH}$, $L(4, 1)$ is the midpoint of $\overline{HJ}$, and $M(6, 2)$ is the midpoint of $\overline{GJ}$. Find the coordinates of G, H, and J.

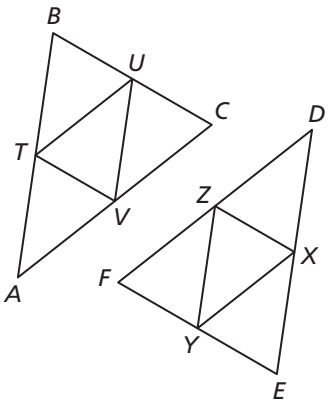
3. Find the perimeter and area of $\triangle DEF$, if $\overline{DE}$, $\overline{EF}$, and $\overline{DF}$ are midsegments.



4. Write a paragraph proof.

Given: $\triangle ABC \cong \triangle DEF$;
T, U, and V are midpoints of $\triangle ABC$;
X, Y, and Z are midpoints of $\triangle DEF$.

Prove: $\triangle TUV \cong \triangle XYZ$



Name_____ Date _____

6.4 Puzzle Time

What Did The Stamp Say To The Envelope?

A	B	C	D	E	F
G	H				

Complete each exercise. Find the answer in the answer column. Write the word under the answer in the box containing the exercise letter.

Complete the sentence.

A. A(n) _____ of a triangle is a segment that connects the midpoints of two sides of the triangle.

B. Every triangle has three midsegments, which form the midsegment _____.

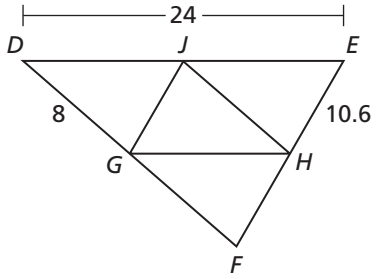
C. The segment connecting the midpoints of two sides of a triangle is parallel to the third side and is _____ as long as that side.

In the diagram, *G*, *H*, and *J* are midpoints of the sides of $\triangle DEF$. Find the measure of the segment.

D. $\overline{GH}$

E. $\overline{HJ}$

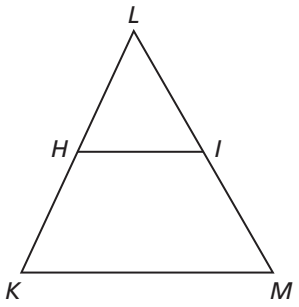
F. $\overline{GJ}$



In the diagram, $\overline{HI}$ is a midsegment of $\triangle KLM$. Find the measure of the segment.

G. $KM = 15$; Find HI.

H. $HI = 22$; Find KM.



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5.3 AGAIN			16 POST
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8 WE			7.5 GO
11 ARE			15 DONE