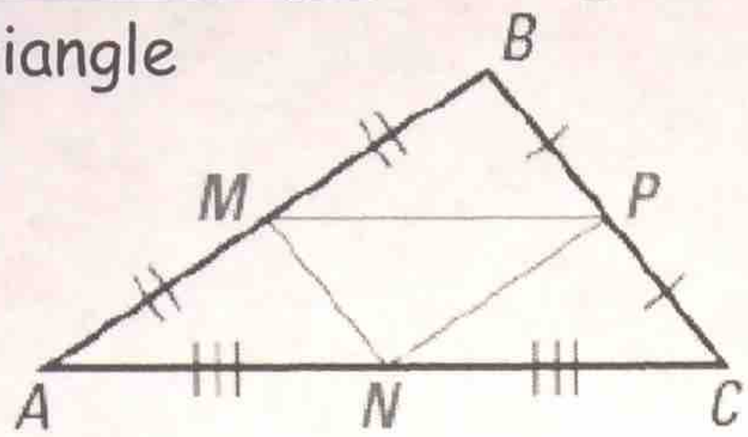
5.1 Midsegment Theorem

midsegment of a triangle - a segment that contains the midpoints of two sides of the triangle

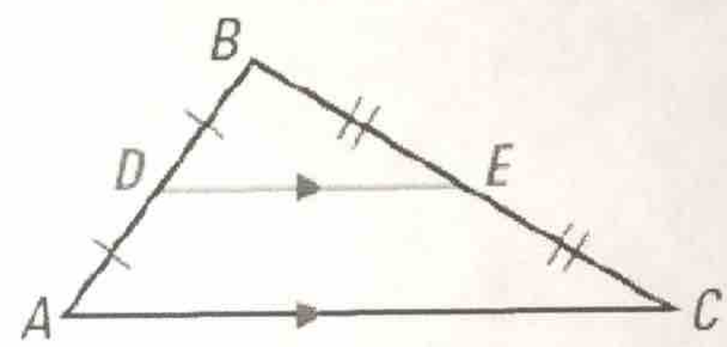


THEOREM *For Your Notebook*

THEOREM 5.1 Midsegment Theorem

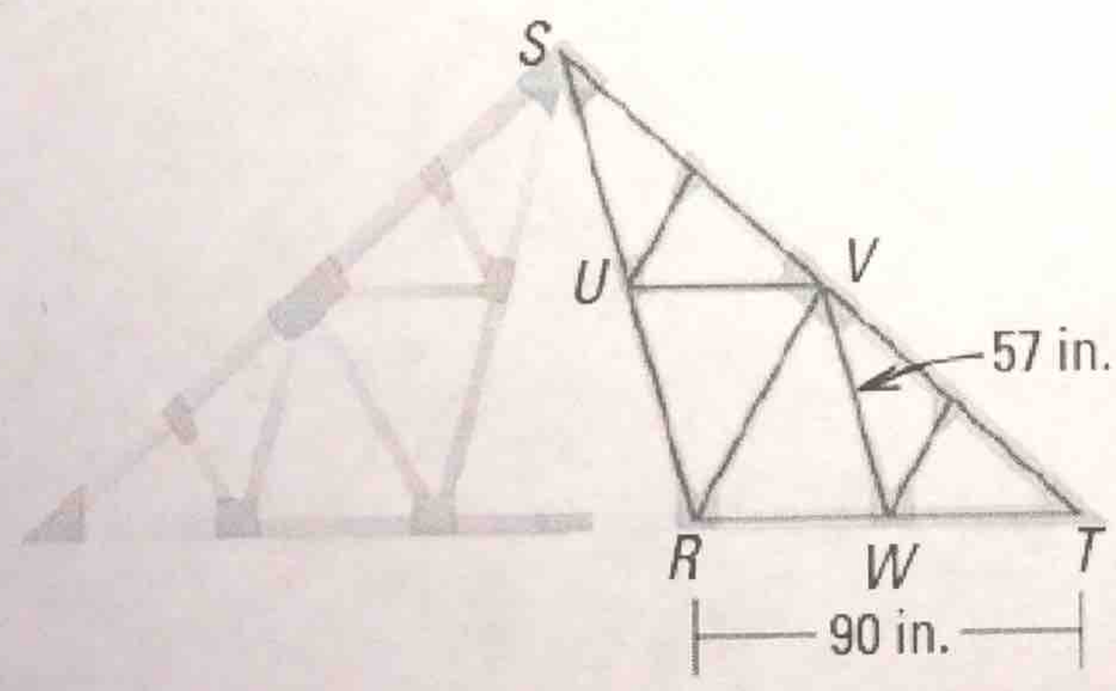
The segment connecting the midpoints of two sides of a triangle is parallel to the third side and is half as long as that side.

Proof: Example 5, p. 297; Ex. 41, p. 300



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

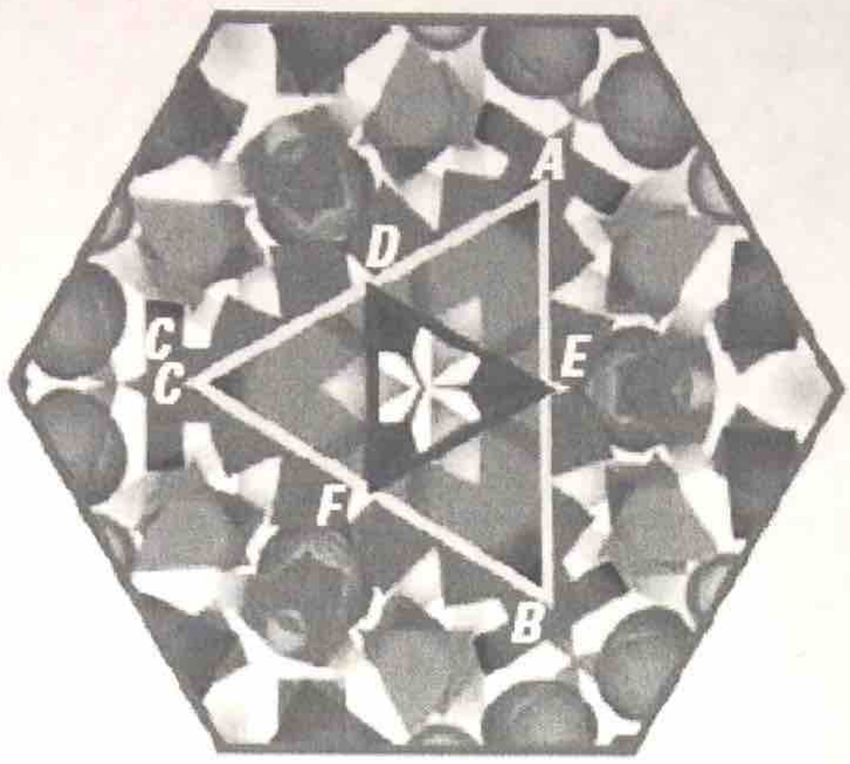
Ex 1: Triangles are used for strength in roof trusses. In the diagram, $\overline{UV}$ and $\overline{VW}$ are midsegments of ΔRST. Find UV and RS.

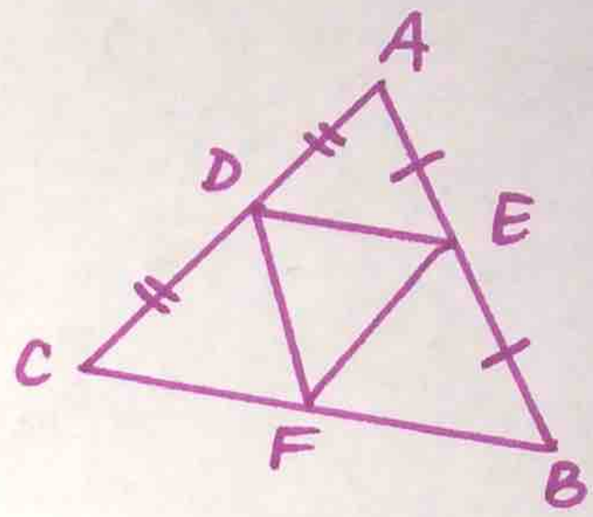


$UV = \frac{1}{2} \cdot RT$
$= \frac{1}{2}(90)$
$= \boxed{45 \text{ in}}$

$RS = 2 \cdot VW$
$= 2(57)$
$= \boxed{114 \text{ in}}$

Ex 2: In the kaleidoscope image, $\overline{AE} \cong \overline{BE}$ and $\overline{AD} \cong \overline{CD}$. Prove that $\overline{CB} \parallel \overline{DE}$.

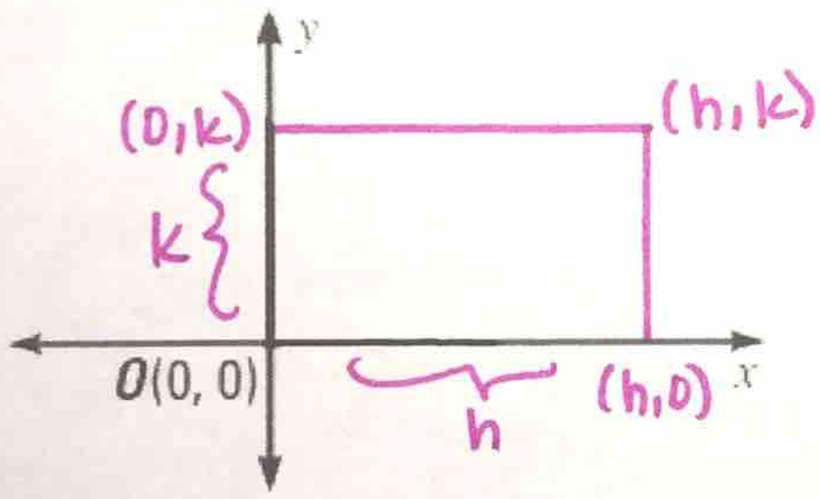




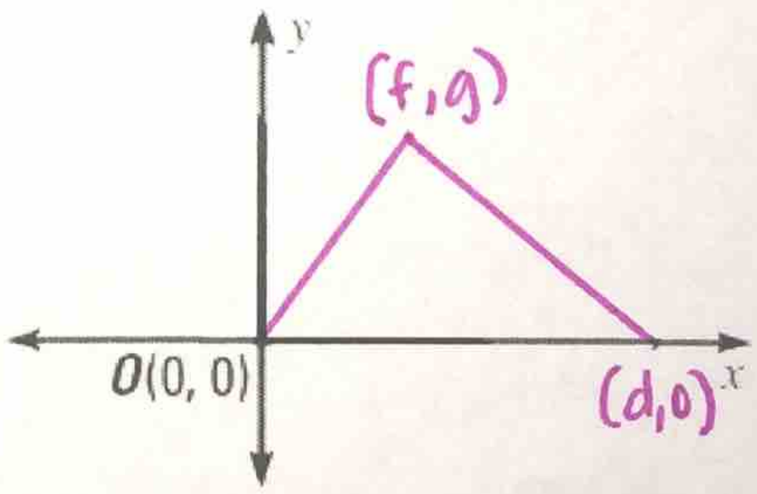
STATEMENTS	REASONS
1. $\overline{AE} \cong \overline{BE}$, $\overline{AD} \cong \overline{CD}$	1. Given
2. E is midpt of $\overline{AB}$, D is midpt of $\overline{AC}$	2. Definition of Midpoint
3. $\overline{DE}$ is a midsegment of $\triangle ABC$	3. Definition of Midsegment
4. $\overline{CB} \parallel \overline{DE}$	4. Midsegment Theorem

Ex 3: Place each figure in a coordinate plane in a way that is convenient for finding side lengths. Assign coordinates to each vertex.

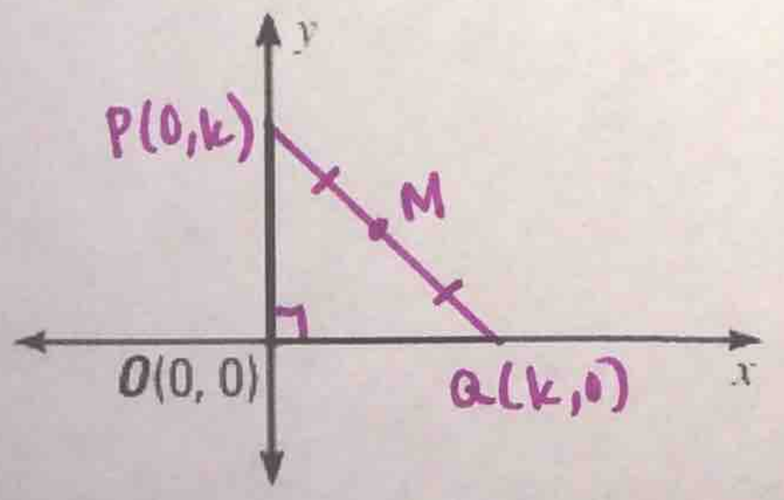
(a) a rectangle



(b) a scalene triangle



Ex 4: Place an isosceles right triangle in a coordinate plane. Find the length of the hypotenuse and the coordinates of the midpoint.



$d_{PQ} = \sqrt{(k-0)^2 + (0-k)^2}$

$= \sqrt{k^2 + k^2}$

$= \sqrt{2k^2}$

$= \boxed{k\sqrt{2} \text{ units}}$

$M_{PQ} = \left(\frac{0+k}{2}, \frac{k+0}{2}\right)$

$= \boxed{\left(\frac{k}{2}, \frac{k}{2}\right)}$