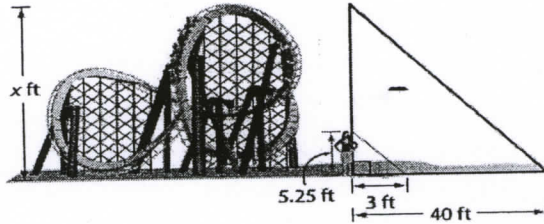


January 13, 2014

7.4 Warm-Up

1.

ROLLER COASTERS Hallie is estimating the height of the Superman roller coaster in Mitchellville, Maryland. She is 5 feet 3 inches tall and her shadow is 3 feet long. If the length of the shadow of the roller coaster is 40 feet, how tall is the roller coaster?



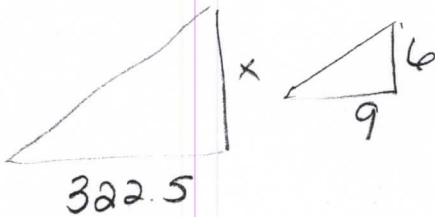
$$\frac{5.25}{x} = \frac{3}{40}$$

$$210 = 3x$$

$$x = 70 \text{ ft}$$

2.

BUILDINGS Adam is standing next to the Palmetto Building in Columbia, South Carolina. He is 6 feet tall and the length of his shadow is 9 feet. If the length of the shadow of the building is 322.5 feet, how tall is the building?



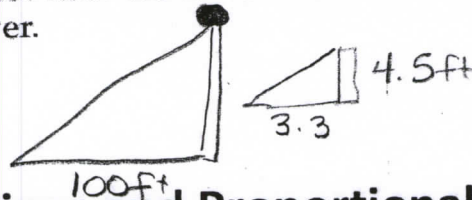
$$\frac{6}{x} = \frac{9}{322.5}$$

$$\frac{1935}{9} = \frac{9x}{9}$$

$$x = 215 \text{ ft}$$

3.

COMMUNICATION A cell phone tower casts a 100-foot shadow. At the same time, a 4-foot 6-inch post near the tower casts a shadow of 3 feet 4 inches. Find the height of the tower.



$$\frac{4.5}{x} = \frac{3.3}{100}$$

$$\frac{3.3x}{3.3} = \frac{450}{3.3}$$

$$x = 136.36 \text{ ft}$$

7.4 Parallel Lines and Proportional Parts

Target: Use Proportional parts within triangles and parallel lines

Why?

Photographers have many techniques at their disposal that can be used to add interest to a photograph. One such technique is the use of a vanishing point perspective, in which an image with parallel lines, such as train tracks, is photographed so that the lines appear to converge at a point on the horizon.

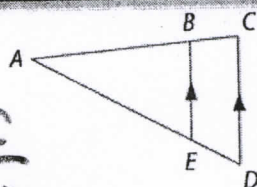


Theorem 7.5 Triangle Proportionality Theorem

If a line is parallel to one side of a triangle and intersects the other two sides, then it divides the sides into segments of proportional lengths.

Example If $\overline{BE} \parallel \overline{CD}$, then $\frac{AB}{AE} = \frac{BC}{ED}$.

$$\frac{AB}{AE} = \frac{BC}{ED}$$



Example 1 Find the Length of a Side

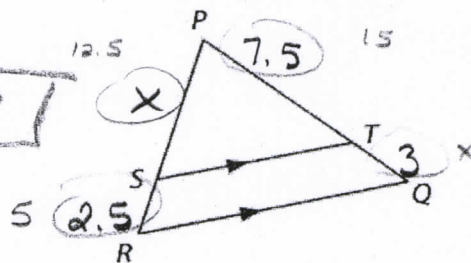
In $\triangle PQR$, $\overline{ST} \parallel \overline{RQ}$. If $PT = 7.5$, $TQ = 3$, and $SR = 2.5$, find PS .

$$\frac{x}{2.5} = \frac{7.5}{3}$$

$$x = 6.25$$

$$\frac{3x}{3} = \frac{18.75}{3}$$

$$\boxed{PS = 6.25}$$



Guided Practice

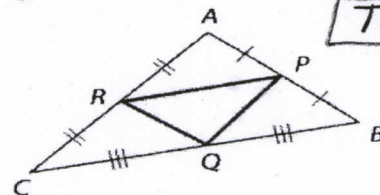
1. If $PS = 12.5$, $SR = 5$, and $PT = 15$, find TQ .

$$\frac{12.5}{5} = \frac{15}{x} \quad 70 = 12.5x$$

$$x = 6 \quad \boxed{TQ = 6}$$

A **midsegment of a triangle** is a segment with endpoints that are the midpoints of two sides of the triangle. Every triangle has three midsegments. The midsegments of $\triangle ABC$ are \overline{RP} , \overline{PQ} , \overline{RQ} .

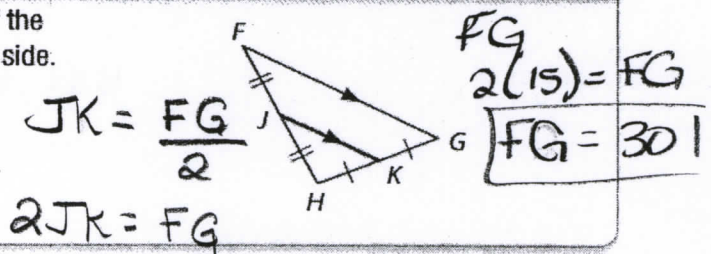
A special case of the Triangle Proportionality Theorem is the Triangle Midsegment Theorem.



Theorem 7.7 Triangle Midsegment Theorem

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

Example If J and K are midpoints of \overline{FH} and \overline{HG} , respectively, then $\overline{JK} \parallel \overline{FG}$ and $JK = \frac{1}{2}FG$.



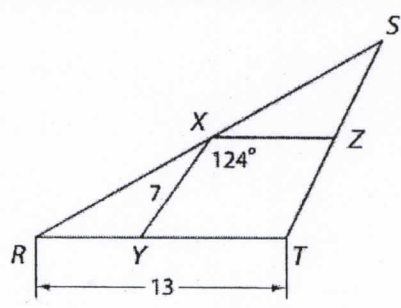
Example 3 Use the Triangle Midsegment Theorem

In the figure, \overline{XY} and \overline{XZ} are midsegments of $\triangle RST$. Find each measure.

a. $XZ = \frac{13}{2} = 6.5$

b. $ST = 2(7) = 14$

c. $m\angle RYX = 124^\circ$ Alt. Interior



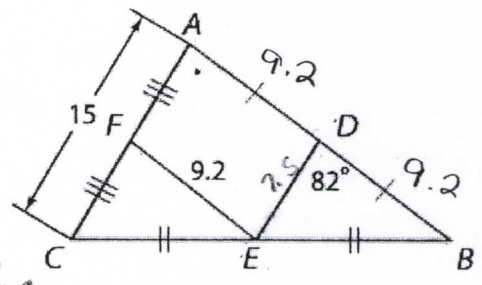
Guided Practice

Find each measure.

3A. $DE = \frac{15}{2} = 7.5$

3B. $DB = 9.2$

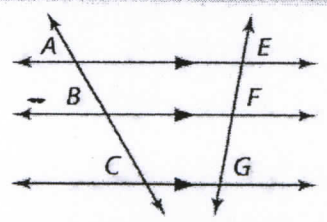
3C. $m\angle FED = 82^\circ$ Alt. Interior



Corollary 7.1 Proportional Parts of Parallel Lines

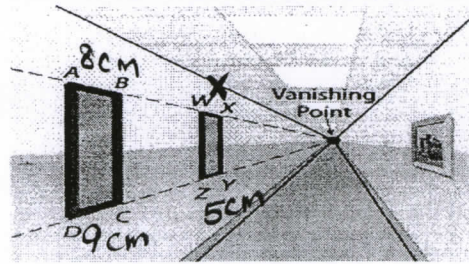
If three or more parallel lines intersect two transversals, then they cut off the transversals proportionally.

Example If $\overline{AE} \parallel \overline{BF} \parallel \overline{CG}$, then $\frac{AB}{BC} = \frac{EF}{FG}$.



Real-World Example 4 Use Proportional Segments of Transversals

ART Megan is drawing a hallway in one-point perspective. She uses the guidelines shown on the left wall. If segments \overline{AD} , \overline{BC} , \overline{WZ} , and \overline{XY} are all parallel, $AB = 8$ centimeters, $DC = 9$ centimeters, and $ZY = 5$ centimeters, find WX .

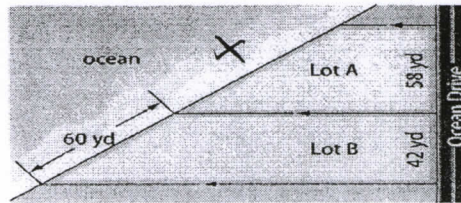


$$\frac{8}{x} = \frac{9}{5}$$

$$40 = 9x \quad x = 4.4 \text{ cm}$$

Guided Practice

- 4. REAL ESTATE** Frontage is the measurement of a property's boundary that runs along the side of a particular feature such as a street, lake, ocean, or river. Find the ocean frontage for Lot A to the nearest tenth of a yard.



$$\frac{42}{58} = \frac{60}{x}$$

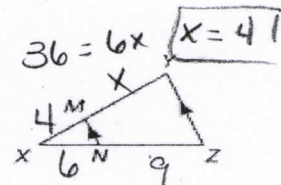
$$3480 = 42x$$

$$x = 82.9 \text{ yds}$$

Example 1

- If $XM = 4$, $XN = 6$, and $NZ = 9$, find XY .
- If $XN = 6$, $XM = 2$, and $XY = 10$, find NZ .

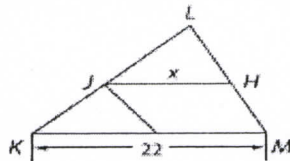
$$\frac{4}{6} = \frac{x}{9}$$



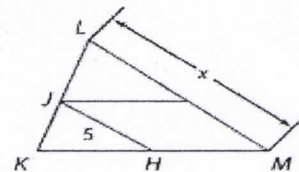
Example 3

\overline{JH} is a midsegment of $\triangle KLM$. Find the value of x .

5.

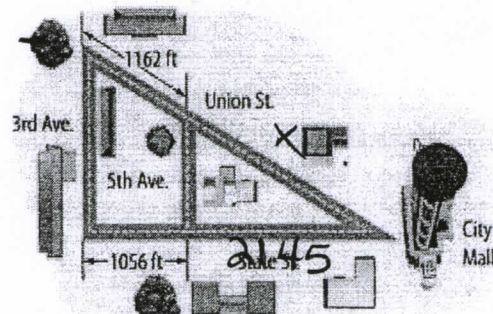


6.



Example 4

- 7. MAPS** Refer to the map at the right. 3rd Avenue and 5th Avenue are parallel. If the distance from 3rd Avenue to City Mall along State Street is 3201 feet, find the distance between 5th Avenue and City Mall along Union Street. Round to the nearest tenth.



$$\frac{1162}{1056} = \frac{x}{2145}$$

$$2492490 = 1056x$$

$$x = 2360.3 \text{ ft}$$

$$\underline{5th Ave = 2360.3 ft}$$

$$\begin{array}{r} 2145 \\ 3201 \\ \hline -1056 \end{array}$$