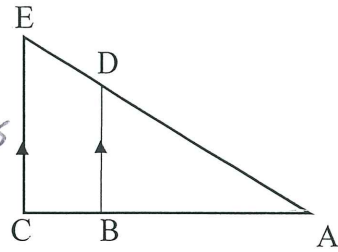


Geometry
Triangle Proportionality and Midsegment (7.4)

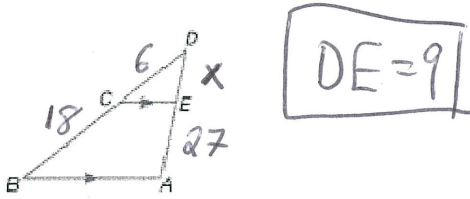
Triangle Proportionality Theorem

If a line is parallel to one side of a triangle and intersects the other 2 sides, then it divides the segments into 2 equal ratios

$$\frac{AD}{DE} = \frac{AB}{BC}$$



Ex) 1. $CB = 18$, $DC = 6$, and $EA = 27$. Find DE .

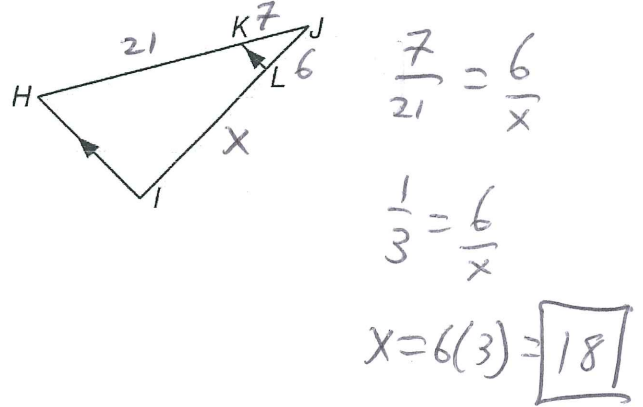


$$\frac{6}{18} = \frac{x}{27} \quad | \quad 18x = 6(27)$$

$$\frac{18x}{18} = \frac{162}{18}$$

$$x = 9$$

2. If $JK = 7$, $KH = 21$, and $JL = 6$, find LI .



Ex) Determine whether $\overline{BC} \parallel \overline{DE}$. Justify your answer.

3. $AD = 15$, $DB = 12$, $AE = 10$, and $EC = 8$

yes, $\overline{BC} \parallel \overline{DE}$

$$\frac{15}{12} = \frac{10}{8} = \frac{5}{4} \checkmark$$

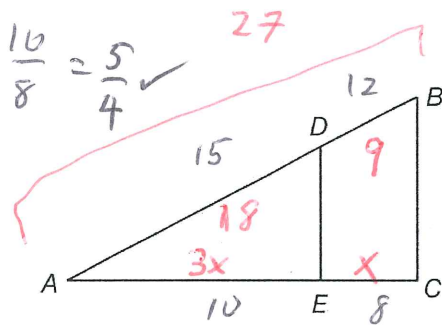
4. $BD = 9$, $BA = 27$, and $CE = \frac{1}{3}EA$

\overline{BC} and \overline{DE}
Not parallel

$$\frac{18}{9} = \frac{3x}{x}$$

$$\downarrow$$

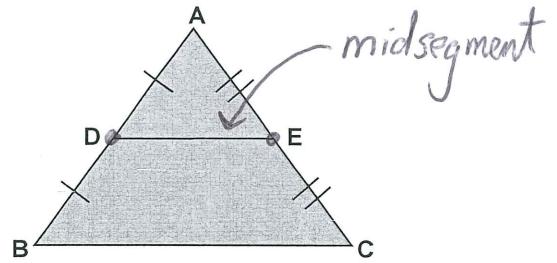
$$2 \neq 3$$



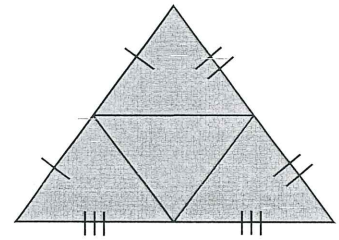
Geometry
Triangle Proportionality and Midsegment

Midsegments of Triangles

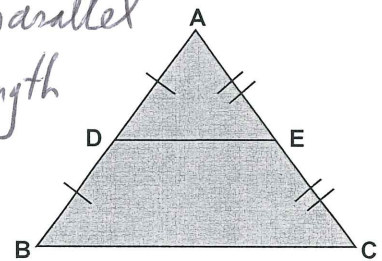
Midsegment: The segment connecting the midpoints of 2 sides of a triangle



Conjecture: The 3 midsegments of a triangle divide the triangle into 4 congruent triangles

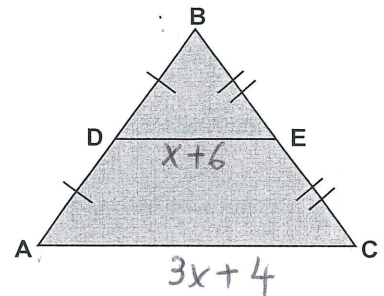


Theorem: A midsegment of a triangle is parallel to the third side and is half the length of the 3rd side
 $DE \parallel BC$ and $DE = \frac{1}{2} BC$



Guided Practice:

1. (a) If $AC = 20$, then $DE = \underline{10}$.
- (b) If $DE = 6$, then $AC = \underline{12}$.
- (c) If $DE = x + 6$ and $AC = 3x + 4$, then $x = \boxed{8}$.



$$2(\text{midsegment}) = 3^{\text{rd}} \text{ side}$$

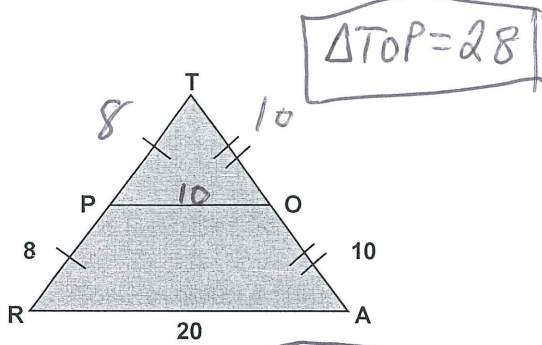
$$2(x+6) = 3x+4$$

$$\begin{array}{r} 2x+12 = 3x+4 \\ -2x \quad \quad -2x \end{array}$$

$$\boxed{8 = x}$$

Geometry
Triangle Proportionality and Midsegment

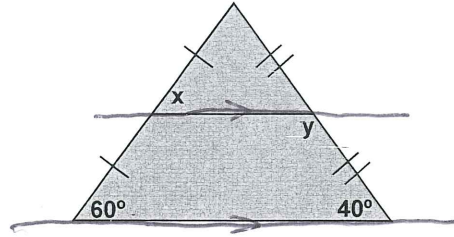
2. Find the perimeter of ΔTOP .



perimeter = 28

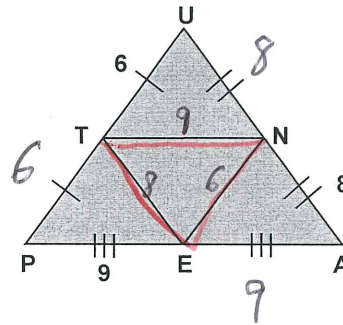
3. Find the missing angle measures.

$x = \underline{60}$ $y = \underline{140}$



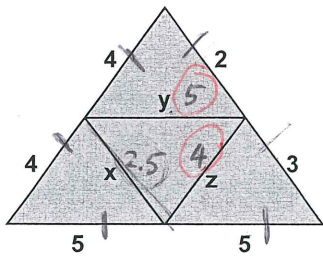
4. Find the perimeter of ΔTEN .

23



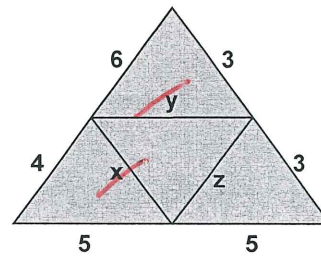
5. Exactly one of the values x , y , or z can be determined. Find it.

(a)



$x = 2.5$

(b)

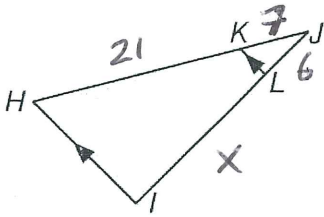


$z = 5$

Skills Practice

Parallel Lines and Proportional Parts

1. If $JK = 7$, $KH = 21$, and $JL = 6$, find LI .

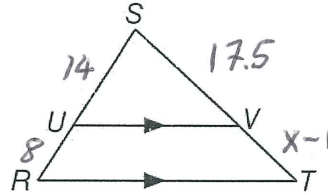


$$\frac{7}{21} = \frac{6}{x}$$

$$\frac{1}{3} = \frac{6}{x}$$

$$\boxed{x = 18}$$

2. If $RU = 8$, $US = 14$, $TV = x - 1$, and $VS = 17.5$, find x and TV .



$$\frac{8}{14} = \frac{x-1}{17.5}$$

$$\frac{4}{7} = \frac{x-1}{17.5}$$

$$7(x-1) = 4(17.5)$$

$$7x - 7 = 70$$

$$7x = 77$$

$$\boxed{x = 11}$$

Determine whether $\overline{BC} \parallel \overline{DE}$. Justify your answer.

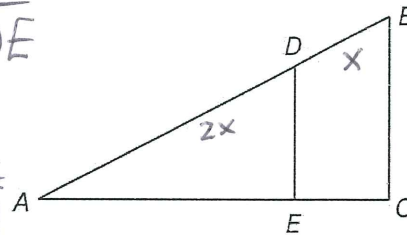
3. $AD = 15$, $DB = 12$, $AE = 10$, and $EC = 8$

$$\frac{12}{15} = \frac{8}{10} = \frac{4}{5} \checkmark \text{ yes } \overline{BC} \parallel \overline{DE}$$

4. $BD = 9$, $BA = 27$, and $CE = \frac{1}{3}EA$

$$AD = 27 - 9 = 18$$

$$\frac{9}{18} \neq \frac{x}{3x} \text{ NO } \overline{BC} \text{ and } \overline{DE} \text{ not parallel}$$



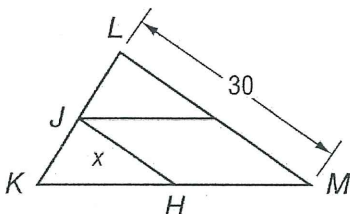
5. $AE = 30$, $AC = 45$, and $AD = 2DB$

$$\frac{1}{2} \neq \frac{1}{3}$$

$$EC = 45 - 30 = 15 \quad \frac{15}{30} = \frac{1}{2} \checkmark \text{ yes } \overline{BC} \parallel \overline{DE}$$

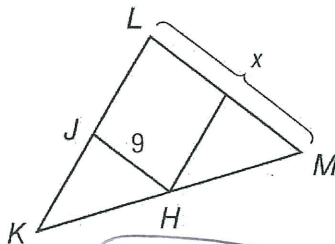
\overline{JH} is a midsegment of $\triangle KLM$. Find the value of x .

6.



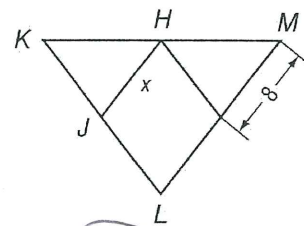
$$\boxed{x = 15}$$

7.



$$\boxed{LM = 18}$$

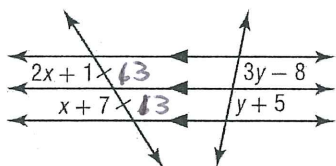
8.



$$\boxed{x = 8}$$

ALGEBRA Find x and y .

9.



$$2x+1 = x+7$$

$$x = 6$$

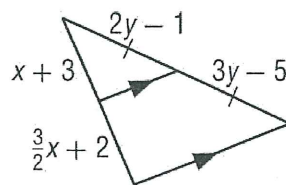
$$\frac{13}{13} = \frac{3y-8}{y+5}$$

$$y+5 = 3y-8$$

$$13 = 2y$$

$$\boxed{y = \frac{13}{2}}$$

10.



$$2y-1 = 3y-5$$

$$4 = y$$

$$\frac{x+3}{\frac{3}{2}x+2} = 1$$

$$\frac{3}{2}x+2 = x+3$$

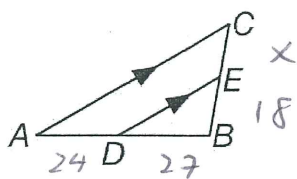
$$0.5x = 1$$

$$\boxed{x = 2}$$

Practice

Parallel Lines and Proportional Parts

1. If $AD = 24$, $DB = 27$, and $EB = 18$, find CE .



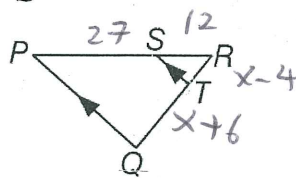
$$\frac{24}{27} = \frac{x}{18}$$

$$\frac{8}{9} = \frac{x}{18}$$

$$9x = 144$$

$$x = 16$$

2. If $QT = x + 6$, $SR = 12$, $PS = 27$, and $TR = x - 4$, find QT and TR .



$$\frac{12}{27} = \frac{x-4}{x+6}$$

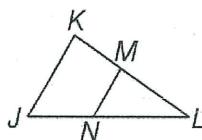
$$\frac{4}{9} = \frac{x-4}{x+6}$$

$$4(x+6) = 9(x-4)$$

$$4x + 24 = 9x - 36$$

$$60 = 5x$$

$$x = 12$$



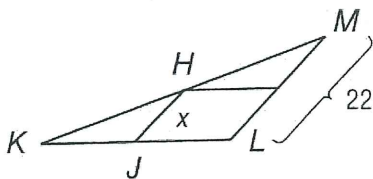
Determine whether $\overline{JK} \parallel \overline{NM}$. Justify your answer.

3. $JN = 18$, $JL = 30$, $KM = 21$, and $ML = 35$

4. $KM = 24$, $KL = 44$, and $NL = \frac{5}{6}JN$

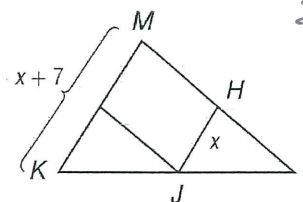
\overline{JH} is a midsegment of $\triangle KLM$. Find the value of x .

6.



$$x = 11$$

7.

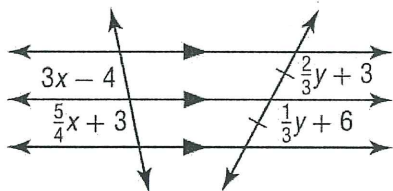


$$2(x) = x + 7$$

$$2x = x + 7$$

$$x = 7$$

7. Find x and y .



8. Find x and y .

$$3x - 4 = x + 1$$

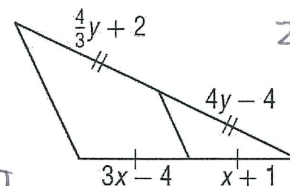
$$2x = 5$$

$$x = 2.5$$

$$\frac{4}{3}y + 2 = 4y - 4$$

$$6 = \frac{8}{3}y$$

$$y = 2.25$$



9. MAPS On a map, Wilmington Street, Beech Drive, and Ash Grove Lane appear to all be parallel. The distance from Wilmington to Ash Grove along Kendall is 820 feet and along Magnolia, 660 feet. If the distance between Beech and Ash Grove along Magnolia is 280 feet, what is the distance between the two streets along Kendall?

