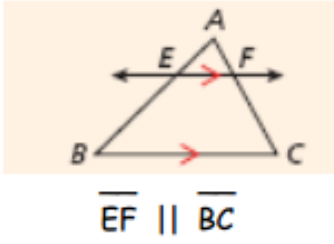


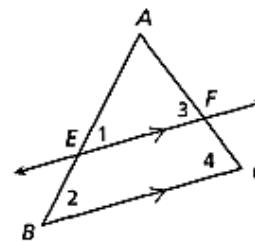
Triangle Proportionality Theorem

Theorem	Hypothesis	Conclusion
If a line parallel to a side of a triangle intersects the other two sides, then it divides those sides proportionally.	 <p>$\overline{EF} \parallel \overline{BC}$</p>	$\frac{AE}{EB} = \frac{AF}{FC}$

PROOF:

Given: $\overline{EF} \parallel \overline{BC}$

Prove: $\frac{AE}{EB} = \frac{AF}{FC}$



Complete the following proof:

Part 1: Show that $\triangle AEF \sim \triangle ABC$.

Since $\overline{EF} \parallel \overline{BC}$, you can conclude that $\angle 1 \cong \angle 2$ and $\angle 3 \cong \angle 4$ by _____

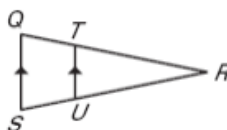
So, $\triangle AEF \sim \triangle ABC$ by _____

Part 2: Use the fact that corresponding sides of similar triangles are proportional.

STATEMENT	equals	REASON
$\frac{AB}{AE}$		Corresponding sides are proportional.
$\frac{AE + EB}{AE}$		Segment Addition Postulate
$1 + \frac{EB}{AE}$		$\frac{a+b}{c} = \frac{a}{c} + \frac{b}{c}$
$\frac{EB}{AE}$		Subtraction Property of Equality

REFLECTION: Explain how to conclude $\triangle AEF \sim \triangle ABC$ without using $\angle 3$ and $\angle 4$ _____

Complete:

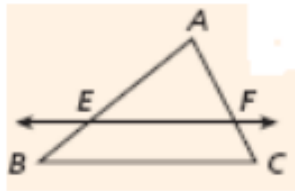


If $\overline{TU} \parallel \overline{QS}$, then _____ = _____.





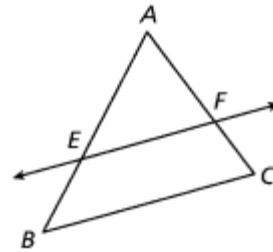
Converse of the Triangle Proportionality Theorem

Theorem	Hypothesis	Conclusion
If a line divides two sides of a triangle proportionally, then it is parallel to the third side.	$\frac{AE}{EB} = \frac{AF}{FC}$ 	line $EF \parallel$ segment BC

PROOF:

Given: $\frac{AE}{EB} = \frac{AF}{FC}$

Prove: $\overline{EF} \parallel \overline{BC}$



Complete the following proof:

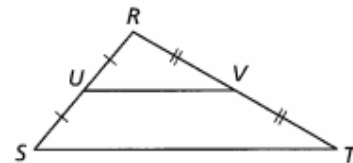
Part 1: Show that $\triangle AEF \sim \triangle ABC$.

It is given that $\frac{AE}{EB} = \frac{AF}{FC}$ and taking the reciprocal of both sides shows that _____.

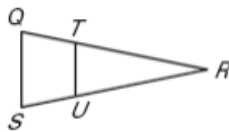
Now add 1 to both sides by adding $\frac{AE}{AE}$ to the left side and $\frac{AF}{AF}$ to the right side. This results in _____ . Adding and using Segment Addition gives _____ . Since $\angle A \cong \angle A$, $\triangle AEF \sim \triangle ABC$ by _____ .

Part 2: As corresponding angles of similar triangles, $\angle AEF \cong$ _____. Therefore, $\overline{EF} \parallel \overline{BC}$ by _____ .

REFLECTION: A student states that \overline{UV} must be parallel to \overline{ST} . Do you agree? Why or why not? _____



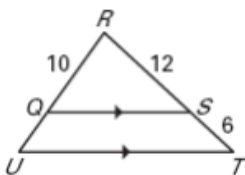
Complete:



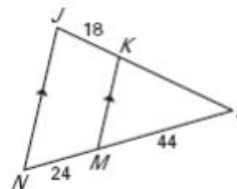
If $\frac{RT}{TQ} = \frac{RU}{US}$, then _____ \parallel _____

PRACTICE:

1) Find the length of \overline{QU} .

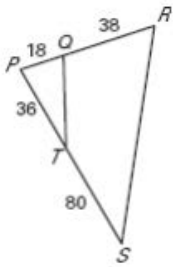


2) Find the length of \overline{KL} .

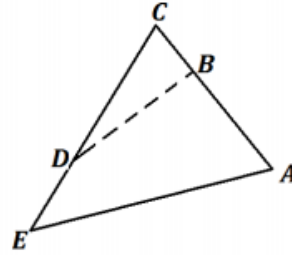




3) Determine whether $\overline{QT} \parallel \overline{RS}$.



4) Given $AB = 31\text{mm}$, $BC = 19\text{mm}$, $CD = 27\text{mm}$, and $DE = 23\text{mm}$. Determine whether $\overline{BD} \parallel \overline{AE}$.

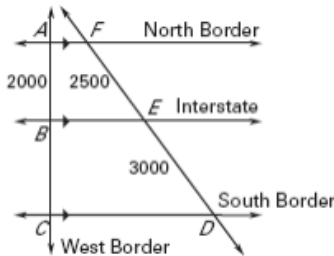


Additional Side-Splitting Theorems/Applications:

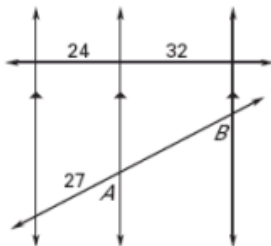
<i>Theorem</i>	<i>Hypothesis</i>	<i>Conclusion</i>
If three parallel lines intersect two transversals, then they divide the transversals <u>proportionally</u> .		$\frac{UW}{WY} = \frac{VX}{XZ} = \frac{UY}{YZ}$

PRACTICE:

5) A farmer's land is divided by a newly constructed interstate. The distances shown are in meters. Find the distance CA between the north border and the south border of the farmer's land.

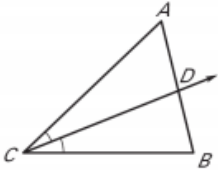


6) Find the length of \overline{AB} .



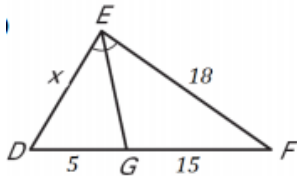


Angle Bisector Theorem:

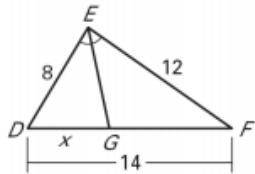
Theorem	Hypothesis	Conclusion
<p>If a ray bisects an angle of a triangle, then it divides the side into segments whose lengths are proportional to the lengths of the other two sides.</p>		$\frac{AD}{BD} = \frac{AC}{BC}$

PRACTICE:

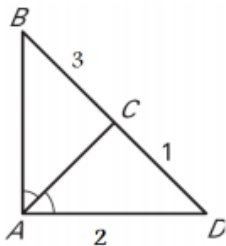
7) In the diagram, $\angle DEG \cong \angle GEF$. Use the given side lengths to find the length of \overline{DG} .



8) In the diagram, $\angle DEG \cong \angle GEF$. Use the given side lengths to find the length of \overline{DG} .

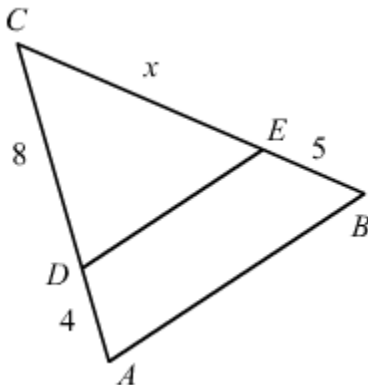


9) Find the length of \overline{AB} .



MIXED PRACTICE:

10) In the figure, $\overline{DE} \parallel \overline{AB}$. What is the value of x?

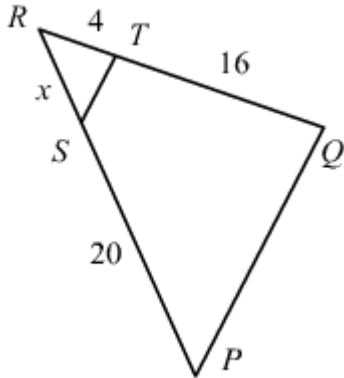


- A) 9
- B) 16

- C) 10
- D) 2.5



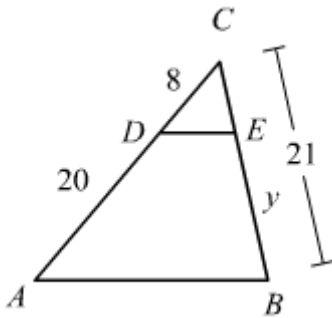
11) In the figure, $\overline{PQ} \parallel \overline{ST}$. What is the value of x ?



- A) 10
- B) 14

- C) 5
- D) 8

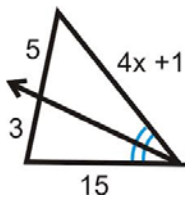
12) In the figure, $\overline{AB} \parallel \overline{DE}$. What is the value of y ?



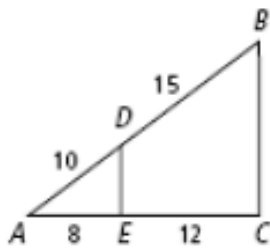
- A) 9
- B) 15

- C) 12
- D) 6

13) Find the value of x .



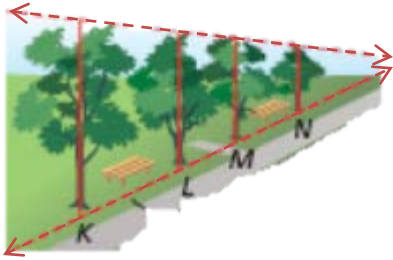
14) Verify that $\overline{DE} \parallel \overline{BC}$.



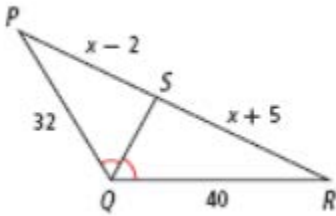


15) Suppose that the artist decided to make a larger sketch of the trees shown below. In the figure, if $AB = 4.5$ in., $BC = 2.6$ in., $CD = 4.1$ in., and $KL = 4.9$ in., find LM and MN to the nearest tenth of an inch.

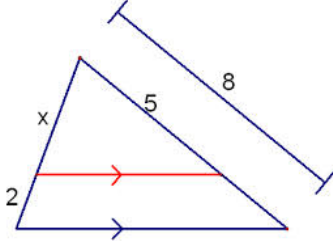
Given: $\overline{AK} \parallel \overline{BL} \parallel \overline{CM} \parallel \overline{DN}$



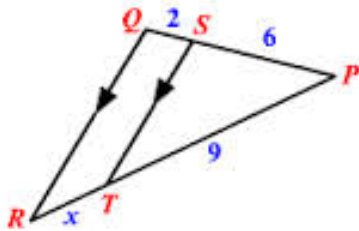
16) Find SR and PS .



17) Find the value of x .

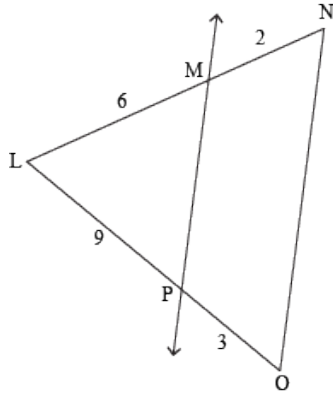


18) Find the value of x .





19) Show that $\overline{MO} \parallel \overline{NO}$.



20) Given that $AC = 12$, $CD = 6$, and $BA = 15$, find the value of DB .

