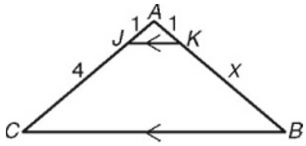
Name ______________________ Date ____________ Class____________

LESSON 12-1

Triangle Proportionality Theorem

Practice and Problem Solving: A/B

For Problems 1–4, find the value of *x*.

1. 

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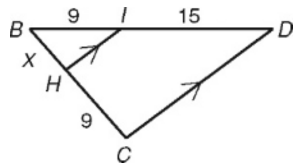
2. 

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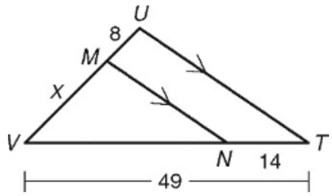
3. 

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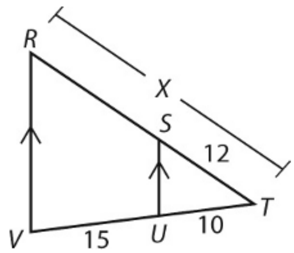
4. 

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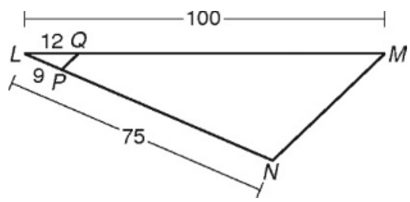
For Problems 5 and 6, determine whether the given segments are parallel.

5. $\overline{PQ}$ and $\overline{NM}$



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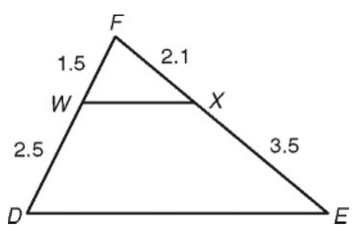
6. $\overline{WX}$ and $\overline{DE}$



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MODULE 12 Using Similar Triangles

LESSON 12-1

Practice and Problem Solving: A/B

1. 4
2. $5\frac{2}{5}$
3. 20
4. 30
5. $PN = 66$ and $QM = 88$. $\frac{LP}{PN} = \frac{9}{66} = \frac{3}{22}$ and $\frac{LQ}{QM} = \frac{12}{88} = \frac{3}{22}$. Because $\frac{LP}{PN} = \frac{LQ}{QM}$, $\overline{PQ} \parallel \overline{NM}$ by the Conv. of the $\triangle$ Proportionality Theorem.
6. $\frac{FW}{WD} = \frac{1.5}{2.5} = \frac{3}{5}$ and $\frac{FX}{XE} = \frac{2.1}{3.5} = \frac{3}{5}$. Because $\frac{FW}{WD} = \frac{FX}{XE}$, $\overline{WX} \parallel \overline{DE}$ by the Conv. of the $\triangle$ Proportionality Theorem.

Practice and Problem Solving: C

1. Possible answer: It is given that $\overline{EF} \parallel \overline{BC}$. $\angle B$ corresponds to $\angle AEF$ and $\angle C$ corresponds to $\angle AFE$ on the transversals, so $\angle B \cong \angle AEF$ and $\angle C \cong \angle AFE$. Thus, $\triangle ABC \sim \triangle AEF$ by the AA Similarity Postulate. By the definition of similar polygons, $\frac{AB}{AE} = \frac{AC}{AF}$. But by the Segment Addition Postulate, $AB = AE + EB$ and $AC = AF + FC$. Substitution leads to $\frac{AE + EB}{AE} = \frac{AF + FC}{AF}$. This can be simplified to $1 + \frac{EB}{AE} = 1 + \frac{FC}{AF}$. The Subtraction Property of Equality shows that $\frac{EB}{AE} = \frac{FC}{AF}$, which can be rewritten as $\frac{AE}{EB} = \frac{AF}{FC}$.
2. $-4 + 4\sqrt{2}$
3. $AX = 20$ miles; $AY = 15$ miles
4. Possible answer: Since it is given that $\angle ABD \cong \angle CBD$ and by the Angle Addition Postulate $m\angle ABD + m\angle CBD = m\angle ABC$, $2m\angle ABD = m\angle ABC$. Since $\overline{BE} \cong \overline{BC}$, $\triangle BEC$ is isosceles, so $\angle BCE \cong \angle E$. By the Exterior Angles Theorem, $m\angle ABC = m\angle BCE + m\angle E$. Substitution shows that $2m\angle ABD = 2m\angle E$ or $m\angle ABD = m\angle E$. Because $\angle ABD$ and $\angle E$ are congruent corresponding angles, $\overline{BD} \parallel \overline{EC}$. By the Triangle Proportionality Theorem, $\frac{AB}{BE} = \frac{AD}{DC}$. Thus, by substituting BC for BE, $\frac{AB}{BC} = \frac{AD}{DC}$.

Practice and Problem Solving: Modified

1. parallel
2. Triangle Proportionality
3. third side
4. They are parallel lines.
5. $\frac{4}{5}$
6. $\frac{x}{15} = \frac{4}{5}$
7. 12
8. $\frac{18}{15}$; $\frac{6}{5}$
9. $\frac{24}{20}$; $\frac{6}{5}$
10. Yes; Converse to the Triangle Proportionality Theorem.

Reading Strategies

1. $\overline{DF}$ and $\overline{EF}$
2. Possible answer: Measure $\angle FAB$ and $\angle D$. They should be equal to each other.
3. $\overline{DA}$ and $\overline{AF}$
4. $\overline{EB}$ and $\overline{BF}$
5. $\frac{AF}{DA}$
6. $\frac{BF}{EB}$