Answers for 6.6
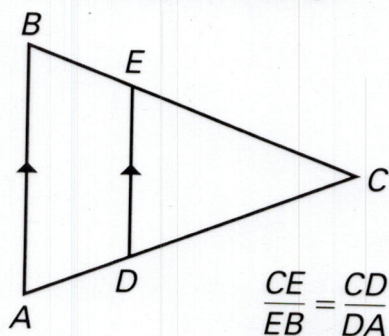
6.6 Skill Practice

1. If a line parallel to one side of a triangle intersects the other two sides, then it divides the two sides proportionally.

$$\frac{CE}{EB} = \frac{CD}{DA}$$

2. In the Midsegment Theorem the segment connecting the midpoints of two sides of a triangle is parallel to the third side which is a special case of the Converse of the Triangle Proportionality Theorem.

3. 9   **4.** 21

5. Parallel; $\frac{8}{5} = \frac{12}{7.5}$, so the Converse of the Triangle Proportionality Theorem applies.

6. not parallel; $\frac{24}{15} \neq \frac{18}{10}$

7. Parallel; $\frac{20}{18} = \frac{25}{22.5}$, so the Converse of the Triangle Proportionality Theorem applies.

8. C   **9.** 10

10. 12   **11.** 1

12. The length of $\overline{CD}$ is not 20; $\frac{10}{16} = \frac{20 - x}{x}$
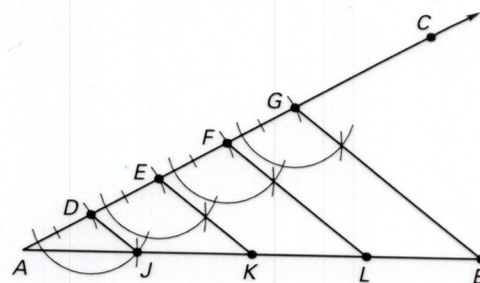
13. C   **14.** 27   **15.** 9

16. $a = 22.8125$, $b = 15.625$, $c = 15$, $d = 5$, $e = 4$, $f = 8$

17. $a = 9$, $b = 4$, $c = 3$, $d = 2$

18. $\overrightarrow{AD}$ must bisect $\angle A$ to use Theorem 6.7.

19. a–b. See figure in part (c)

c.

Theorem 6.6 guarantees that parallel lines divide transversals proportionally.
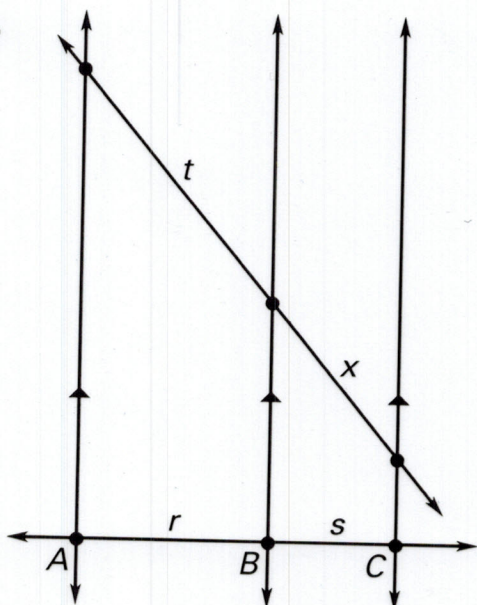
Since $\frac{AD}{DE} = \frac{DE}{EF} = \frac{EF}{FG} = 1$

implies $\frac{AJ}{JK} = \frac{JK}{KL} = \frac{KL}{LB} = 1$

which means $AJ = JK = KL = LB$.

20.

6.6 Problem Solving

21. 350 yd

22. Since $\overline{QS} \parallel \overline{TU}$ $\angle S \cong \angle TUR$ and $\angle Q \cong \angle UTR$ using the Corresponding Angles Postulate. $\triangle SRQ \sim \triangle URT$ using the AA Similarity Postulate.

$\dfrac{QR}{TR} = \dfrac{SR}{UR}$ using the

definition of similarity, $QR = QT + TR$ and $SR = SU + UR$ by the Segment Addition Postulate. Substituting you get

$\dfrac{QT + TR}{TR} = \dfrac{SU + UR}{UR}$ which

simplifies to $\dfrac{QT}{TR} = \dfrac{SU}{UR}$.

23. Draw $\overleftrightarrow{AD}$. (Through any two points, there is exactly one line.) Let G be the point of intersection of $\overleftrightarrow{AD}$ and $\overleftrightarrow{BE}$. Since $k_1 \parallel k_2$ and $k_2 \parallel k_3$, by the Triangle Proportionality Theorem

$\dfrac{CB}{BA} = \dfrac{DG}{GA}$ and $\dfrac{DG}{GA} = \dfrac{DE}{EF}$. Using

the Transitive Property of

Equality, $\dfrac{CB}{BA} = \dfrac{DE}{EF}$.

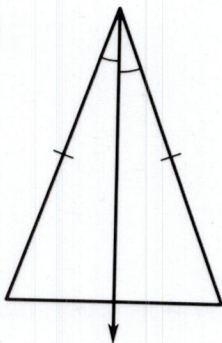**24. a.** Lot A = 50.9 yd,
   Lot B = 58.4 yd,
   Lot C = 64.7 yd

b. Lot C

c. About $114,735; about $127,112. *Sample answer:* Solve the ratios

$\dfrac{50.9}{58.4} = \dfrac{100,000}{x}$ and

$\dfrac{50.9}{64.7} = \dfrac{100,000}{x}$.

25.

In an isosceles triangle, the legs are congruent, so the ratio of their lengths is $1:1$. By Theorem 6.7, this ratio is equal to the ratio of the lengths of the segments created by the ray, so it is also $1:1$.

26. *Sample answer:* Begin by showing $\dfrac{RT + TQ}{TQ} = \dfrac{RU + US}{US}$ and

simplifying this to $\dfrac{RQ}{TQ} = \dfrac{RS}{US}$.

Use the proportions to solve for $\dfrac{TQ}{US}$ and use the Transitive

Property of Equality. Show $\triangle RTU \sim \triangle RQS$ using the SAS Similarity Theorem and show $\angle RTU \cong \angle RQS$ by definition of similar triangles. Then use the Corresponding Angles Converse Postulate to show $\overline{QS} \parallel \overline{TU}$.

27. Since $\overline{XW} \parallel \overline{AZ}$, $\angle XZA \cong \angle WXZ$ using the Alternate Interior Angles Congruence Theorem. This makes $\triangle AXZ$ isosceles because it is shown that $\angle A \cong \angle WXZ$ and by the Converse of the Base Angles Theorem, $\overline{AX} \cong \overline{XZ}$. Since $\overline{XW} \parallel \overline{AZ}$ using the Triangle Proportionality Theorem you get $\dfrac{YW}{WZ} = \dfrac{XY}{AX}$. Substituting you get $\dfrac{YW}{WZ} = \dfrac{XY}{XZ}$.

28. a. about 4.3 cm

b. *Sample answer:* The line connecting the top left to the bottom right of Car 1 is parallel to the line connecting the top left to the bottom right of Car 2; the triangle with vertices consisting of the vanishing point, the top left of Car 1, and the bottom right of Car 1 is similar to the triangle with vertices consisting of the vanishing point, the top left of Car 2, and the bottom right of Car 2.

c. about 4.7 cm

Answers for 6.6 *continued*

For use with pages 400–403

29. Draw $\overline{AN}$ and $\overline{CM}$ so they are both parallel to $\overline{BY}$. $\triangle APN \sim \triangle MPC$, $\triangle CXM \sim \triangle BXP$, and $\triangle BZP \sim \triangle AZN$ using the AA Similarity Postulate. From $\triangle APN \sim \triangle MPC$ you get $\dfrac{AP}{MP} = \dfrac{AN}{MC}$ using the definition of similarity. Similarly from $\triangle CXM \sim \triangle BXP$ and $\triangle BZP \sim \triangle AZN$ you get

$$\frac{CX}{BX} = \frac{MC}{PB} \text{ and } \frac{BZ}{AZ} = \frac{BP}{AN},$$

respectively. Using Theorem 6.4 and $\triangle ACM$, you get $\dfrac{AY}{YC} = \dfrac{AP}{PM}$.

Now $\dfrac{AY}{YC} \cdot \dfrac{CX}{BX} \cdot \dfrac{BZ}{AZ} =$

$$\frac{AN}{MC} \cdot \frac{MC}{PB} \cdot \frac{BP}{AN} = 1.$$

6.6 Mixed Review

30. $-\dfrac{21}{2}$

31. $\dfrac{2}{3}$

32. $\dfrac{5}{4}$

33. $\dfrac{125}{64}$

34. reflection in the x–axis, $(x, y) \rightarrow (x, -y)$

35. horizontal translation of 3 units to the right followed by a vertical translation of 3 units down, $(x, y) \rightarrow (x + 3, y - 3)$

36. rotation of 180°, $(x, y) \rightarrow (-x, -y)$

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Geometry
Answer Transparencies for Checking Homework **A19**