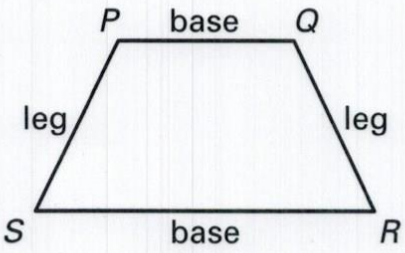
Answers for 8.5

For use with pages 546–549

8.5 Skill Practice

1.



2. A trapaziod has one pair of parallel sides and at most one pair of congruent opposite sides. A kite has two pairs of consecutive congruent sides and opposite sides are not congruent.

3. trapezoid

4. not a trapezoid

5. not a trapezoid

6. trapezoid

7. 130°, 50°, 130°

8. 80°, 100°, 80°

9. 118°, 62°, 62°

10. Trapezoid; since both pairs of base angles are congruent, they must also be supplementary, because the sum of the measures of the angles of a quadrilateral is 360°, making $\overline{AB} \parallel \overline{DC}$.

11. Trapezoid; $\overline{EF} \parallel \overline{HG}$ since they are both perpendicular to $\overline{EH}$.

12. Trapezoid; $\overline{JK} \parallel \overline{ML}$

13. 14 **14.** 23

15. 66.5 **16.** D

17. Only one pair of opposite angles in a kite is congruent. In this case $m\angle B = m\angle D = 120°$; $m\angle A + m\angle B + m\angle C + m\angle D = 360°$, $m\angle A + 120° + 50° + 120° = 360°$, so $m\angle A = 70°$.

18. 110° **19.** 80° **20.** 60°

21. $WX = XY = 3\sqrt{2}$,

$YZ = ZW = \sqrt{34}$

22. $WX = WZ = 2\sqrt{13}$,

$XY = YZ = 6\sqrt{5}$

23. $XY = YZ = 5\sqrt{5}$,

$WX = WZ = \sqrt{461}$

24. $DC = 2MN - AB$ since

$MN = \frac{AB + DC}{2}$;

$DC = 2(8) - 14$, $DC = 2$

25. 2 **26.** 3 **27.** 2.3

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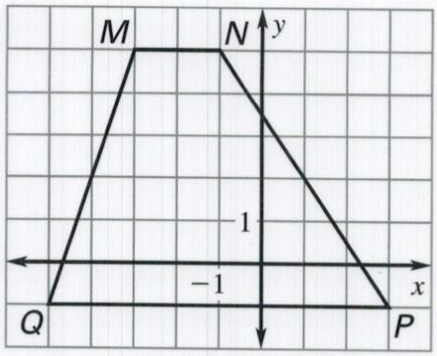
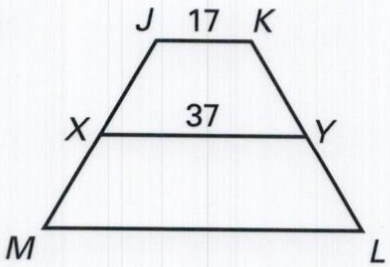
28.



$MP = 6\sqrt{2}$, $NQ = 2\sqrt{13}$; $MNPQ$ is not isosceles; Theorem 8.16.

29.



57

30. 12, 36 **31.** A

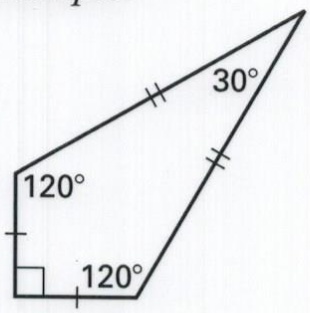
32. 6, 8; 50; solve the equation $\frac{x^2 + 36}{2} = 7x - 6$, the solution $x = 6$ must be rejected because the midsegment will equal 36 and that is not possible.

33. *Sample answer:* A kite or a quadrilateral that is not a parallelogram or a trapezoid would have no pair of opposite sides parallel. So, no consecutive angles would be supplementary. So, the measure of an interior angle could be greater than 180°.

8.5 Problem Solving

34. 32.2 cm, 68.8 cm

35. *Sample:*



36. a. isosceles trapezoid, kite

b. It increases; $m\angle BAF$ approaches 180°, $m\angle ABC$ approaches 0°, and $m\angle BCF$ approaches 180°, and $m\angle CFA$ approaches 0°.

c. 65°, 115°, 115°; in an isosceles trapezoid base angles are congruent.

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37. Since $\overline{BC} \parallel \overline{AE}$ and $\overline{AB} \parallel \overline{EC}$, $ABCE$ is a parallelogram which makes $\overline{AB} \cong \overline{EC}$. Using the Transitive Property of Segment Congruence, $\overline{CE} \cong \overline{CD}$ making $\triangle ECD$ isosceles. Since $\triangle ECD$ is isosceles $\angle D \cong \angle CED$. $\angle A \cong \angle CED$ using the Corresponding Angles Congruence Postulate, therefore $\angle A \cong \angle D$ using the Transitive Property of Angle Congruence. $\angle CED$ and $\angle CEA$ form a linear pair and therefore are supplementary. $\angle A$ and $\angle ABC$ are supplementary, and $\angle CEA$ and $\angle ECB$ are supplementary since they are consecutive pairs of angles in a parallelogram. Using the Congruent Supplements Theorem, $\angle A \cong \angle D$ and $\angle B \cong \angle BCD$.

38. Since $\overline{FG} \parallel \overline{EJ}$ and $\overline{EF} \parallel \overline{JG}$, $EFGJ$ is a parallelogram. Using the Corresponding Angles Theorem, $\angle E \cong \angle GJH$. It was given that $\angle E \cong \angle H$, therefore $\angle GJH \cong \angle H$ using the Transitive Property of Congruence. By the Converse of the Base Angles Theorem, $\triangle GHJ$ is isosceles with $\overline{JG} \cong \overline{HG}$. Since $EFGH$ is a parallelogram, $\overline{JG} \cong \overline{EF}$. Using the Transitive Property of Congruence, $\overline{EF} \cong \overline{HG}$. This makes $EFGJ$ an isosceles trapezoid.

39. Given: $JKLM$ is an isosceles trapezoid with $\overline{KL} \parallel \overline{JM}$ and $\overline{JK} \cong \overline{LM}$. Since pairs of base angles are congruent in an isosceles trapezoid, $\angle JKL \cong \angle MLK$. Using the Reflexive Property of Congruence, $\overline{KL} \cong \overline{KL}$. $\triangle JKL \cong \triangle MLK$ using the SAS Congruence Postulate. Using corresponding parts of congruent triangles are congruent, $\overline{JL} \cong \overline{KM}$.

40. In a triangle the midsegment's length is half the length of the third side, therefore $BG = \frac{1}{2} CD$ and $GE = \frac{1}{2} AF$. This implies that $BG + GE = \frac{1}{2} CD + \frac{1}{2} AF$, which implies $BE = \frac{CD + AF}{2}$.

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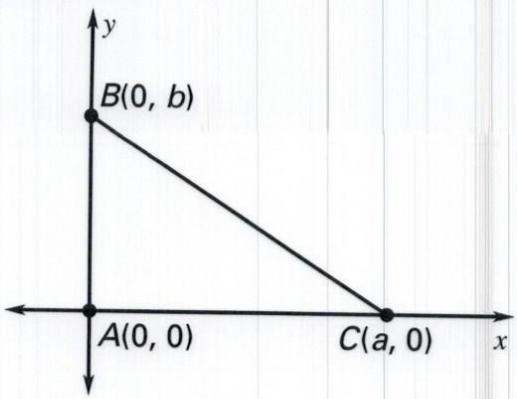
41. Given: $ABCD$ is a kite with $\overline{AB} \cong \overline{CB}$ and $\overline{AD} \cong \overline{CD}$. Using the Reflexive Property of Congruence, $\overline{BD} \cong \overline{BD}$ and $\overline{ED} \cong \overline{ED}$. Using the SSS Congruence Postulate, $\triangle BAD \cong \triangle BCD$. Using corresponding parts of congruent triangles are congruent, $\angle CDE \cong \angle ADE$. Using the SAS Congruence Postulate, $\triangle CDE \cong \triangle ADE$.Using corresponding parts of congruent triangles are congruent, $\angle CED \cong \angle AED$. Since $\angle CED$ and $\angle AED$ are congruent and form a linear pair, they are right angles. This makes $\overline{AC} \perp \overline{BD}$.

42. Given: $EFGH$ is a kite with $\overline{EF} \cong \overline{GF}$ and $\overline{EH} \cong \overline{GH}$. Construct $\overline{FH}$. Using the Reflexive Property of Congruence, $\overline{FH} \cong \overline{FH}$. Using the SSS Congruence Postulate, $\triangle FGH \cong \triangle FEH$. Using corresponding parts of congruent triangles are congruent, $\angle G \cong \angle E$. Now suppose $\angle F \cong \angle H$. This would make $EFGH$ a parallelogram and $EFGH$ would not be a kite. This contradicts the given, thus $\angle F$ is not congruent to $\angle H$.

43. If the diagonals of a trapezoid are congruent, then the trapezoid is isosceles. Given: trapezoid $JKLM$ with $\overline{KM} \cong \overline{JL}$. Draw $\overline{KP}$ perpendicular to $\overline{JM}$ at point P and draw $\overline{LQ}$ perpendicular to $\overline{JM}$ at point Q. $KLQP$ is a rectangle with $\overline{KP} \cong \overline{LQ}$. Since $\triangle LQJ$ and $\triangle KPM$ are right triangles, they are congruent by the HL Congruence Theorem. Using corresponding parts of congruent triangles are congruent, $\angle LJM \cong \angle KMJ$. Using the Reflexive Property of Congruence, $\overline{JM} \cong \overline{JM}$. $\triangle LJM \cong \triangle KMJ$ by the SAS Congruence Postulate. Using corresponding parts of congruent triangles are congruent, $\overline{KJ} \cong \overline{LM}$. Trapezoid $JKLM$ is isosceles.

8.5 Mixed Review

44. *Sample:*



$(0, 0), (a, 0), (0, b)$

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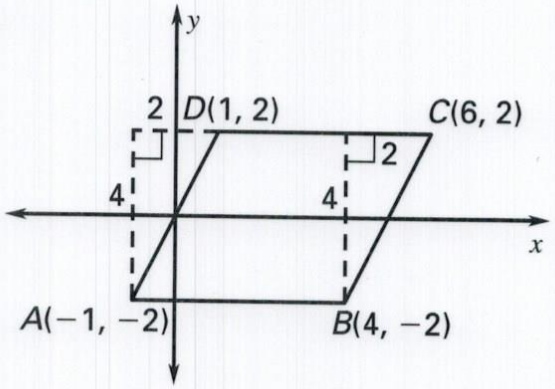
45. AD **46.** CD

47.



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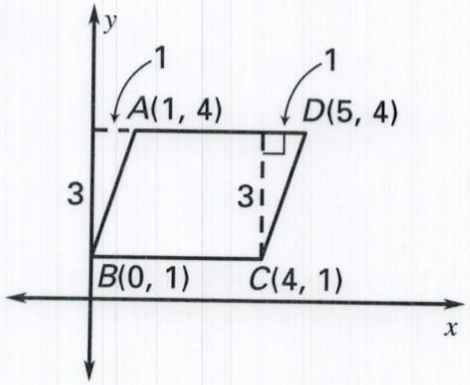
48.



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