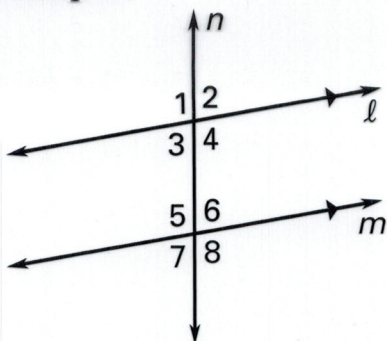


Answers for 3.3

For use with pages 165–170

3.3 Skill Practice

1. *Sample:*



$\angle 1$ and $\angle 8$, $\angle 2$ and $\angle 7$

2. Given two lines cut by a transversal, alternate interior angles are congruent if and only if the lines are parallel; given two lines cut by a transversal, alternate exterior angles are congruent if and only if the lines are parallel; given two lines cut by a transversal, consecutive interior angles are supplementary if and only if the lines are parallel.

3. 40 4. 60 5. 15

6. 90 7. 60 8. 20

9. The student believes that $x = y$ but there is no indication that they are equal.

10. yes; Alternate Interior Angles Converse

11. yes; Alternate Exterior Angles Converse

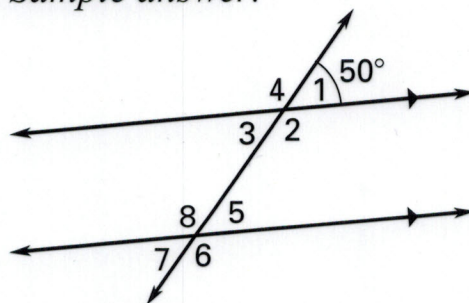
12. no

13. yes; Corresponding Angles Converse

14. no

15. yes; Alternate Exterior Angles Converse

16. *Sample answer:*



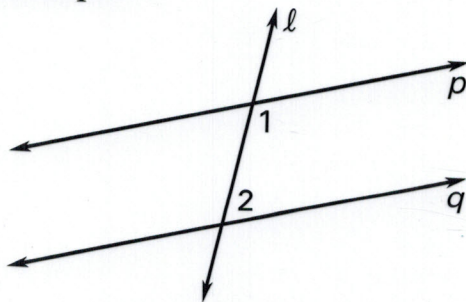
$m\angle 3 = 50^\circ$, Vertical Angles Congruence Theorem;
 $m\angle 4 = 130^\circ$, Linear Pair Postulate;
 $m\angle 2 = 130^\circ$, Vertical Angles Congruence Theorem;
 $m\angle 8 = 130^\circ$, Alternate Interior Angles Theorem;
 $m\angle 6 = 130^\circ$, Vertical Angles Congruence Theorem;
 $m\angle 5 = 50^\circ$, Linear Pair Postulate;
 $m\angle 7 = 50^\circ$, Vertical Angles Congruence Theorem

Answers for 3.3 continued

For use with pages 165–170

17. a. $m\angle DCG = 115^\circ$,
 $m\angle CGH = 65^\circ$
- b. They are consecutive interior angles and they are supplementary.
- c. yes; Consecutive Interior Angles Converse

18. a. *Sample:*



- b. Given: $\angle 1$ and $\angle 2$ are supplementary, Prove: $p \parallel q$
19. yes; Consecutive Interior Angles Converse
20. yes; Alternate Exterior Angles Converse
21. no
22. The student assumed the congruent angles were alternate interior angles between \overleftrightarrow{AD} and \overleftrightarrow{BC} . By the Alternate Interior Angles Converse; $\overleftrightarrow{AB} \parallel \overleftrightarrow{DC}$.
23. D

24. 1 angle. *Sample answer:* Using the Vertical Angles Congruence Theorem, the Linear Pair Postulate, and the Alternate Interior Angles Theorem the other angle measures can be found.

25. *Sample answer:* $\angle 1 \cong \angle 4$ therefore $\angle 4$ and $\angle 7$ are supplementary. Lines j and k are parallel by the Consecutive Interior Angles Converse.

26. $\overrightarrow{EA} \parallel \overrightarrow{HC}$; \overrightarrow{EB} is not parallel to \overrightarrow{HD} , $\angle GHC \cong \angle HEA$, $\angle GHD$ is not congruent to $\angle HEB$.

27. a. 1 line

b. an infinite number of lines

c. 1 plane

28. a. 54

b. 47.5

c. No, *Sample answer:* For p to be parallel to q , $x = 54$, then $y = 63$ because of the linear pair formed, but in order for r and s to be parallel, y must equal 47.5.

3.3 Problem Solving

29. Alternate Interior Angles Converse Theorem

30. Corresponding Angles Converse

Answers for 3.3 continued

For use with pages 165–170

31. 3. Substitution

4. Definition of supplementary angles
5. Consecutive Interior Angles Converse

32. Alternate Exterior Angles Converse Theorem

33. Yes. *Sample answer:* E 20th is parallel to E 19th by the Corresponding Angles Converse Postulate. E 19th is parallel to E 18th by the Alternate Exterior Angles Converse Theorem. E 18th is parallel to E 17th by the Alternate Interior Angles Converse Theorem. They are all parallel by the Transitive Property of Parallel Lines.

34. Statements (Reasons)

1. $\angle 1 \cong \angle 2, \angle 3 \cong \angle 4$ (Given)
2. $\angle 2 \cong \angle 3$ (Vertical Angles Congruence Theorem)
3. $\angle 1 \cong \angle 4$
(Transitive Property of Angle Congruence)
4. $\overline{AB} \parallel \overline{CD}$ (Alternate Interior Angles Converse Theorem)

35. Statements (Reasons)

1. $a \parallel b, \angle 2 \cong \angle 3$ (Given)
2. $\angle 2$ and $\angle 4$ are supplementary.
(Consecutive Interior Angles Theorem)
3. $\angle 3$ and $\angle 4$ are supplementary.
(Substitution)
4. $c \parallel d$ (Consecutive Interior Angles Converse Theorem)

36. Statements (Reasons)

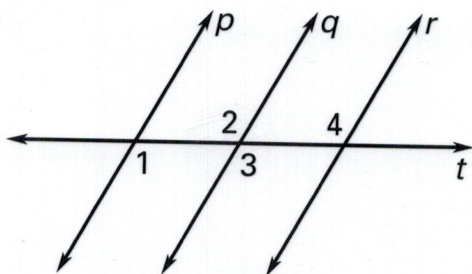
1. $\angle 2 \cong \angle 7$ (Given)
2. $\angle 2$ and $\angle 4$ are supplementary.
(Linear Pair Postulate)
3. $\angle 7 \cong \angle 6$ (Vertical Angles Congruence Theorem)
4. $\angle 6$ and $\angle 4$ are supplementary.
(Substitution)
5. $m \parallel n$ (Consecutive Interior Angles Converse Postulate)

37. You are given that $\angle 3$ and $\angle 5$ are supplementary. By the Linear Pair Postulate, $\angle 5$ and $\angle 6$ are also supplementary. So $\angle 3 \cong \angle 6$ by the Congruent Supplements Theorem. By the Alternate Interior Angles Converse Theorem, $m \parallel n$.

Answers for 3.3 continued

For use with pages 165–170

38. a.



b. Given: $p \parallel q$ and $q \parallel r$,
Prove: $p \parallel r$

c. Statements (Reasons)

1. $p \parallel q$ and $q \parallel r$ (Given)
2. $\angle 1 \cong \angle 2$ (Alternate Interior Angles Theorem)
3. $\angle 2 \cong \angle 3$ (Vertical Angles Congruence Theorem)
4. $\angle 3 \cong \angle 4$ (Alternate Interior Angles Theorem)
5. $\angle 1 \cong \angle 4$
(Transitive Property of Angle Congruence)
6. $p \parallel r$ (Alternate Interior Angles Converse Theorem)

39. a. *Sample answer:* Corresponding Angles Converse Theorem

b. Slide the triangle along a fixed horizontal line and use the edge that forms the 90° angle to draw vertical lines.

40–44. Sample answers are given.

40. Consecutive Interior Angles Converse Theorem

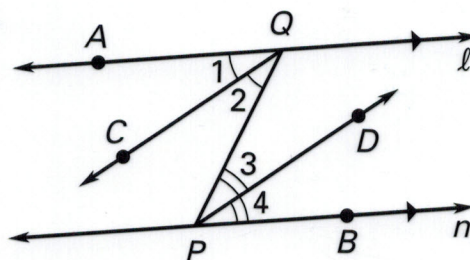
41. Vertical Angles Congruence Theorem followed by the Consecutive Interior Angles Converse Theorem

42. Corresponding Angles Converse Postulate

43. Vertical Angles Congruence Theorem followed by the Corresponding Angles Converse Postulate

44. Consecutive Interior Angles Converse Theorem

45. a.



b. Yes; if two parallel lines are cut by a transversal, the angle bisectors of alternate interior angle pairs are parallel.

Answers for 3.3 continued

For use with pages 165–170

45. b. (cont.)

Statements (Reasons)

1. $\ell \parallel n$ (Given)
2. $\angle AQP \cong \angle BPQ$
(Alternate Interior Angles Theorem)
3. $m\angle 1 + \angle 2 = m\angle AQP$,
 $m\angle 4 + \angle 3 = m\angle BPQ$
(Angle Addition Postulate)
4. $m\angle 1 = m\angle 2$,
 $m\angle 3 = m\angle 4$
(Definition of angle bisector)
5. $m\angle 2 + m\angle 2 = m\angle AQP$,
 $m\angle 3 + m\angle 3 = m\angle BPQ$
(Substitution)
6. $2m\angle 2 = 2m\angle 3$ (Transitive Property of Equality)
7. $m\angle 2 = m\angle 3$ (Division Property of Equality)
8. $\angle 2 \cong \angle 3$ (Definition of Congruent Angles)
9. $\overrightarrow{QC} \parallel \overrightarrow{PD}$ (Alternate Interior Angles Converse Theorem)

3.3 Mixed Review

- 46.** $-\frac{4}{3}$ **47.** $\frac{3}{2}$ **48.** -5
- 49.** $\frac{1}{6}$ **50.** 32 sandwiches

- 51.** 4; by the Transitive Property of Congruence, $\overline{AB} \cong \overline{CD}$, so $9x - 11 = 6x + 1$, $3x = 12$, $x = 4$.

- 52.** $-\frac{3}{4}$ **53.** $-\frac{3}{5}$ **54.** -1





3.1–3.3 Mixed Review of Problem Solving

- 1. a.** Sample answer: q and p , k and m
b. Sample answer: q and m
c. Sample answer: n and m , n and k
- 2. a.** $\angle 2$: supplementary, $\angle 3$: supplementary, $\angle 4$: vertical, $\angle 5$: corresponding, $\angle 6$: supplementary, $\angle 7$: alternate exterior, $\angle 8$: exterior
b. $\angle 2$, $\angle 6$, $\angle 8$
- 3.** 53° ; Alternate Exterior Angles Theorem
- 4.** yes; Alternate Interior Angles Converse Theorem
- 5. a.** 11
b. 23° ; Transitive Property of Parallel Lines and Alternate Interior Angles Theorem

Answers for 3.3 *continued*

For use with pages 165–170

6. 150° ;

	1	5	0
			
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

7. 92, supplementary to 88° ; 116° ,
 $c \parallel d$ by the Alternate Interior
 Angles Converse Theorem
 followed by the Consecutive
 Interior Angles Theorem.