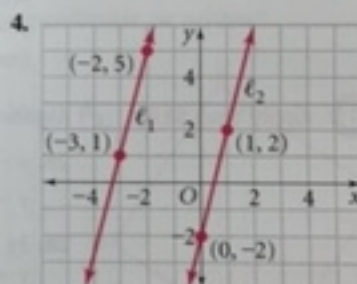
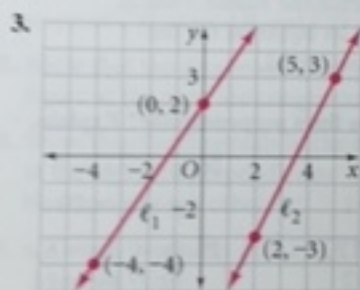
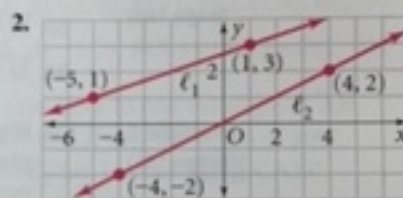
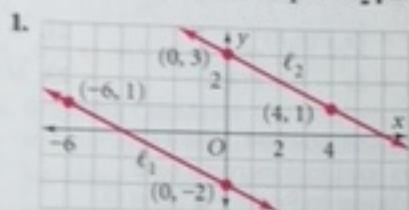


In Exercises 1–5, are lines ℓ_1 and ℓ_2 parallel? Explain, using slope.



5. Line ℓ_1 contains $A(-3, 6)$ and $B(2, 6)$, and line ℓ_2 contains $C(0, 0)$ and $D(7, 0)$.

Algebra Are the lines parallel? Explain.

6. $y = 2x + 5$

7. $y = \frac{3}{4}x - 10$

8. $y = -x + 6$

$y = 2x$

$y = \frac{3}{4}x + 2$

$x + y = 20$

9. $y - 7x = 6$

10. $3x + 4y = 12$

11. $2x + 5y = -1$

$y + 7x = 8$

$6x + 2y = 6$

$10y = -4x - 20$

Write an equation for the line parallel to \overleftrightarrow{AB} that contains point C .

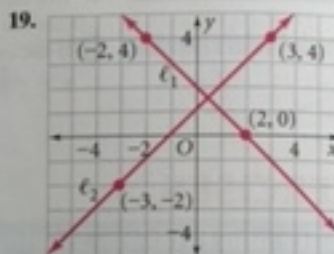
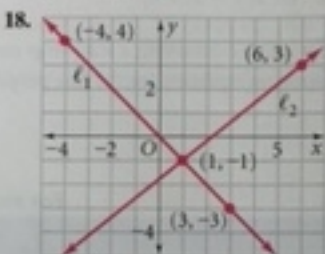
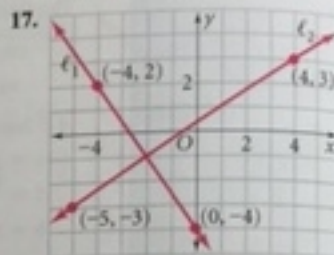
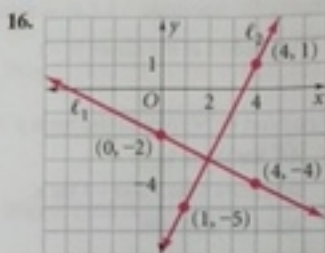
12. $\overleftrightarrow{AB}: y = -2x + 1, C(0, 3)$

13. $\overleftrightarrow{AB}: y = \frac{1}{3}x, C(6, 0)$

14. $\overleftrightarrow{AB}: -x + 2y = 4, C(-2, 4)$

15. $\overleftrightarrow{AB}: 3x + 2y = 12, C(6, -2)$

Algebra Are lines ℓ_1 and ℓ_2 perpendicular? Explain using slope.



Write an equation for the line perpendicular to \overleftrightarrow{MN} that contains point P .

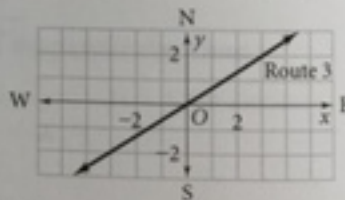
20. $\overleftrightarrow{MN}: y = \frac{2}{3}x, P(6, 6)$

21. $\overleftrightarrow{MN}: y = \frac{1}{2}x - 5, P(4, 0)$

22. $\overleftrightarrow{MN}: y + 2x = -8, P(4, 4)$

23. $\overleftrightarrow{MN}: 4y + 5x = 20, P(0, 0)$

24. Highway Construction Highway planners want to construct a road perpendicular to Route 3 at point O . An equation for the Route 3 line is $y = \frac{2}{3}x$. Find an equation for the line for the new road.



Algebra Are the lines perpendicular? Explain.

25. $y - \frac{1}{2}x = 0$

26. $y = -x - 7$

27. $y = 3$

$y - 2x = -1$

$y - x = 20$

$x = -2$

28. $3y + 2x = 12$

29. $2x + 3y = 6$

30. $2x - 7y = -42$

$y + 3x = -2$

$6x - 4y = 24$

$4y = -7x - 2$

Use slopes to find whether the opposite sides of quadrilateral $ABCD$ are parallel.

31. $A(0, 2), B(3, 4), C(2, 7), D(-1, 5)$

32. $A(-3, 1), B(1, -2), C(0, -3), D(-4, 0)$

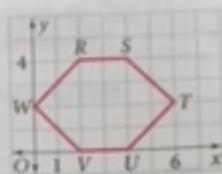
33. $A(1, 1), B(5, 3), C(7, 1), D(3, 0)$

34. $A(1, 0), B(4, 0), C(3, -3), D(-1, -3)$

35. Open-Ended Write equations for two perpendicular lines that have the same y -intercept and do not pass through the origin.

36. Writing Can the y -intercepts of two parallel lines be the same? Explain.

37. Use slope to show that the opposite sides of hexagon $RSTUVW$ at the right are parallel.
38. Use slope to determine whether a triangle with vertices $G(3, 2)$, $H(8, 5)$, and $K(0, 10)$ is a right triangle. Explain.

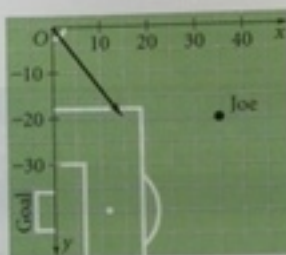


Exercise 37

Proof Developing Proof Use slope to explain why each theorem is true for three lines in the coordinate plane.

39. Theorem 3-5: If two lines are parallel to the same line, then they are parallel to each other.
40. Theorem 3-6: In a plane, if two lines are perpendicular to the same line, then they are parallel to each other.

41. **Soccer** The coordinate system at the right is designed for a soccer field. Each unit represents one yard. Joe is at point $P(35, -20)$. The path of the ball from a corner kick is represented by the equation $y = -\frac{1}{3}x$. To have the best chance for a shot on goal, Joe wants to run toward the ball so that his path meets the path of the ball at a right angle.



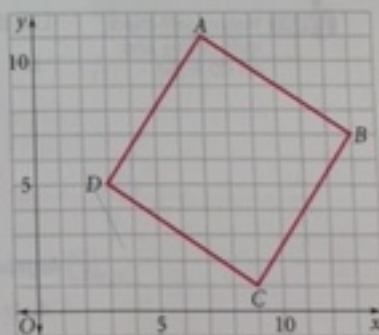
- a. Find an equation for the line on which Joe should run.
- b. **Critical Thinking** Why is point-slope form the best choice for the equation?

Determine whether \overrightarrow{AB} and \overrightarrow{CD} are parallel, perpendicular, or neither.

42. $A(-1, \frac{1}{2})$, $B(-1, 2)$, $C(3, 7)$, $D(3, -1)$ 43. $A(-2, 3)$, $B(-2, 5)$, $C(1, 4)$, $D(2, 4)$
44. $A(2, 4)$, $B(5, 4)$, $C(3, 2)$, $D(0, 8)$ 45. $A(-3, 2)$, $B(5, 1)$, $C(2, 7)$, $D(1, -1)$

46. **Graphing Calculator** Use your graphing calculator to find the slope of \overrightarrow{AB} in Exercise 45. Enter the x -coordinates of A and B into the L_1 list of your list editor. Enter the y -coordinates into the L_2 list. In your **STAT** **CALC** menu select **LinReg** ($ax + b$). **ENTER** to find the slope a . Repeat to find the slope of \overrightarrow{CD} . Are \overrightarrow{AB} and \overrightarrow{CD} parallel, perpendicular, or neither?

47. Show that the diagonals of the figure at the right are congruent.
48. Show that the diagonals of the figure at the right are perpendicular bisectors of each other.
49. a. Graph the points $P(2, 2)$, $Q(7, 4)$, and $R(3, 5)$.
- b. Find the coordinates of a point S that, along with points P , Q , and R , will form the vertices of a quadrilateral whose opposite sides are parallel. Graph the quadrilateral.
- c. Repeat part (b), finding a different point S and graphing the new quadrilateral.



Exercises 47 and 48

50. A triangle has vertices $L(-5, 6)$, $M(-2, -3)$, and $N(4, 5)$. Write an equation for the line perpendicular to \overline{LM} that contains point N .