

Identify all corresponding angles, alternate interior angles, alternate exterior angles, consecutive interior angles, vertical angles and linear pair using the image below.

1. Corresponding Angles

$\angle 3$ and $\angle 1$; $\angle 4$ and $\angle 6$; $\angle 5$ and $\angle 2$;
 $\angle 7$ and $\angle 8$

2. Alternate Interior Angles:

$\angle 4$ and $\angle 2$; $\angle 7$ and $\angle 1$

3. Alternate Exterior Angles:

$\angle 3$ and $\angle 8$; $\angle 5$ and $\angle 6$

4. Consecutive Interior Angles:

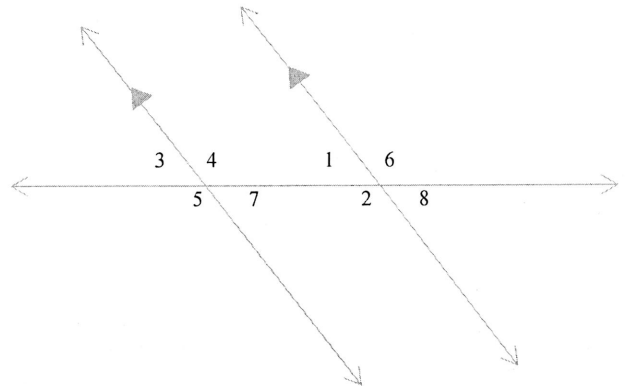
$\angle 7$ and $\angle 2$; $\angle 4$ and $\angle 1$

5. Vertical Angles:

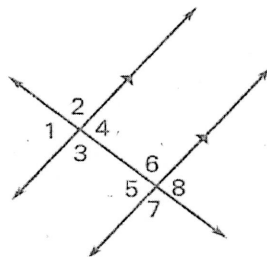
$\angle 5$ and $\angle 4$; $\angle 3$ and $\angle 7$; $\angle 1$ and $\angle 8$; $\angle 2$ and $\angle 6$

6. Linear pair:

$\angle 3$ and $\angle 4$; $\angle 4$ and $\angle 7$; $\angle 7$ and $\angle 5$; $\angle 5$ and $\angle 3$
 $\angle 1$ and $\angle 6$; $\angle 6$ and $\angle 8$; $\angle 8$ and $\angle 2$; $\angle 2$ and $\angle 1$



Complete the statement using the diagram.



7. $\angle 1$ and $\angle 5$ are corresponding angles

8. $\angle 4$ and $\angle 5$ are alternate interior angles

9. $\angle 4$ and $\angle 6$ are consecutive interior angles

10. $\angle 5$ and $\angle 8$ are vertical angles

11. $\angle 3$ and $\angle 6$ are alternate interior angles

12. $\angle 1$ and $\angle 8$ are alternate exterior angles

13. $\angle 5$ and $\angle 3$ are consecutive interior angles

14. $\angle 7$ and $\angle 3$ are corresponding angles

15. $\angle 2$ and $\angle 3$ are vertical angles

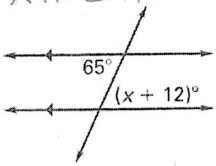
16. $\angle 1$ and $\angle 8$ are alternate exterior angles

17. $\angle 6$ and $\angle 2$ are corresponding angles

18. $\angle 4$ and $\angle 8$ are corresponding angles

Find the value of x .

19. A.H. Interior Angles

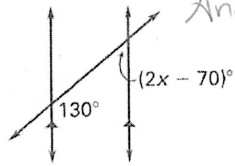


$$65 = x + 12$$

$$\begin{array}{r} -12 \\ -12 \end{array}$$

$$53 = x$$

20. Consecutive Interior Angles



$$130 + 2x - 70 = 180$$

$$2x + 60 = 180$$

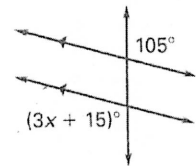
$$\begin{array}{r} -60 \\ -60 \end{array}$$

$$2x = 120$$

$$\frac{2x}{2} = \frac{120}{2}$$

$$x = 60$$

21. A.H. Exterior Angles



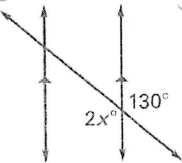
$$3x + 15 = 105$$

$$\begin{array}{r} -15 \\ -15 \end{array}$$

$$\frac{3x}{3} = \frac{90}{3}$$

$$x = 30$$

22. Vertical Angles

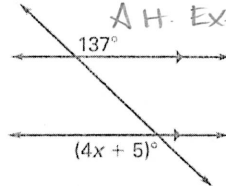


$$2x = 130$$

$$\frac{2x}{2} = \frac{130}{2}$$

$$x = 65$$

23. A.H. Exterior Angles



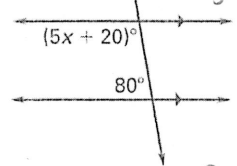
$$4x + 5 = 137$$

$$\begin{array}{r} -5 \\ -5 \end{array}$$

$$\frac{4x}{4} = \frac{132}{4}$$

$$x = 33$$

24. Consecutive Interior Angles



$$5x + 20 + 80 = 180$$

$$5x + 100 = 180$$

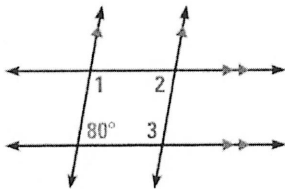
$$\begin{array}{r} -100 \\ -100 \end{array}$$

$$\frac{5x}{5} = \frac{80}{5}$$

$$x = 16$$

Find $m\angle 1$, $m\angle 2$ and $m\angle 3$.

25.

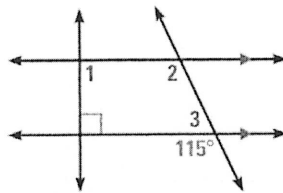


$$m\angle 1 = 100^\circ$$

$$m\angle 2 = 80^\circ$$

$$m\angle 3 = 100^\circ$$

26.

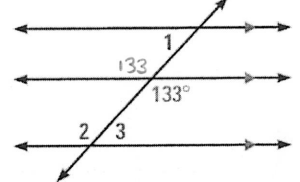


$$m\angle 1 = 90^\circ$$

$$m\angle 2 = 115^\circ$$

$$m\angle 3 = 65^\circ$$

27.



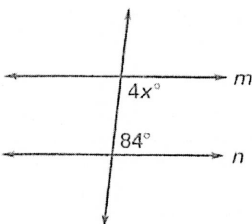
$$m\angle 1 = 47^\circ$$

$$m\angle 2 = 133^\circ$$

$$m\angle 3 = 47^\circ$$

Find the value of x that makes $m \parallel n$.

28.



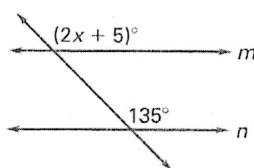
$$4x + 84 = 180$$

$$\begin{array}{r} -84 \\ -84 \end{array}$$

$$\frac{4x}{4} = \frac{96}{4}$$

$$x = 24$$

29.



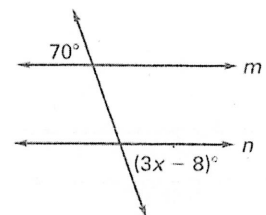
$$2x + 5 = 135$$

$$\begin{array}{r} -5 \\ -5 \end{array}$$

$$\frac{2x}{2} = \frac{130}{2}$$

$$x = 65$$

30.

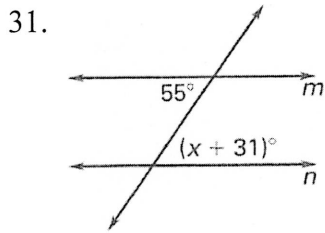


$$3x - 8 = 70$$

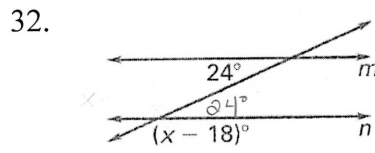
$$\begin{array}{r} +8 \\ +8 \end{array}$$

$$\frac{3x}{3} = \frac{78}{3}$$

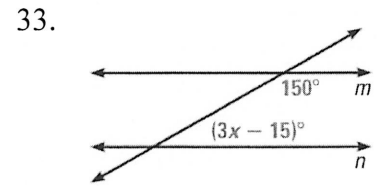
$$x = 26$$



$$\begin{aligned} x + 31 &= 55 \\ -31 & \quad -31 \\ \hline x &= 24 \end{aligned}$$



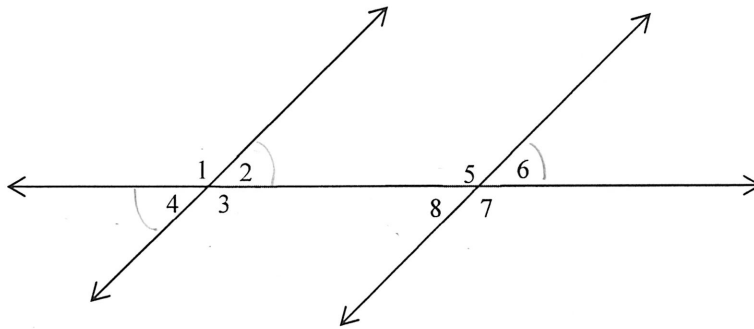
$$\begin{aligned} x - 18 + 24 &= 180 \\ x + 6 &= 180 \\ -6 & \quad -6 \\ \hline x &= 174 \end{aligned}$$



$$\begin{aligned} 3x - 15 + 150 &= 180 \\ 3x + 135 &= 180 \\ -135 & \quad -135 \\ \hline 3x &= 45 \\ \frac{3x}{3} &= \frac{45}{3} \\ x &= 15 \end{aligned}$$



Use the diagram and information below to determine if there is enough information to prove $a \parallel b$. Write parallel or not parallel. If the lines are parallel, write which theorem or postulate justifies your answer.



34. Given: $\angle 4 \cong \angle 6$

Parallel; Alternate Exterior Angles Converse

35. Given: $\angle 4 \cong \angle 2$ (Vertical Angles)

Not Parallel; Not Enough Information

36. Given: $m\angle 4 + m\angle 1 = 180^\circ$ (Linear Pair)

Not Parallel; Not Enough Information

37. Given: $\angle 4 \cong \angle 8$

Parallel; Corresponding Angles Converse

38. Given: $\angle 5 \cong \angle 7$ (Vertical Angles)

Not Parallel; Not Enough Information

39. Given: $m\angle 2 + m\angle 5 = 180^\circ$

Parallel; Consecutive Interior Angles Converse

40. $m\angle 7 + m\angle 8 = 180^\circ$ (Linear Pair)

Not Parallel; Not Enough Information

41. Given: $\angle 3 \cong \angle 5$

Parallel; Alternate Interior Angles Converse

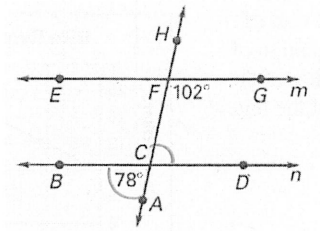
42. Given: $\angle 2 \cong \angle 5$

Not Parallel; Consecutive Interior Angles need to be supplementary
NOT \cong

43. Given: $m\angle 3 + m\angle 6 = 180^\circ$

Parallel; $\angle 8 \cong \angle 6$ Vertical Angles
so... $m\angle 3 + m\angle 8 = 180^\circ$
Consecutive Interior Angles Converse

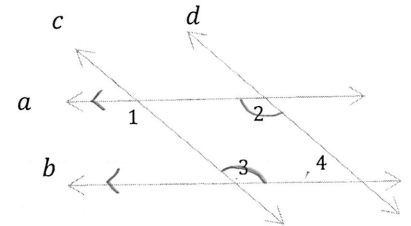
44. **Given:** $m\angle BCA = 78^\circ$
 $m\angle CFG = 102^\circ$



Prove: $m \parallel n$

Statement	Reason
1. $m\angle BCA = 78^\circ$	1. <u>Given</u>
1. $m\angle CFG = 102^\circ$	
2. $\angle FCD \cong \angle BCA$	2. <u>Vertical Angles</u>
3. $m\angle FCD = m\angle BCA$	3. <u>Definition of Congruent Angles</u>
4. $m\angle FCD = 78^\circ$	4. <u>Transitive Property</u>
5. $78^\circ + 102^\circ = 180^\circ$	5. <u>Angle Addition</u>
6. $m\angle FCD + m\angle CFG = 180^\circ$	6. <u>Substitution Property</u>
7. $\angle FCD$ and $\angle CFG$ are supplementary	7. <u>Definition of Supplementary Angles</u>
8. $m \parallel n$	8. <u>Consecutive Interior Angles Converse</u>

45. **Given:** $\angle 2 \cong \angle 3$, $a \parallel b$
Prove: $c \parallel d$



Statement	Reason
1. $\angle 2 \cong \angle 3$	1. <u>Given</u>
1. $a \parallel b$	
2. $m\angle 2 = m\angle 3$	2. <u>Definition of Congruent Angles</u>
3. $\angle 2$ and $\angle 4$ are supp.	3. <u>Consecutive Interior Angles Theorem</u>
4. $m\angle 2 + m\angle 4 = 180^\circ$	4. <u>Defⁿ of Supplementary Angles</u>
5. $m\angle 3 + m\angle 4 = 180^\circ$	5. <u>Substitution Property</u>
6. $\angle 3$ and $\angle 4$ are supplementary	6. <u>Defⁿ of Supplementary Angles</u>
7. $c \parallel d$	7. <u>Consecutive Interior Angles Converse</u>

Find the slope of the line that passes through the points.

46. $(3, 4)$ and $(5, 6)$

47. $(6, -6)$ and $(2, -6)$

48. $(-4, 3)$ and $(-9, 7)$

$$m = \frac{6-4}{5-3}$$

$$= \frac{2}{2}$$

$$m = 1$$

$$m = \frac{-6 - (-6)}{2 - 6}$$

$$= \frac{-6 + 6}{-4}$$

$$= \frac{0}{-4} \quad m = 0$$

$$m = \frac{7-3}{-9 - (-4)}$$

$$= \frac{4}{-9+4}$$

$$m = -\frac{4}{5}$$

Tell whether the lines through the given points are parallel, perpendicular or neither. Justify your answer.

49. Line 1: $(0, 1)$ and $(1, 4)$
 Line 2: $(3, 2)$ and $(6, 3)$

$$m_1 = \frac{4-1}{1-0} \quad m_2 = \frac{3-2}{6-3}$$

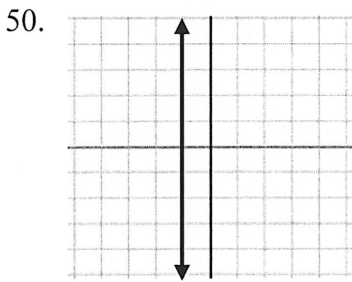
$$m_1 = \frac{3}{1} \quad m_2 = \frac{1}{3}$$

Neither

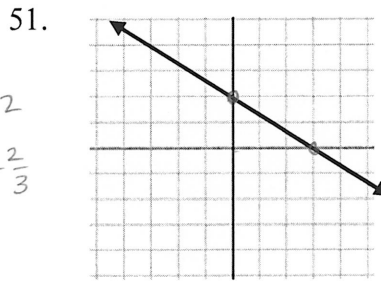
* They are not the same * parallel *

* They are not opposite AND reciprocals * perpendicular *

Write an equation ($y = mx + b$) of the line shown.



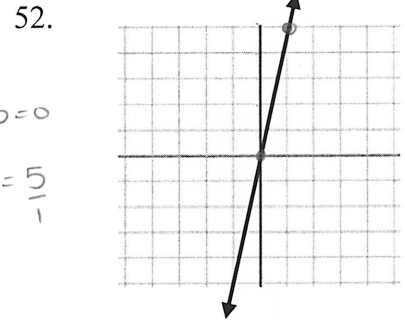
$$x = -1$$



$$b = 2$$

$$m = -\frac{2}{3}$$

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



$$b = 0$$

$$m = \frac{5}{1}$$

$$y = 5x$$

53. Write an equation of the line with the given slope m and y-intercept b . $\rightarrow m = \frac{3}{5}, b = 7$

$$y = \frac{3}{5}x + 7$$

Write an equation of the line that passes through the given point P and has the given slope m .

54. $P(5, 4), m = 4$

$$y = mx + b \Rightarrow 4 = 4(5) + b$$

$$4 = 20 + b$$

$$-16 = b$$

$$y = 4x - 16$$

55. $P(6, -2), m = 3$

$$y = mx + b \Rightarrow -2 = 3(6) + b$$

$$-2 = 18 + b$$

$$-20 = b$$

$$y = 3x - 20$$

56. Find the equation of a line in slope-intercept form that passes through $(4, 1)$ and $(2, 2)$

$$m = \frac{2-1}{2-4}$$

$$y = mx + b \Rightarrow 2 = -\frac{1}{2}(2) + b$$

$$2 = -1 + b$$

$$3 = b$$

$$y = -\frac{1}{2}x + 3$$

$$y = -\frac{1}{2}x + 3$$

57. Find equations in slope-intercept form of the lines go through point $P(8, -5)$ and that are parallel and perpendicular to line $L \rightarrow L: y = 4x - 2$ $m=4$

a.) Parallel Line: $m=4; P(8, -5)$

$$y = mx + b \Rightarrow -5 = 4(8) + b$$

$$-5 = 32 + b$$

$$\begin{array}{r} -32 \\ -32 \end{array}$$

$$-37 = b$$

$$y = 4x - 37$$

b.) Perpendicular Line: $\perp m = -\frac{1}{4}; P(8, -5)$

$$y = mx + b \Rightarrow -5 = -\frac{1}{4}(8) + b$$

$$-5 = -2 + b$$

$$\begin{array}{r} +2 \\ +2 \end{array}$$

$$-3 = b$$

$$y = -\frac{1}{4}x - 3$$

Graph each equation.

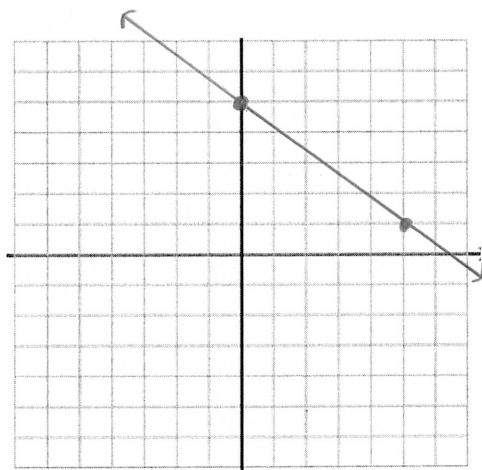
58. $y = -\frac{4}{5}x + 5$

$b = 5$

$m = -\frac{4}{5}$

or

$m = \frac{4}{-5}$

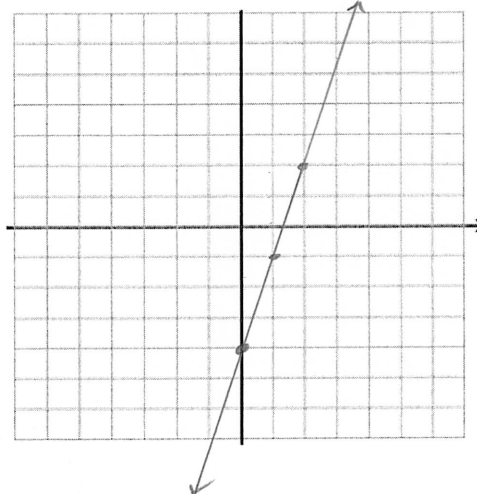


59. $-\frac{3y}{-3} = \frac{-9x}{-3} + \frac{12}{-3}$

$b = -4$

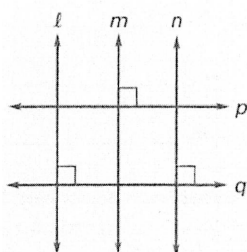
$y = 3x - 4$

$m = \frac{3}{1}$



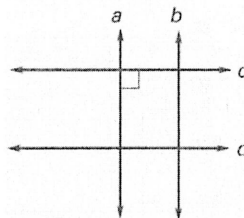
Determine which lines, if any must be parallel. Explain.

60.



$l \parallel n$; both are perpendicular to q

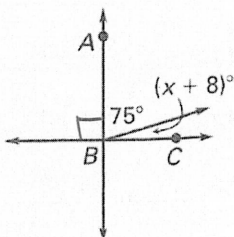
61.



None; Not Enough Info.

In the diagram, $\overline{AB} \perp \overline{BC}$. Find the value of x .

62.



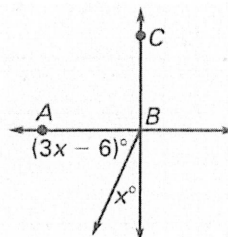
$$x + 8 + 75 = 90$$

$$x + 83 = 90$$

$$\begin{array}{r} -83 \\ -83 \end{array}$$

$x = 7$

63.



$$3x - 6 + x = 90$$

$$4x - 6 = 90$$

$$\begin{array}{r} +6 \\ +6 \end{array}$$

$$4x = 96$$

$$\begin{array}{r} \frac{4x}{4} = \frac{96}{4} \end{array}$$

$x = 24$