Vocabulary and Core Concept Check   Key!

1. **COMPLETE THE SENTENCE** Two distinct nonvertical lines that have the same slope are **same**

2. **VOCABULARY** Two lines are perpendicular. The slope of one line is $-\frac{5}{7}$. What is the slope of the other line? Justify your answer. $m = \frac{7}{5}$

In Exercises 9–12, write an equation of the line that passes through the given point and is (parallel) to the given line. *(See Example 2.)*   same slope

9. $(-1, 3); y = 2x + 2$

⑨ $m = 2$ point $(-1, 3)$

Point-Slope: $y - 3 = 2(x + 1)$

$y - 3 = 2x + 2$

Slope-Intercept: $y = 2x + 5$

In Exercises 13–18, determine which of the lines, if any, are parallel or perpendicular. Explain. *(See Example 3.)*

17. Line a: $4x - 3y = 2$ $m = \frac{4}{3}$

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

Line b: $y = \frac{4}{3}x + 2$ $m = 4/3$

Line c: $4y + 3x = 4$ $m = -3/4$

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

Lines a and b are parallel since they have the same slope.

Line c is perpendicular to lines a and b since the slopes are opp. reciprocals

---

In Exercises 19–22, write an equation of the line that passes through the given point and is (perpendicular) to the given line. *(See Example 4.)*   opp. reciprocal

19. $(7, 10); y = \frac{1}{2}x - 9$

$m = -2$: point slope $y - 10 = -2(x - 7)$

$y - 10 = -2x + 14$

Slope-int: $y = -2x + 24$

---

25. **ERROR ANALYSIS** Describe and correct the error in writing an equation of the line that passes through $(1, 3)$ and is parallel to the line $y = \frac{1}{4}x + 2$.

$y - y_1 = m(x - x_1)$
$y - 3 = -4(x - 1)$
$y - 3 = -4x + 4$
$y = -4x + 7$

They used a slope that would be perpendicular.

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

Slope should be the same

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

26. **ERROR ANALYSIS** Describe and correct the error in writing an equation of the line that passes through $(4, -5)$ and is perpendicular to the line $y = \frac{1}{3}x + 5$.

$y - y_1 = m(x - x_1)$
$y - (-5) = 3(x - 4)$
$y + 5 = 3x - 12$
$y = 3x - 17$

Slope is only the reciprocal. Needs to be opposite, too!

$y + 5 = -3(x - 4)$ $m = -3$