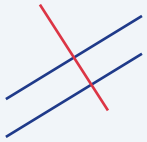
Parallel and Perpendicular Lines

Name: _____	Date: _____	Score: _____ / 18

Quick Review and Helpful Hints

Two lines are *parallel* when they have the *same slope*. They are *perpendicular* when their slopes are *negative reciprocals* (the product of the slopes is -1). To get a perpendicular slope, flip the fraction and change its sign.

▷ **Example:** A line has slope 2. Find the slope of a line (a) parallel and (b) perpendicular to it. **Work:** Parallel keeps the same slope: 2. Perpendicular flips and negates: $-\frac{1}{2}$. ★ **Answer:** 2 and $-\frac{1}{2}$



Parallel: same slope. Perpendicular: flip & negate.

Practice Problems

Find the slope or answer Yes/No as directed.

1. Parallel slope to $m = 3$ _____
2. Perpendicular slope to $m = 3$ _____
3. Parallel slope to $m = -2$ _____
4. Perpendicular slope to $m = -2$ _____
5. Parallel slope to $m = \frac{1}{4}$ _____
6. Perpendicular slope to $m = \frac{1}{4}$ _____
7. Perpendicular slope to $m = 1$ _____
8. Perpendicular slope to $m = -\frac{2}{3}$ _____
9. Are $y = 2x + 1$ and $y = 2x - 5$ parallel? _____
10. Are $y = 3x$ and $y = -\frac{1}{3}x$ perpendicular? _____
11. Are $y = x + 2$ and $y = x - 7$ perpendicular? _____
12. Parallel slope to $y = -4x + 3$ _____
13. Perpendicular slope to $y = 5x - 1$ _____
14. Are $y = 2x + 1$ and $y = -2x + 1$ parallel? _____

Word Problems

15. A road has slope $\frac{3}{4}$. A road parallel to it has what slope? _____
16. A wall is perpendicular to a ramp of slope $\frac{2}{5}$. What is the wall's slope? _____
17. Line a is $y = \frac{1}{2}x + 4$. Give the slope of any line perpendicular to it. _____
18. Are the lines $y = -x + 6$ and $y = x - 2$ perpendicular? _____

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Answer Keys

1. 3
2. $-\frac{1}{3}$
3. -2
4. $\frac{1}{2}$
5. $\frac{1}{4}$
6. -4
7. -1
8. $\frac{3}{2}$
9. Yes
10. Yes
11. No
12. -4
13. $-\frac{1}{5}$
14. No
15. $\frac{3}{4}$
16. $-\frac{5}{2}$
17. -2
18. Yes

Step-by-Step Explanations

1. Start by naming the process: Parallel lines keep the same slope; perpendicular lines use the opposite reciprocal slope. The setup/work is Parallel lines share the slope: 3. So the final answer is 3.

2. A good way to think about this is: Parallel lines keep the same slope; perpendicular lines use the opposite reciprocal slope. The setup/work is Flip and negate $3 = \frac{3}{1}$: $-\frac{1}{3}$. So the final answer is $-\frac{1}{3}$.

3. Step by step: Parallel lines keep the same slope; perpendicular lines use the opposite reciprocal slope. The setup/work is Parallel keeps the slope: -2. So the final answer is -2.

4. Take it one move at a time: Parallel lines keep the same slope; perpendicular lines use the opposite reciprocal slope. The setup/work is Flip and negate -2: $\frac{1}{2}$. So the final answer is $\frac{1}{2}$.

5. Start by naming the process: Parallel lines keep the same slope; perpendicular lines use the opposite reciprocal slope. The setup/work is Parallel keeps the slope: $\frac{1}{4}$. So the final answer is $\frac{1}{4}$.

6. A good way to think about this is: Parallel lines keep the same slope; perpendicular lines use the opposite reciprocal slope. The setup/work is Flip and negate $\frac{1}{4}$: -4. So the final answer is -4.

7. Step by step: Parallel lines keep the same slope; perpendicular lines use the opposite reciprocal slope. The setup/work is Flip and negate 1: -1. So the final answer is -1.

8. Take it one move at a time: Parallel lines keep the same slope; perpendicular lines use the opposite reciprocal slope. The setup/work is Flip and negate $-\frac{2}{3}$: $\frac{3}{2}$. So the final answer is $\frac{3}{2}$.

9. Start by naming the process: Parallel lines keep the same slope; perpendicular lines use the opposite reciprocal slope. The setup/work is Same slope 2, so yes, parallel. So the final answer is Yes.

10. A good way to think about this is: Parallel lines keep the same slope; perpendicular lines use the opposite reciprocal slope. The setup/work is Slopes 3 and $-\frac{1}{3}$ multiply to -1, so yes. So the final answer is Yes.

11. Step by step: Parallel lines keep the same slope; perpendicular lines use the opposite reciprocal slope. The setup/work is Both have slope 1 (parallel, not perpendicular): no. So the final answer is No.

12. Take it one move at a time: Parallel lines keep the same slope; perpendicular lines use the opposite reciprocal slope. The setup/work is Parallel keeps the slope: -4. So the final answer is -4.

13. Start by naming the process: Parallel lines keep the same slope; perpendicular lines use the opposite reciprocal slope. The setup/work is Flip and negate 5: $-\frac{1}{5}$. So the final answer is $-\frac{1}{5}$.

14. A good way to think about this is: Parallel lines keep the same slope; perpendicular lines use the opposite reciprocal slope. The setup/work is Slopes 2 and -2 differ, so not parallel: no. So the final answer is No.

15. Step by step: Parallel lines keep the same slope; perpendicular lines use the opposite reciprocal slope. The setup/work is A parallel road keeps the slope: $\frac{3}{4}$. So the final answer is $\frac{3}{4}$.

16. Take it one move at a time: Parallel lines keep the same slope; perpendicular lines use the opposite reciprocal slope. The setup/work is Flip and negate $\frac{2}{5}$: $-\frac{5}{2}$. So the final answer is $-\frac{5}{2}$.

17. Start by naming the process: Parallel lines keep the same slope; perpendicular lines use the opposite reciprocal slope. The setup/work is Flip and negate $\frac{1}{2}$: -2. So the final answer is -2.

18. A good way to think about this is: Parallel lines keep the same slope; perpendicular lines use the opposite reciprocal slope. The setup/work is Slopes -1 and 1 multiply to -1, so yes, perpendicular. So the final answer is Yes.

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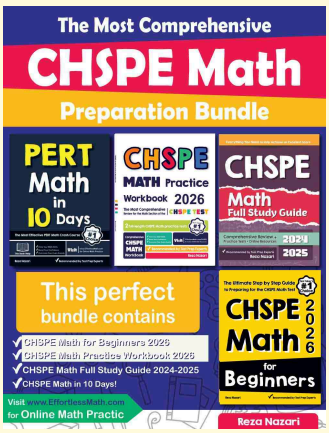

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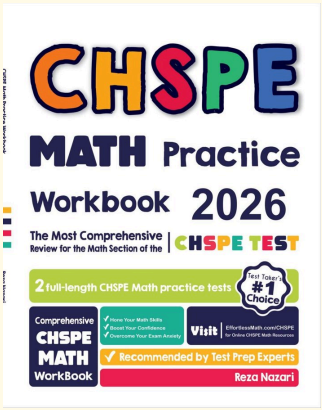

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