

Parallel and Perpendicular Lines

Name: _____

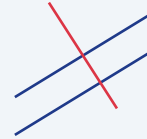
Date: _____

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



Answer Keys

- | | | |
|--------------------------------------|--------------------------------------|---------------------------------------|
| 1. <input type="text" value="3"/> | 7. <input type="text" value="-1"/> | 13. <input type="text" value="-1/5"/> |
| 2. <input type="text" value="-1/3"/> | 8. <input type="text" value="3/2"/> | 14. <input type="text" value="No"/> |
| 3. <input type="text" value="-2"/> | 9. <input type="text" value="Yes"/> | 15. <input type="text" value="3/4"/> |
| 4. <input type="text" value="1/2"/> | 10. <input type="text" value="Yes"/> | 16. <input type="text" value="-5/2"/> |
| 5. <input type="text" value="1/4"/> | 11. <input type="text" value="No"/> | 17. <input type="text" value="-2"/> |
| 6. <input type="text" value="-4"/> | 12. <input type="text" value="-4"/> | 18. <input type="text" value="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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