ALBERT

Name _____ Date _____

Slopes of Parallel and Perpendicular Lines Worksheet

Geometry · Common Core HSG-GPE.B.5

> Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).

Practice

Builds the skill step by step.

1. What is the slope of a line parallel to $y = 3x - 2$?

2. What is the slope of a line perpendicular to $y = 3x - 2$?

3. What is the slope of a line perpendicular to $y = -\frac{2}{5}x + 1$?

4. How are the lines $y = 2x + 1$ and $y = 2x - 4$ related?

   A. parallel

   B. perpendicular

   C. the same line

   D. neither

5. How are the lines $y = 4x$ and $y = -\frac{1}{4}x + 3$ related?

   A. perpendicular

   B. parallel

   C. the same line

   D. neither

6. Write the equation, in slope-intercept form, of the line through (0, 5) parallel to $y = -2x + 7$.

7. What is the slope of the line $2x + 3y = 6$?

8. How are the lines $y = 5$ and $x = -2$ related?

   A. perpendicular

   B. parallel

   C. the same line

   D. neither

9. What is the slope of a line perpendicular to the line through (1, 2) and (3, 8)?

10. Write the equation, in slope-intercept form, of the line through (2, 7) parallel to $y = x$.

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On Level

Grade-level practice.

1. A line passes through (4, 1) and is perpendicular to y = 2x + 3. What is its y-intercept?

2. A line passes through (−3, 2) and is parallel to 2x − y = 5. What is its y-intercept?

3. For what value of k is y = kx + 1 perpendicular to $y = \frac{3}{4}x$?

4. For what value of k is 6x + ky = 3 parallel to y = 2x?

5. Line AB passes through A(1, 1) and B(4, 5). Line CD passes through C(0, 3) and D(4, 0). How are they related?

   A. perpendicular

   B. parallel

   C. the same line

   D. neither

6. Explain why the slopes of two perpendicular lines (neither vertical) multiply to -1. Use a $90°$ rotation.

7. Quadrilateral (0, 0), (4, 1), (5, 5), (1, 4) has opposite sides with slopes $\frac{1}{4}$ and 4. Which is true?

   A. It is a parallelogram but not a rectangle.

   B. It is a rectangle.

   C. It is not a parallelogram.

   D. It is a square.

8. Triangle ABC has A(0, 0), B(8, 0) and C(2, 6). The altitude from C lies on the line $x = c$. What is c?

9. What is the y-intercept of the perpendicular bisector of the segment from (2, 2) to (6, 4)?

10. A line through $(5, -1)$ is perpendicular to $x = 3$. It is the line $y = c$. What is c?

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Challenge

Multi-step and word problems that stretch it.

1. The line through (1, k) and (3, 7) is perpendicular to $y = -\frac{1}{2}x$. What is k?

2. Triangle ABC has A(1, 2), B(5, 4) and C(3, 8). At which vertex is the right angle?

   A. B

   B. A

   C. C

   D. There is no right angle.

3. The perpendicular from (5, 5) meets the line y = x + 2 at point F. What are the coordinates of F?

4. What is the distance from (5, 5) to the line y = x + 2? Give the exact value.

5. Prove that ABCD with A(0, 0), B(3, 1), C(4, 4) and D(1, 3) is a rhombus using slopes.

6. A line through (2, 3) is parallel to the line through (−1, 4) and (3, −4). What is its y-intercept?

7. For what value of a are $ax + 2y = 5$ and $3x - 6y = 1$ perpendicular?

8. Two different non-vertical lines have the same slope. What must be true?

   A. They are perpendicular.

   B. They never intersect.

   C. They intersect at one point.

   D. They are the same line.

9. The perpendicular from (0, 10) to the line $y = 2x$ meets it at which point?

10. Square ABCD is labeled counterclockwise with A(0, 0) and B(3, 1). What are the coordinates of C?