Solutions

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3. What word is used to describe two lines that are always the same distance apart?

Parallel

4. What word is used to describe two lines that intersect at a 90° angle?

Perpendicular

7. Indicate whether each of the following pairs of slopes would result in parallel lines, perpendicular lines or neither.

a) 3 and -3 b) $\frac{3}{2}$ and $\frac{2}{3}$ c) $-\frac{3}{5}$ and $\frac{5}{3}$ d) $\frac{4}{7}$ and $\frac{12}{21}$ e) 3 and $\frac{-6}{18}$

Parallel → slopes are equal

Perpendicular → slopes are the negative reciprocal of each other.

a) Neither

b) Neither

c) Perpendicular $\left(-\frac{3}{5} \times \frac{5}{3} = \frac{-15}{15} = -1\right)$

d) Parallel $\left(\frac{4}{7} \times \frac{3}{3} = \frac{12}{21}\right)$

e) Perpendicular $\left(\frac{3}{1} \times \frac{-6}{18} = \frac{-18}{18} = -1\right)$

8. Determine the slope of a line that is perpendicular to a line with the given slope.

a) $\frac{3}{7}$ b) $-\frac{5}{3}$ c) -3 d) 1 e) $\frac{1}{4}$ f) $\frac{-3}{2}$ g) 0 h) undefined

a) $\frac{3}{7} \rightarrow -\frac{7}{3}$

b) $-\frac{5}{3} \rightarrow \frac{3}{5}$

c) $\frac{-3}{1} \rightarrow \frac{1}{3}$

d) $\frac{1}{1} \rightarrow -\frac{1}{1} = -1$

e) $\frac{1}{4} \rightarrow -\frac{4}{1} = -4$

f) $-\frac{3}{2} \rightarrow \frac{2}{3}$

g) $\frac{0}{1} \rightarrow \frac{1}{0}$ = undefined

h) $\frac{1}{0} \rightarrow \frac{0}{1} = 0$

undefined slope

9. The line $y = 2x$ is rotated 180° around the point $(0, 4)$ in the clockwise direction.

a) Determine the slope of the transformed line.

b) Determine the y-intercept of the transformed line.

c) Determine the equation of the transformed line.

a) Rotating 180° → slope stays the same
⇒ slope = 2

b) y-intercept is 4 below centre of rotation. After rotation is 4 above it.
⇒ y-intercept is (0,8)

c) Equation is $y = 2x + 8$

10. Determine the equation of the line that results from each of the following transformations.

a) The line $y = \frac{1}{3}x$ is rotated 90° about the origin.

b) The line $y = -4x$ is first rotated 90° about the origin and then translated up 5 units.

c) The line $y = 6x$ is rotated 180° about the point $(0, 3)$ and then translated down 1 unit.

a) Rotating 90° makes the lines perpendicular.
⇒ slope of $\frac{1}{3}$ → $\frac{-3}{1} = -3$
Equation is $y = -3x$

b) slope of $\frac{-4}{1}$ → $\frac{1}{4}$ ⇒ $y = \frac{1}{4}x + 4$
translates up 4

c) Rotated 180° → slope stays the same.
y-intercept is 3 below centre of rotation.
After rotation it is 3 above it.
y-intercept is (0,6).
Then translated down 1 ⇒ $y = -6x + 5$