Enrich

Parallel and Perpendicular Lines

Two lines are **parallel** if they have the same slope.

Two lines are **perpendicular** if the product of their slopes is –1.

Example

Use the points $A(2, 3)$, $B(6, 8)$, $C(-1, 4)$, and $D(4, 0)$.

Is the line through A and B parallel or perpendicular to the line through C and D?

Find the slope of the line through A and B.

$$\frac{8-3}{6-2} = \frac{5}{4}$$

Find the slope of the line through C and D.

$$\frac{0-4}{4-(-1)} = -\frac{4}{5}$$

Since $\frac{5}{4} \cdot -\frac{4}{5} = -1$, these lines are perpendicular.

Exercises

Use slope to describe the relationship between the line containing X and Y and the line containing P and Q. Explain your reasoning.

1. $X(3, 5)$, $Y(7, 9)$, $P(-2, -1)$, $Q(0, 1)$

2. $X(1, 1)$, $Y(4, -6)$, $P(-5, -12)$, $Q(-12, -15)$

3. $X(0, 2)$, $Y(4, 0)$, $P(7, 6)$, $Q(8, 8)$

4. $X(12, 8)$, $Y(3, 8)$, $P(9, -4)$, $Q(5, -4)$