2.4 Slopes of Parallel and Perpendicular Lines

Monday, September 23, 2019 7:46 AM

Warm Up

Find the slope of each set of points.

(3,6), (9,11)

(3,7), (13,2)

(6,9), (-11,13)

(7,-5), (-9,-2)

(5,5), (-7,-16)

(-4,9), (-3,-7)

Essential Question

How do the slopes of lines that are parallel to each other compare? How do the slopes of lines that are perpendicular to each other compare?

Goal: "I can. . .

Use slope to solve problems about parallel and perpendicular lines."

Example 1

A hill and a gondola line 20 ft above the ground that goes up the hill both have slope $\frac{1}{2}$. What is the geometric relationship between the hill and the gondola line?

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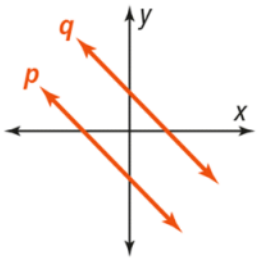
1. Suppose another line for a chair lift is placed at a constant distance c below the gondola line. What is an equation of the new line? Is the new line also parallel to the hill? Explain.

Two non-vertical lines are parallel if and only if their slopes are equal.

Any two vertical lines are parallel.

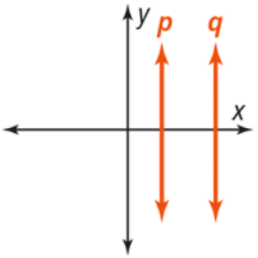
PROOF: SEE LESSON 7-5.

If... p and q are both not vertical



Then... $p \parallel q$ if and only if the slope of line p = slope of line q

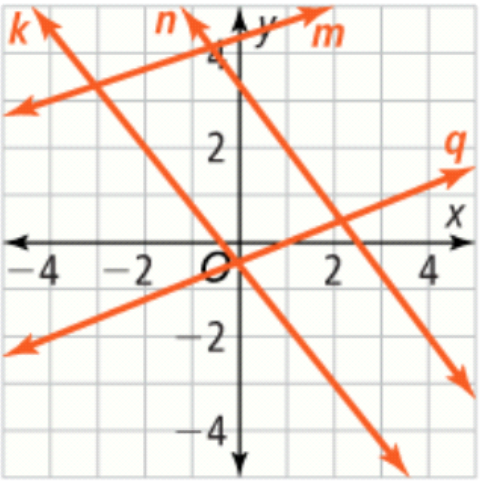
If... p and q are both vertical



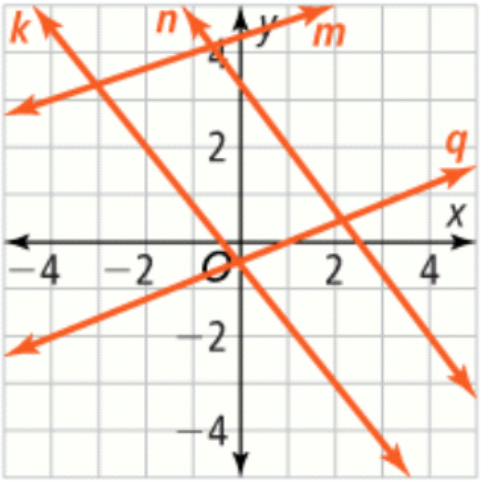
Then... $p \parallel q$

Example 2

Are lines *k* and *n* parallel?



2. Are lines m and q parallel?

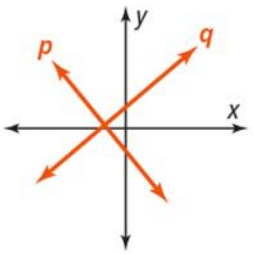


Two non-vertical lines are perpendicular if and only if the product of their slopes is −1.

A vertical line and a horizontal line are perpendicular to each other.

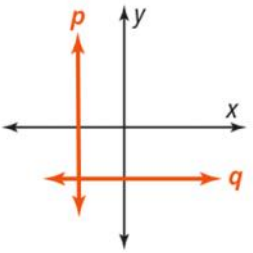
PROOF: SEE LESSON 7-4.

If... p and q are both not vertical



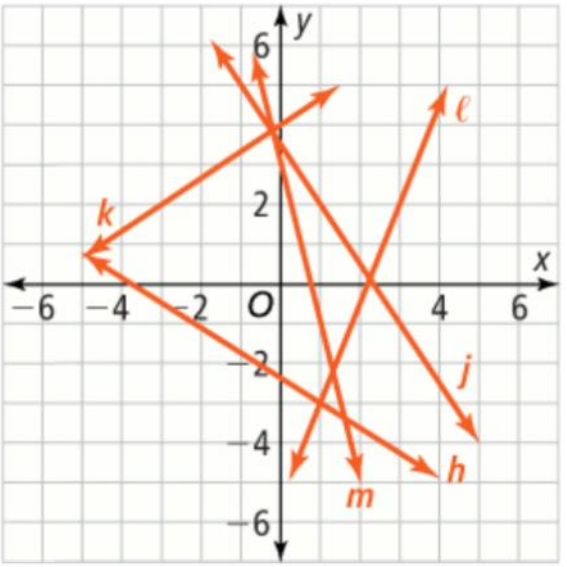
Then... $p \perp q$ if and only if the product of their slopes is −1

If... one of p and q is vertical and the other is horizontal



Then... $p \perp q$

Are lines *j* and *k* perpendicular?



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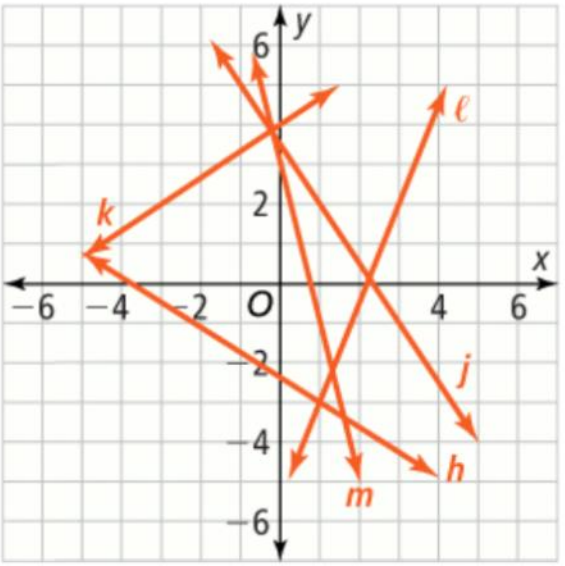
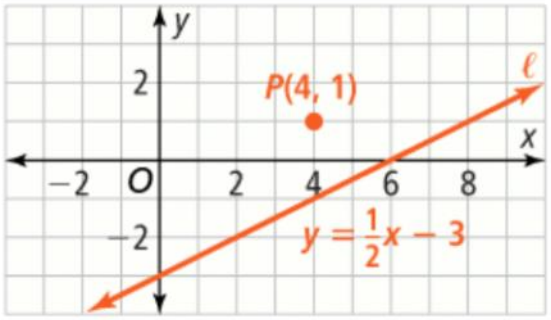
3. a. Are lines *h* and *ℓ* perpendicular?

b. Are lines *k* and *m* perpendicular?



Write Equations of Parallel and Perpendicular Lines

A. What is an equation of the line through *P* that is parallel to ℓ?



B. What is the equation of the line through *P* that is perpendicular to ℓ?

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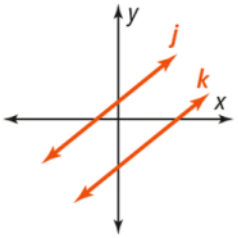
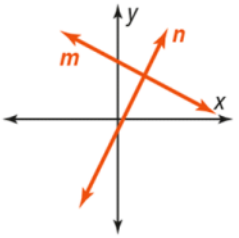
4. What are equations of lines parallel and perpendicular to the given line *k* passing through point *T*?

a. $y = -3x + 2;\ T(3,\ 1)$

b. $y = \frac{3}{4}x - 5;\ T\ (12, -2)$

Slopes of Parallel and Perpendicular Lines

	Parallel Lines	Perpendicular Lines
DIAGRAMS		
SYMBOLS	$j \parallel k$ if and only if the slopes are the same.	$m \perp n$ if and only if the product of the two slopes is -1.

Homework

Pg. 97
13, 15, 26, 27, 29, 31, 32