Review

1. Circle the *rate* that matches this situation: Ron reads 5 books every 2 weeks.

$\frac{5 \text{ weeks}}{2 \text{ books}}$ $\frac{2 \text{ books}}{5 \text{ weeks}}$ $\frac{5 \text{ books}}{2 \text{ weeks}}$

2. Write *always, sometimes,* or *never.*

A *rate* is _?_ a ratio. Always

A ratio is _?_ a *rate.* Sometimes

3. Underline the correct word to complete each sentence.

A *rate* compares two quantities by division / multiplication .

A *rate* compares quantities in different / the same unit(s).

Vocabulary Builder

$$\text{slope} = \frac{\text{vertical change}}{\text{horizontal change}} = \boxed{\frac{\text{rise}}{\text{run}}}$$

slope (noun) slohp

Definition: **Slope** is the ratio of the vertical change (or rise) to the horizontal change (or run) between two points on a line. **Slope** is also called the rate of change.

Main Idea: **Slope** describes the steepness of a line in the coordinate plane.

Examples: You can measure the **slope** of a hill, mountain, road, or roof.

Use Your Vocabulary

4. How does the *slope* of a road affect a person's driving?

answers may vary

5. What kind of ski *slope* would a beginner skier use?

answer may vary

Problem 1 Finding Rate of Change Using a Table

Got It? The table at the right shows the distance a band marches over time. The rate of change from one row of the table to the next is 260 feet per minute. Do you get the rate of change of 260 feet per minute if you use nonconsecutive rows of the table? Explain.

Distance Marched

Time (min)	Distance (ft)
1	260
2	520
3	780
4	1040

6. Use the values from the second and fourth rows to find the rate of change.

$$\text{rate of change} = \frac{\text{change in distance}}{\text{change in time}}$$

$$= \frac{1040 - 520}{4 - 2}$$

$$= \frac{520}{2}$$

$$= \frac{260}{1}$$

When you use nonconsecutive rows, the rate of change is 260 ft per min.

7. Is the rate of change you found in Exercise 6 the same as if you had used two consecutive rows? Explain why or why not.

Yes, the rate of change is the same because the band is marching at a constant rate

Problem 2 Finding Slope Using a Graph

Got It? What is the slope of the line?

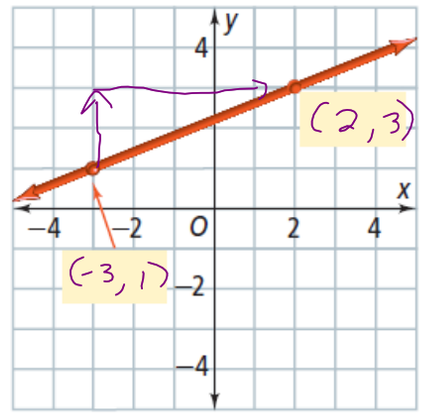
8. Label each point on the graph with its coordinates.

9. Draw a vertical arrow to represent the rise.

   rise = 2

10. Draw a horizontal arrow to represent the run.

    run = 5



11. Underline the correct word to complete the sentence.

Because the points are on the same line, the rate of change from point to point is constant / differs.

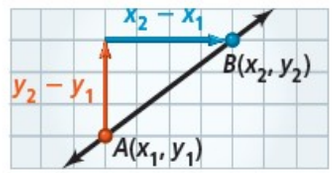
12. Write the slope of the line.

$$\text{slope} = \frac{\text{vertical change}}{\text{horizontal change}} = \frac{\text{rise}}{\text{run}} = \frac{2}{5}$$

take note

Key Concept The Slope Formula

In the diagram, (x_1, y_1) are the coordinates of point A, and (x_2, y_2) are the coordinates of point B. To find the slope of $\overleftrightarrow{AB}$, you can use the *slope formula*.



$$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}, \text{ where } x_2 - x_1 \neq 0$$

When using the *slope formula*, the x-coordinate you use first in the denominator must belong to the same ordered pair as the y-coordinate you use first in the numerator.

When using the *slope formula,* the x-coordinate you use first in the denominator must belong to the same ordered pair as the y-coordinate you use first in the numerator.

13. To find the change in x- or y-coordinates, do you add or subtract?

Subtract

14. What number will you get in the denominator if the x-coordinates are the same? Explain how that will affect the answer you find for the slope.

Zero. A denominator of zero is undefined

Problem 3 Finding Slope Using Points

(x, y)

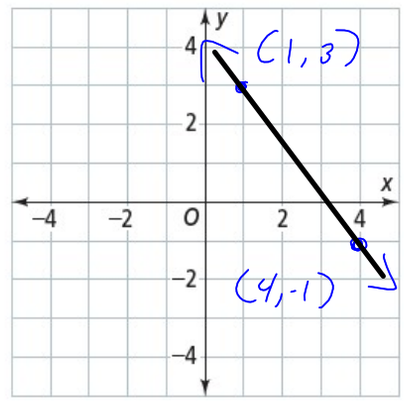
Got It? What is the slope of the line through (1, 3) and (4, −1)?

15. You can use either pair for (x_2, y_2) and complete the equation.

$$\text{slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-1 - 3}{4 - 1} = \frac{-4}{3}$$

16. Reasoning Plot the points and draw a line through them. Does the slope of the line look as you expected it to? Explain.

Yes, the slope is negative, and the line goes down



Problem 4 Finding Slopes of Horizontal and Vertical Lines

Got It? What is the slope of the line through (4, −3) and (4, 2)?

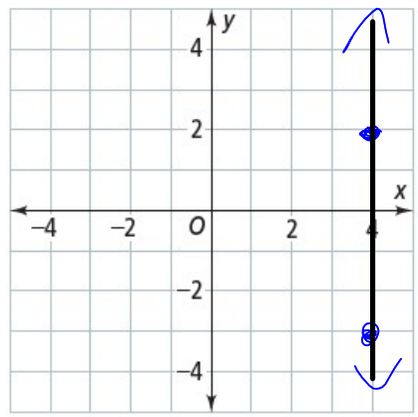
17. Graph the points (4, −3) and (4, 2) and draw the line that goes through the points.

18. Is the line that you drew *horizontal* or *vertical*?

vertical

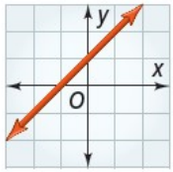
19. What is the slope of the line through (4, −3) and (4, 2)?

undefined

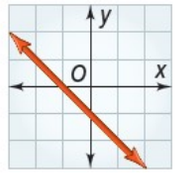


Concept Summary Slopes of Lines

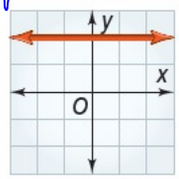
20. Label each graph with one of the descriptions in the box at the right.



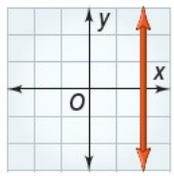
positive slope



negative slope



zero

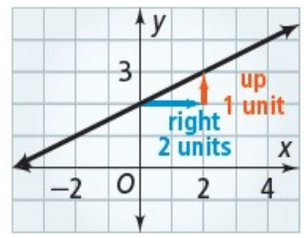


undefined

negative slope
positive slope
slope of 0
undefined slope

Lesson Check • Do you UNDERSTAND?

Error Analysis A student calculated the slope of the line at the right to be 2. Explain the mistake. What is the correct slope?



21. The rise of the graphed line is 1 .

22. The run of the graphed line is 2 .

23. What mistake did the student make by calculating the slope to be 2? Explain how to find the correct slope.

The student used $\frac{run}{rise}$ for the slope instead of $\frac{rise}{run}$