

# Graph Story Detectives

*Read change, then sketch it.*

**GRADE 8 • 8.F.B.5**

**CCSS.Math.Content.8.F.B.5** "Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear)..."

NAME \_\_\_\_\_

DATE \_\_\_\_\_

## NOTICE THE CHANGE

A graph is increasing when  $y$  goes up as  $x$  moves right, and decreasing when  $y$  goes down. A linear graph is a straight line with a constant rate of change. A nonlinear graph is curved or changes its rate.

## WORKED EXAMPLE

A graph goes through  $(20,6)$ ,  $(24,10)$ , and  $(28,14)$ . Is it increasing or decreasing? Is it linear or nonlinear?

1. The  $x$ -values increase by 4 each time.
2. The  $y$ -values increase by 4 each time.
3. The constant change makes a straight-line pattern.

**Answer: Increasing and linear.**

## PRACTICE 5 problems

- 1** A graph goes through  $(7,2)$ ,  $(8,5)$ , and  $(9,8)$ . Is it increasing or decreasing? Is it linear or nonlinear?

**ANSWER** \_\_\_\_\_

- 2** A graph goes through  $(10,16)$ ,  $(11,9)$ , and  $(12,4)$ . Is it increasing or decreasing? Is it linear or nonlinear?

**ANSWER** \_\_\_\_\_

- 3** A curve rises from left to right and gets steeper. Is it increasing or decreasing? Is it linear or nonlinear?

**ANSWER** \_\_\_\_\_

- 4** Sketch the line segment through  $(25,19)$  and  $(27,13)$ . Describe the graph.

**ANSWER** \_\_\_\_\_

- 5** Sketch a downward-opening parabola with vertex  $(31,21)$  that passes through  $(30,17)$  and  $(32,17)$ . Describe the graph.

**ANSWER** \_\_\_\_\_

## APPLY IT Show your work

- 1** In an online game, a player has 25 coins at minute 0, 55 coins at minute 3, and 115 coins at minute 9. Sketch the graph. Is the number of coins increasing or decreasing? Is the relationship linear or nonlinear?

WORK SPACE

ANSWER \_\_\_\_\_

- 2** At a skate park, a rider's height is 2 units at time 0, 11 units at time 1, 18 units at time 2, 23 units at time 3, and 26 units at time 4. Sketch the graph. Describe the relationship.

WORK SPACE

ANSWER \_\_\_\_\_

## CHALLENGE One step up

### CHALLENGE

A graph includes the points (1,30), (3,22), (5,18), (7,22), and (9,30). Explain why the graph is nonlinear. Also describe where it is increasing and decreasing.

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## PART 1 • PRACTICE

| # | PROBLEM                                                                                                             | ANSWER                                                           |
|---|---------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|
| 1 | A graph goes through (7,2), (8,5), and (9,8). Is it increasing or decreasing? Is it linear or nonlinear?            | <b>Increasing and linear.</b>                                    |
| 2 | A graph goes through (10,16), (11,9), and (12,4). Is it increasing or decreasing? Is it linear or nonlinear?        | <b>Decreasing and nonlinear.</b>                                 |
| 3 | A curve rises from left to right and gets steeper. Is it increasing or decreasing? Is it linear or nonlinear?       | <b>Increasing and nonlinear.</b>                                 |
| 4 | Sketch the line segment through (25,19) and (27,13). Describe the graph.                                            | <b>A decreasing, linear graph.</b>                               |
| 5 | Sketch a downward-opening parabola with vertex (31,21) that passes through (30,17) and (32,17). Describe the graph. | <b>It increases to (31,21), then decreases. It is nonlinear.</b> |

## PART 2 • APPLY IT

1. **The graph is increasing and linear.** Plot the three points and draw a straight line through them. The player earns 30 coins every 3 minutes, so the rate is constant.
2. **The height is increasing and nonlinear. The graph rises but becomes less steep.** Plot the points and connect them with a smooth rising curve. The height increases by smaller amounts each time, so the rate is not constant.

## CHALLENGE

**It decreases from  $x=1$  to  $x=5$ , then increases from  $x=5$  to  $x=9$ . It is nonlinear because the changes in  $y$  are not constant for equal changes in  $x$ .**

Accept equivalent descriptions such as rises or falls. For sketches, accept any accurate graph with the required points and qualitative features.