

# Data Line Detectives

Use bivariate data to model real situations.

**GRADE 8 • 8.FGR.6**

**8.FGR.6** "Solve practical, linear problems involving situations using bivariate quantitative data."

NAME \_\_\_\_\_

DATE \_\_\_\_\_

## BUILD A LINEAR MODEL

When two quantities change at a constant rate, you can model them with  $y=mx+b$ . Find the rate of change,  $m$ , from two data pairs, then use one pair to find the starting value,  $b$ . Use the equation to predict a new value or solve for an unknown.

## WORKED EXAMPLE

A print shop records that 2 posters cost \$17 and 5 posters cost \$29. Write an equation for the cost  $y$  of  $x$  posters. Then find the cost of 7 posters.

1. Find the rate:  $(29-17)/(5-2)=12/3=4$ .
2. Use a data pair:  $17=4(2)+b$ , so  $b=9$ .
3. Write the model:  $y=4x+9$ .
4. Substitute  $x=7$ :  $y=4(7)+9=37$ .

**Answer:  $y=4x+9$ , and 7 posters cost \$37.**

## PRACTICE 6 problems

- 1** A table includes the pairs  $x=1, y=14$  and  $x=3, y=20$ . Write the linear equation that models the data.

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

- 2** A table includes the pairs  $x=3, y=19$  and  $x=6, y=28$ . What is  $y$  when  $x=8$ ?

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

- 3** The relationship  $y=6x+1$  models the number of points  $y$  earned after  $x$  tasks. How many points are earned after 8 tasks?

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

- 4** A plant grows from 16 centimeters at day 3 to 31 centimeters at day 8. What is the rate of growth in centimeters per day?

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

- 5** A linear data set includes  $x=3, y=22$  and  $x=6, y=31$ . What is the  $y$ -intercept?

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

- 6** For the equation  $y=6x+1$ , find  $x$  when  $y=49$ .

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

## APPLY IT Show your work

- 1** A school photo booth charges a \$6 entry fee plus \$3 for each print. Let  $x$  be the number of prints and  $y$  be the total cost in dollars. Write an equation for the cost. Then find the cost of 8 prints.

WORK SPACE

ANSWER \_\_\_\_\_

- 2** The esports club compares jersey orders. An order of 3 jerseys costs \$48, and an order of 6 jerseys costs \$72. Let  $x$  be the number of jerseys and  $y$  be the total cost in dollars. Write the linear equation, then find the cost of 8 jerseys.

WORK SPACE

ANSWER \_\_\_\_\_

## CHALLENGE One step up

### CHALLENGE

At a skate park, Plan A costs  $y=3x+18$  dollars for  $x$  visits. Plan B costs  $y=6x$  dollars. At how many visits do the plans cost the same, and what is that cost? Which plan costs less for more than 6 visits? Explain using the equations.

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## PART 1 • PRACTICE

| # | PROBLEM                                                                                                                     | ANSWER                       |
|---|-----------------------------------------------------------------------------------------------------------------------------|------------------------------|
| 1 | A table includes the pairs $x=1, y=14$ and $x=3, y=20$ . Write the linear equation that models the data.                    | <b><math>y=3x+11</math></b>  |
| 2 | A table includes the pairs $x=3, y=19$ and $x=6, y=28$ . What is $y$ when $x=8$ ?                                           | <b>34</b>                    |
| 3 | The relationship $y=6x+1$ models the number of points $y$ earned after $x$ tasks. How many points are earned after 8 tasks? | <b>49</b>                    |
| 4 | A plant grows from 16 centimeters at day 3 to 31 centimeters at day 8. What is the rate of growth in centimeters per day?   | <b>3 centimeters per day</b> |
| 5 | A linear data set includes $x=3, y=22$ and $x=6, y=31$ . What is the $y$ -intercept?                                        | <b>13</b>                    |
| 6 | For the equation $y=6x+1$ , find $x$ when $y=49$ .                                                                          | <b>8</b>                     |

## PART 2 • APPLY IT

- $y=3x+6$ ; \$30** The cost rises by \$3 per print, and the starting fee is \$6, so  $y=3x+6$ . Substitute  $x=8$  to get  $y=30$ .
- $y=8x+24$ ; \$88** The rate is  $(72-48)/(6-3)=8$  dollars per jersey. Using  $48=8(3)+b$  gives  $b=24$ , and  $y=8(8)+24=88$ .

## CHALLENGE

**The plans match at 6 visits, and each costs \$36. For more than 6 visits, Plan A costs less because its cost increases by \$3 per visit while Plan B increases by \$6 per visit.**

Accept equivalent equation forms, such as  $y=11+3x$ . For word problems, accept correct dollar notation and require both the equation and the requested predicted cost.