

Writing Linear Equations and Scatter Plots: math practice, Grade 9 – download the PDF

22 problems graded by difficulty (★ easy, ★★ medium, ★★★ hard). Try first, without looking at the solutions!

1 Slope-intercept form



- (a) Write the equation of the line with slope **4** and y-intercept **−3**.
- (b) Write the equation of the line with slope $-\frac{1}{2}$ and y-intercept **6**.
- (c) Find the value of **y** on each line when **x = 6**.

2 Point-slope practice



Write each line in slope-intercept form.

- (a) Slope **2**, through **(1, 4)**.
- (b) Slope **−3**, through **(−2, 5)**.

3 Two easy points



A line passes through **(1, 2)** and **(5, 10)**. Find its slope and its equation.

4 Name the correlation



Say whether each pair of variables most likely has a positive correlation, a negative correlation, or no correlation.

- (a) The outside temperature and the cups of hot chocolate sold at a stand.
- (b) A person's height and shoe size.
- (c) The day of the month a student was born and the student's math score.

5 Find a residual



A model for the number of pages read is $y = 3x + 10$, where x is the number of minutes. Find the residual at each data point.

- (a) (4, 25) (b) (6, 26)

6 True or false?



Decide whether each statement is true or false, and explain.

- (a) A residual of 0 means the data point lies exactly on the line.
- (b) If two variables have a strong correlation, one must cause the other.

7 Evaluate piecewise and absolute value functions



Let $f(x) = \begin{cases} x + 2 & \text{if } x < 0 \\ 3x & \text{if } x \geq 0 \end{cases}$ and $g(x) = |x - 3|$.

Find $f(-4)$, $f(0)$, $f(5)$, $g(-1)$, $g(3)$, and $g(7)$.

8

Filling a pool

A small pool already holds some water. After 2 minutes it holds 30 gallons, and the hose adds water at a steady 12 gallons per minute (about 45 liters per minute).

(a) Write an equation for the volume V after t minutes.

(b) How many gallons are in the pool after 10 minutes?

(c) When does the pool hold 150 gallons?

9

Taxi fare

A 3-mile ride costs \$9.50 and an 8-mile ride costs \$19.50 (1 mile is about 1.6 km).

(a) Write the fare F as a linear function of the miles x .

(b) What is the starting fee, and what does the slope mean?

(c) How much is a 12-mile ride?

10

Residual table

A line of best fit for some data is $y = 2x + 1$. Complete the table.

x	Actual y	Predicted	Residual
2	4		
4	10		
6	12		
8	19		

Do the residuals suggest that the line is a reasonable model?

11 Reading r



Three scatter plots have $r = -0.92$, $r = 0.15$, and $r = 0.97$.

- (a) Describe the direction and strength of each.
- (b) For which two would a linear model be most appropriate?

12 Bike rental model



A bike rental shop uses $y = 0.4x + 25$, where x is the miles ridden and y is the cost in dollars.

- (a) Interpret the slope and the y-intercept.
- (b) Predict the cost for 120 miles.
- (c) How many miles can you ride for \$65?

13 Interpolation or extrapolation



The model $y = 4.5x + 51$ was built from quiz data with study times from 1 to 8 hours.

- (a) Predict the score for 4.5 hours. Is this interpolation or extrapolation?
- (b) Predict the score for 12 hours. Is this reliable? Explain.

14 Parking fees



A garage charges \$4 for any stay of up to 2 hours, and then \$3 for each additional hour. So $P(h) = 4$ for $0 < h \leq 2$ and $P(h) = 4 + 3(h - 2)$ for $h > 2$.

- (a) Find $P(1.5)$ and $P(5)$.
- (b) Write the second rule in the form $3h + c$.
- (c) How long can you stay for \$19?

15 A negative slope

A line passes through $(2, -1)$ and $(-4, 8)$.

- (a) Write its equation in slope-intercept form.
- (b) Find its x-intercept.

16 Standard form from intercepts

A line crosses the x-axis at $(6, 0)$ and the y-axis at $(0, -4)$. Write its equation in slope-intercept form and in standard form $Ax + By = C$ with integer coefficients.

17 Missing coordinate

The points $(2, k)$ and $(6, 13)$ lie on a line of slope $\frac{3}{2}$. Find k and write the equation of the line.

18 A pattern in the residuals

A drone's height y (in feet) was recorded at x seconds: $(1, 10)$, $(2, 6)$, $(3, 4)$, $(4, 4)$, $(5, 6)$, $(6, 10)$. A student proposes the model $y = 7$.

- (a) Compute the six residuals.
- (b) Describe the residual pattern. Is a line a good model for these data?

19 Fit a line through two data points

★★★

An app had these downloads (in thousands) after x weeks: $(0, 8)$, $(2, 15)$, $(4, 18)$, $(6, 27)$, $(8, 32)$.

- (a) Write the equation of the line through the first and last points.
- (b) Compute the residual at each of the five points.
- (c) Predict the downloads in week 5.

20 Hidden cause

★★★

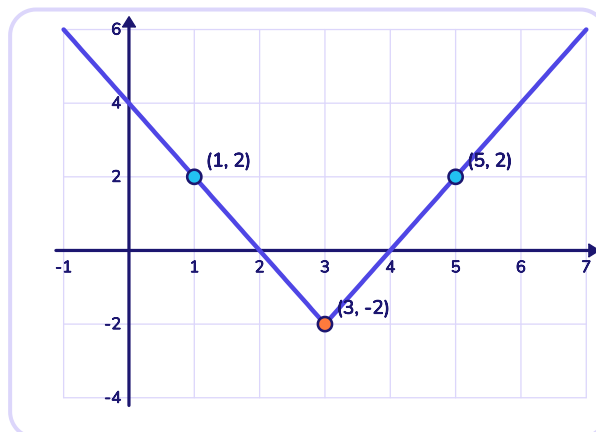
A town finds that the more ice cream cones it sells each week, the more sunburns the clinic treats ($r = 0.9$).

- (a) Does eating ice cream cause sunburns?
- (b) Name a lurking variable and explain how it creates the correlation.

21 Equation of a V graph

★★★

The graph below is the graph of $y = a|x - h| + k$. Find a , h , and k , then the x-intercepts.



22

Write a piecewise function

★★★

A function is made of two line segments. For $x \leq 4$ the line passes through $(0, 2)$ and $(4, 6)$. For $x > 4$ the line passes through $(4, 6)$ and $(8, 0)$.

(a) Write both rules.

(b) Evaluate the function at $x = 2$ and $x = 6$.

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