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FREE PRACTICE PACKET · ALGEBRA I

Slope & Linear Functions

Slope, slope-intercept form, intercepts, function notation and real-world models

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Tips for students and parents

Slope is a rate of change: how much y changes each time x goes up by 1. In real-world problems, the slope is usually the "per" amount (per hour, per mile) and the y-intercept is the starting amount. Sketching a quick graph is a great way to check an answer.

Made by Tim Rusli, Math & Physics Tutor in Union, NJ · Aligned to NJ Student Learning Standards for Algebra I (linear functions)

Name _____ Date _____

Part A · Finding slope

Slope = rise over run = change in y divided by change in x.

Example (1, 2) and (3, 8) → $m = \frac{8 - 2}{3 - 1} = \frac{6}{2} = 3$

Find the slope of the line through each pair of points.

1. (1, 2) and (3, 8)

2. (0, 5) and (4, −3)

3. (−2, 1) and (2, 3)

4. (−1, 4) and (5, 4)

Find the slope (m) and y-intercept (b) of each line.

5. $y = 4x - 7$

6. $y = -\frac{1}{2}x + 3$

7. $2x + y = 9$

8. $3x - 6y = 12$

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Part B · Equations and functions

Slope-intercept form: y = mx + b. Find m first, then plug in a point to find b.

Example Slope 4 through (2, 3): 3 = 4(2) + b → b = −5 → y = 4x − 5

Write each line in slope-intercept form, or answer the question.

1. Slope 3, y-intercept −2

2. Slope −2, through (1, 5)

3. Through (2, 3) and (4, 11)

4. Through (−3, 1) and (3, −3)

5. Find the x- and y-intercepts of 2x + 5y = 20

6. f(x) = 3x − 4. Find f(5).

7. f(x) = 3x − 4. Find f(−2).

8. f(x) = 3x − 4. Solve f(x) = 14.

9. Is (3, 5) on the line y = 2x − 1? Show why.

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Name _____ Date _____

Part C · Word problems

Identify the rate of change (slope) and the starting value (y-intercept) before writing the equation.

1. A taxi charges $3 plus $2.50 per mile. Write an equation for the cost C of a ride of m miles. How much is an 8-mile ride?

   Answer: _____

2. A 24 cm candle burns 1.5 cm per hour. Write an equation for its height h after t hours. When does it burn out?

   Answer: _____

3. A plumber charges $190 for a 2-hour job and $385 for a 5-hour job. Write a linear equation for the cost C of an h-hour job. What do the slope and y-intercept mean?

   Answer: _____

4. Write the equation of the line through (2, 9) that is parallel to $y = 3x + 1$.

   Answer: _____

5. Leo says the slope through (1, 3) and (4, 9) is $\frac{4 - 1}{9 - 3} = \frac{1}{2}$. Is he right? Explain.

Challenge Write the equation of the line through (4, 1) that is perpendicular to $y = 2x - 5$.

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Answer key

Answers are shown in simplest form. Equivalent forms of an equation are also correct.

Part A

A1	$m = \mathbf{3}$
A2	$m = \mathbf{-2}$
A3	$m = \mathbf{\frac{1}{2}}$
A4	$m = \mathbf{0}$
A5	$m = \mathbf{4}$, $b = \mathbf{-7}$
A6	$m = \mathbf{-\frac{1}{2}}$, $b = \mathbf{3}$
A7	$m = \mathbf{-2}$, $b = \mathbf{9}$
A8	$m = \mathbf{\frac{1}{2}}$, $b = \mathbf{-2}$

Part B

B1	$y = \mathbf{3x - 2}$
B2	$y = \mathbf{-2x + 7}$
B3	$y = \mathbf{4x - 5}$
B4	$y = \mathbf{-\frac{2}{3}x - 1}$
B5	x-intercept **(10, 0)**, y-intercept **(0, 4)**
B6	$f(5) = \mathbf{11}$
B7	$f(-2) = \mathbf{-10}$
B8	$x = \mathbf{6}$
B9	**Yes**: $2(3) - 1 = 5$

Part C

C1	$C = 2.5m + 3$; an 8-mile ride costs **$23**
C2	$h = 24 - 1.5t$; it burns out after **16 hours**
C3	$C = 65h + 60$. The plumber charges **$65 per hour** plus a **$60 service fee**.
C4	Same slope, 3: $9 = 3(2) + b$, so $y = \mathbf{3x + 3}$
C5	No. He flipped it: slope is change in y over change in x, $\frac{9-3}{4-1} = \mathbf{2}$.
★	Perpendicular slope is $-\frac{1}{2}$: $1 = -\frac{1}{2}(4) + b$, so $y = \mathbf{-\frac{1}{2}x + 3}$



NEED A LITTLE MORE HELP?

One-on-one tutoring with Tim Rusli

I'm a Math and Physics tutor in Union, NJ with a Bachelor's in Applied Mathematics from Rutgers. I break hard problems into small, clear steps so students build real confidence, from elementary math to SAT Math, Calculus and Physics.

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