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> I. Model Problems. II. Practice III. Challenge Problems VI. Answer Key

Web Resources

<u>www.mathwarehouse.com/algebra/linear_equation/slope-intercept-form.php</u> Slope of a Line www.mathwarehouse.com/slope2/

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I. Model Problems

The equation of a line is given by the formula y = mx + b. *m* equals the slope of the line *b* equals the *y*-intercept of the line This equation of the line is called **"slope-intercept" form** because it easily shows both the slope and the intercept of the line.

To find the equation of a line given the slope and intercept, simply plug into the equation.

Example 1 Write the equation of the line with slope 2 that has *y*-intercept 5.

y = mx + b	Write the slope-intercept formula.
y = 2x + 5	Substitute $m = 2$ and $b = 5$
The answer is $y = 2x + 5$.	

To find the equation of a line given the slope and one point on the line, plug in the slope and the coordinates of the point to solve for b, the y-intercept.

Example 2 Write the equation of the line with slope 3 that passes through the point (-1, 6).

y = mx + b	Write the slope-intercept formula
6 = 2(-1) + b	Substitute $m = 2$ and $(x, y) = (-1, -1)$
	6)
6 = -2 + b	Simplify
b = 8	Add 2 to each side to solve for <i>b</i>
y = 3x + 8	Substitute $m = 3$ and $b = 8$ into the
	slope-intercept formula

The answer is y = 3x + 8.

Sometimes the slope of the equation is not given. To find the equation of a line that passes through two points, you must first calculate the slope, then follow the steps in Example 2.



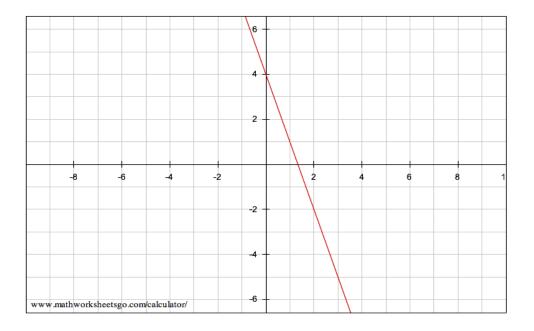
Example 3 Write the equation of the line that passes through the points (3, -2) and (-2, 8).

$m = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}$	Write the slope formula
$m = \frac{8 - (-2)}{-2 - 3} = \frac{10}{-5} = -2$	Substitute $(x_1, y_1) = (-2, 3)$ and $(x_2, y_2) = (8, -2)$
y = mx + b	Write the point-slope form
3 = -2(-2) + b	Substitute $m = -2$ and
	(x, y) = (-2, 3).
3 = 4 + b	Simplify.
<i>b</i> = -1	Subtract 4 from each side.
y = -2x - 1	Substitute $m = -2$ and $b = -1$ into
	the point-slope formula.
The answer is $v = -2r = 1$	

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The answer is y = -2x - 1.
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Sometimes you will need to find the equation of a line given its graph.

Example 4 Write the equation of the line graphed below.





Notice that the graph passes through the points (0, 4) and (2, -2). The *y*-intercept is 4. This is the value of *b*.

$m = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}$	Write the slope formula
$m = \frac{4 - (-2)}{0 - 2} = \frac{6}{-2} = -3$	Substitute $(x_1, y_1) = (2, -2)$ and $(x_2, y_2) = (0, 4)$
y = mx + b y = -3x + 4	Write the point-slope form Substitute $m = -3$ and b = 4 into the point-slope formula.

II.

Practice

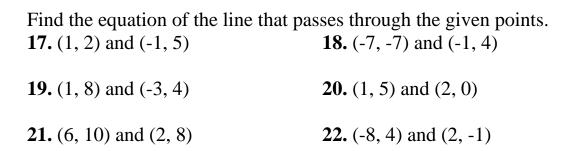
Find the equation of the line that has given slope and *y*-intercept.

1. $m = 2$ and $b = 7$	2. $m = -3$ and $b = 10$
3. $m = 10$ and $b = -3$	4. <i>m</i> = -7 and <i>b</i> = 11
5. $m = 4$ and $b = -20$	6. $m = -12$ and $b = -8$
7. $m = 6$ and $b = 6$	8. $m = -5$ and $b = -10$

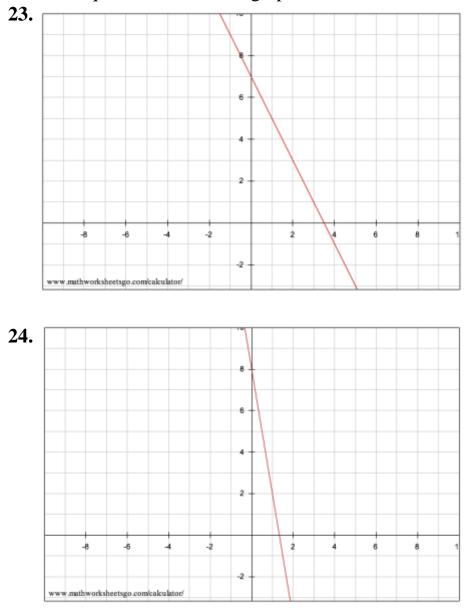
Find the equation of the line with the given slope that passes through the given point.

9. $m = 2$ and (-1, 5)	10. <i>m</i> = -4 and (1, 1)
11. <i>m</i> = -2 and (-2, -2)	12. <i>m</i> = 6 and (2, 0)
13. <i>m</i> = 3 and (0, 7)	14. <i>m</i> = -1 and (4, 5)
15. <i>m</i> = 1 and (-2, 5)	16. <i>m</i> = 0 and (10, 7)

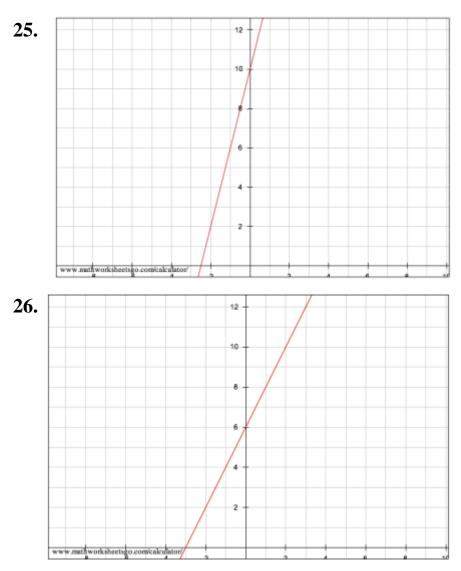




Find the equation of each line graphed below.







III. Challenge Problems

27. Explain why you cannot use y = mx + b to find the equation of a vertical line.

28. What is the equation of a line that passes through the points (-0.72, 1.42) and (4.22, 5.83)?



29. Correct the Error

There is an error in the student work shown below: Question: Find the equation of the line that passes through the points (-1, 4) and (2, 7). Solution:

The slope is given by the formula rise over run.

$$= \frac{7 - 4}{2 - (-1)} = \frac{3}{3} = 1$$
Plug into $y = mx + b$;
 $y = mx + 1$.
Substitute (-1, 4) to solve for m :
 $4 = -1 \cdot m + 1$ so $m = -3$
The equation of the line is $y = -3x + 1$.

What is the error? Explain how to solve the problem.



IV. Answer Key

1. y = 2x + 72. y = -3x + 103. y = 10x - 34. y = -7x + 115. y = 4x - 206. y = -12x - 87. y = 6x + 68. y = -5x - 109. y = 2x + 710. y = -4x + 511. y = -2x + 612. y = 6x - 1213. y = 3x + 714. y = -x + 915. y = x + 716. y = 717. y = -1.5x + 3.518. y = 1.833x + 5.83319. y = x + 720. y = -5x + 1021. y = 0.5x + 722. y = -0.5x23. y = -2x + 724. y = -6x + 825. y = 4x + 1026. y = 2x + 6

27. The equation of a vertical line is an equation in the form x = a constant. Vertical lines have infinite slope and typically do not have a *y*-intercept.

28. y = 0.893x + 2.06

29. The student switched the *y*-intercept and the slope in the equation of a line formula (the student mistakenly thought *b* was the slope)

