

Writing and Graphing Linear Functions in Three Forms

Grade 9 – Algebra 1 math · Worksheet Answer Key · Standards: F-IF.C.7a, F-LE.A.1a, F-LE.A.2, A-CED.A.2

Each answer key shows the slope calculation, the substitution into the chosen form and a check with a given point. If your equation looks different, rewrite it in slope-intercept form to compare.

Standards: F-IF.C.7a, F-LE.A.1a, F-LE.A.2, A-CED.A.2 · **Level:** Grade 9 Algebra 1

Problem 1 Slope from two points

$$\text{Slope} = (19 - (-5)) \div (13 - 7) = 24 \div 6 = 4.$$

4

Problem 2 Negative slope

$$\text{Slope} = (-2 - 4) \div (5 - (-1)) = -6 \div 6 = -1.$$

-1

Problem 3 Read slope and intercept

The equation has the form $y = mx + b$ with $m = -8$ and $b = 15$.

Slope -8; y-intercept 15

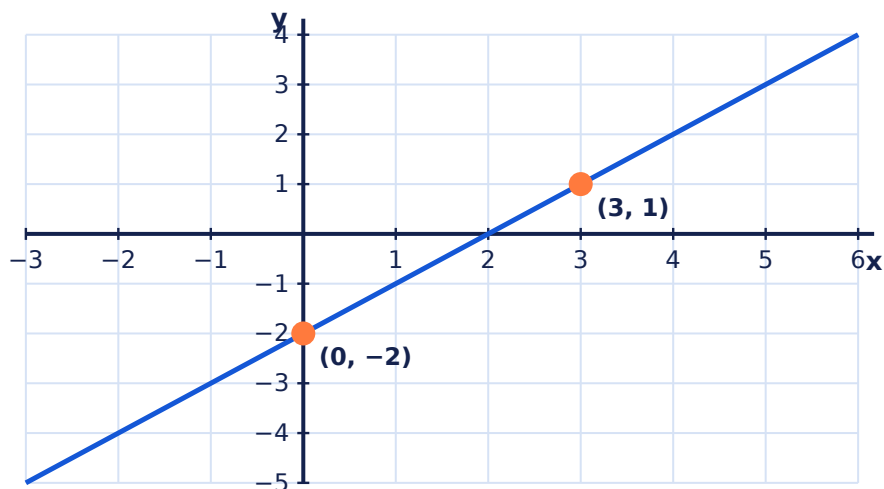
Problem 4 Write from slope and intercept

Substitute $m = 6$ and $b = -11$ into $y = mx + b$.

$$y = 6x - 11$$

Problem 5 Equation from a graph

The line crosses the y-axis at -2 , so $b = -2$. Slope = $(1 - (-2)) \div (3 - 0) = 1$.



$$\text{Slope} = (1 - (-2)) \div 3 = 1.$$

$$y = x - 2$$

Problem 6 Point-slope form

Point-slope: $y - (-1) = 3(x - 2)$, which is $y + 1 = 3(x - 2)$.

Distribute: $y + 1 = 3x - 6$, so $y = 3x - 7$.

Check: $3(2) - 7 = -1$.

$$y = 3x - 7$$

Problem 7 Line through two points

Slope = $(-11 - 9) \div (6 - (-4)) = -20 \div 10 = -2$.

Use $(-4, 9)$: $y - 9 = -2(x + 4)$, so $y = -2x - 8 + 9 = -2x + 1$.

Check $(6, -11)$: $-2(6) + 1 = -11$.

$$y = -2x + 1$$

Problem 8 Standard to slope-intercept

$2y = -4x + 10$, so $y = -2x + 5$.

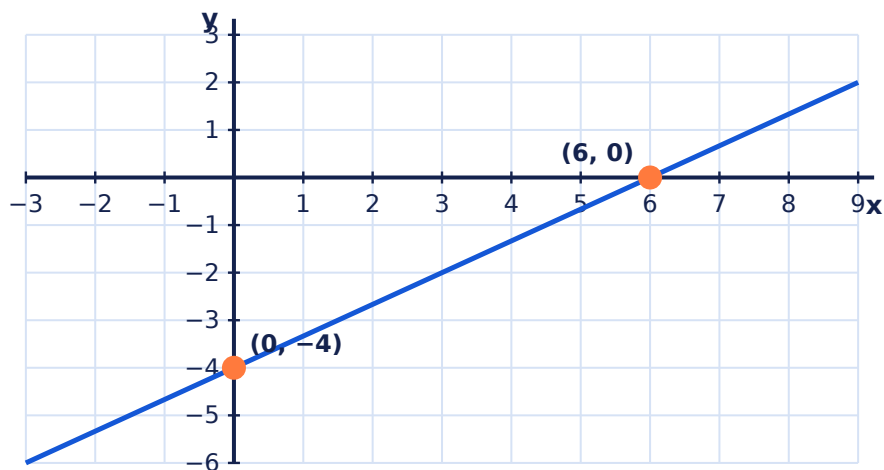
y-intercept: 5. x-intercept: $0 = -2x + 5$ gives $x = 2.5$.

$$y = -2x + 5; \text{ intercepts } (2.5, 0) \text{ and } (0, 5)$$

Problem 9 Slope-intercept to standard

Multiply by 3: $3y = 2x - 12$. Move the x term: $-2x + 3y = -12$, or $2x - 3y = 12$.

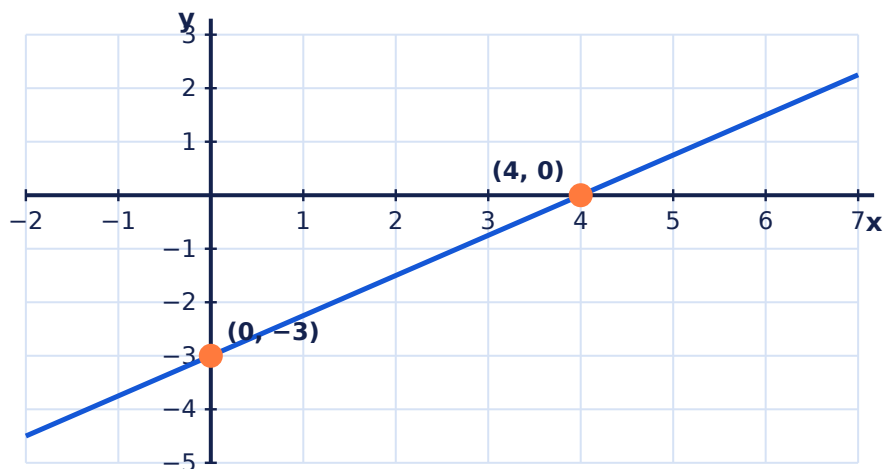
$$2x - 3y = 12$$



$2x - 3y = 12$ crosses the axes at $(6, 0)$ and $(0, -4)$.

Problem 10 Graph from intercepts

$x = 0$: $-4y = 12$ so $y = -3$. $y = 0$: $3x = 12$ so $x = 4$.



$3x - 4y = 12$ drawn through its intercepts.

Intercepts $(4, 0)$ and $(0, -3)$

Problem 11 Parallel line

Parallel lines have equal slopes, so $m = 2$.

$$y - 9 = 2(x - 3), \text{ so } y = 2x + 3.$$

Check: $2(3) + 3 = 9$.

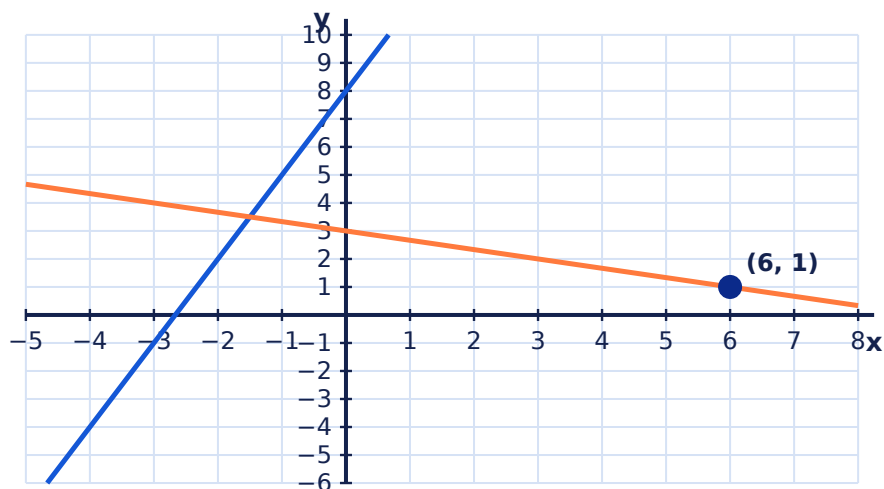
$$y = 2x + 3$$

Problem 12 Perpendicular line

The negative reciprocal of 3 is $-1/3$.

$$y - 1 = -(1/3)(x - 6), \text{ so } y = -(1/3)x + 2 + 1 = -(1/3)x + 3.$$

Check: $-(1/3)(6) + 3 = 1$.



Slopes 3 and $-1/3$ multiply to -1 .

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

Problem 13 Parallel, perpendicular or neither

(a) $6x - 2y = 5$ gives $y = 3x - 5/2$, slope 3: the same slope, so parallel.

(b) $3y = -4x + 7$ gives slope $-4/3$. And $(3/4)(-4/3) = -1$, so perpendicular.

(a) parallel (b) perpendicular

Problem 14 Is the table linear?

For equal steps of 2 in x , y increases by 6 each time, so the rate of change is $6 \div 2 = 3$ and the table is linear.

The y -intercept is 5, so $y = 3x + 5$.

Linear; $y = 3x + 5$

Problem 15 Fitness membership

$$C(m) = 22m + 40. C(7) = 22(7) + 40 = 154 + 40 = 194.$$

The slope 22 is the monthly fee in dollars per month; the intercept 40 is the joining fee at $m = 0$.

$$\mathbf{C(m) = 22m + 40; \$194 \text{ after 7 months}}$$

Problem 16 Hiker's elevation

$$\text{Slope} = (2,950 - 1,900) \div (5 - 2) = 1,050 \div 3 = 350 \text{ feet per hour.}$$

$$E - 1,900 = 350(t - 2), \text{ so } E = 350t + 1,200 \text{ (start at 1,200 ft).}$$

$$4,000 = 350t + 1,200 \text{ gives } 350t = 2,800 \text{ and } t = 8.$$

$$\mathbf{E = 350t + 1,200; 8 \text{ hours}}$$

Problem 17 Burning candle

$$H(t) = 12 - 0.75t.$$

$$\text{Burns out when } 12 - 0.75t = 0, \text{ so } t = 16 \text{ hours.}$$

Domain $0 \leq t \leq 16$ hours; range $0 \leq H \leq 12$ inches, matching the graph from $(0, 12)$ to $(16, 0)$.

$$\mathbf{H(t) = 12 - 0.75t; \text{ burns out at 16 hours}}$$

Problem 18 School store budget

$$0.5p + 2n = 20. \text{ Multiply by 2: } p + 4n = 40.$$

$$\text{p-intercept: } n = 0 \text{ gives } p = 40. \text{ n-intercept: } p = 0 \text{ gives } n = 10.$$

$$\text{For } p = 12: 12 + 4n = 40, \text{ so } 4n = 28 \text{ and } n = 7.$$

$$\mathbf{p + 4n = 40; \text{ intercepts } (40, 0) \text{ and } (0, 10); 7 \text{ notebooks}}$$

Problem 19 Draining a pool

$$\text{Slope} = (200 - 450) \div (8 - 3) = -250 \div 5 = -50 \text{ gallons per minute.}$$

$$G - 450 = -50(t - 3), \text{ so } G = -50t + 600.$$

At $t = 0$ the pool held 600 gallons. Empty when $-50t + 600 = 0$, so $t = 12$ minutes.

$G = -50t + 600$; 600 gallons; empty at 12 minutes

Problem 20 Right angle test

Slope of AB = $(2 - 0) \div (6 - 0) = 1/3$. Slope of BC = $(5 - 2) \div (5 - 6) = 3 \div (-1) = -3$.

The product is $(1/3)(-3) = -1$, so $AB \perp BC$.

Yes, the angle at B is a right angle.