

Algebra 1 · Linear Functions: Slope-Intercept, Point-Slope and Standard Form · Worksheet Answer Key

Common Core F-IF.C.7a, F-LE.A.1a, F-LE.A.2, A-CED.A.2 · mathovore.fr

Every solution below shows the setup, the arithmetic and a check. Compare your slopes, equations and graphs with these, and look for the step where a sign or a fraction went astray if an answer differs.

Algebra 1 Common Core: F-IF.C.7a · F-LE.A.1a · F-LE.A.2 · A-CED.A.2

Problem 1: Slope from two points

$$m = \frac{11-3}{6-2} = \frac{8}{4} = 2. \text{ The slope is } 2.$$

Problem 2: A negative slope

$$m = \frac{-7-5}{1-(-3)} = \frac{-12}{4} = -3. \text{ The slope is } -3. \text{ The line falls from left to right.}$$

Problem 3: A fractional slope

$$m = \frac{1-(-1)}{2-(-4)} = \frac{2}{6} = \frac{1}{3}. \text{ The slope is } \frac{1}{3}.$$

Problem 4: Horizontal and vertical lines

a. $m = \frac{5-5}{9-2} = \frac{0}{7} = 0$. The slope is **0** (horizontal line, $y=5$).

b. $m = \frac{6-(-2)}{3-3} = \frac{8}{0}$, and division by zero is not defined. The slope is **undefined** (vertical line, $x=3$).

Problem 5: Read slope and intercept

a. The slope is $-\frac{3}{4}$ and the y-intercept is 5, the point (0,5).

b. $y = -\frac{3}{4}(8) + 5 = -6 + 5 = -1$. So $y = -1$.

Problem 6: Equation from a graph

The line crosses the y-axis at (0,2), so $b=2$. From (0,2) to (2,5), the rise is 3 and the run is 2, so $m = \frac{3}{2}$.

Check with $(-2, -1)$: $\frac{3}{2}(-2) + 2 = -1$. The equation is $y = \frac{3}{2}x + 2$.

Problem 7: Slope and a point

Substitute into $y = mx + b$: $3 = \frac{4}{5}(10) + b$, so $3 = 8 + b$ and $b = -5$.

The equation is $y = \frac{4}{5}x - 5$.

Problem 8: Point-slope form

Point-slope form: $y + 1 = 3(x - 2)$.

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

Problem 9: Line through two points

Slope: $m = \frac{11-3}{5-1} = 2$. Use point-slope with $(1, 3)$: $y - 3 = 2(x - 1)$.

Distribute and add 3: $y = 2x - 2 + 3$, so $y = 2x + 1$. Check $(5, 11)$: $2(5) + 1 = 11$.

Problem 10: Standard to slope-intercept

Subtract $3x$: $4y = -3x + 12$. Divide by 4: $y = -\frac{3}{4}x + 3$.

The slope is $-\frac{3}{4}$ and the y-intercept is 3.

Problem 11: Slope-intercept to standard

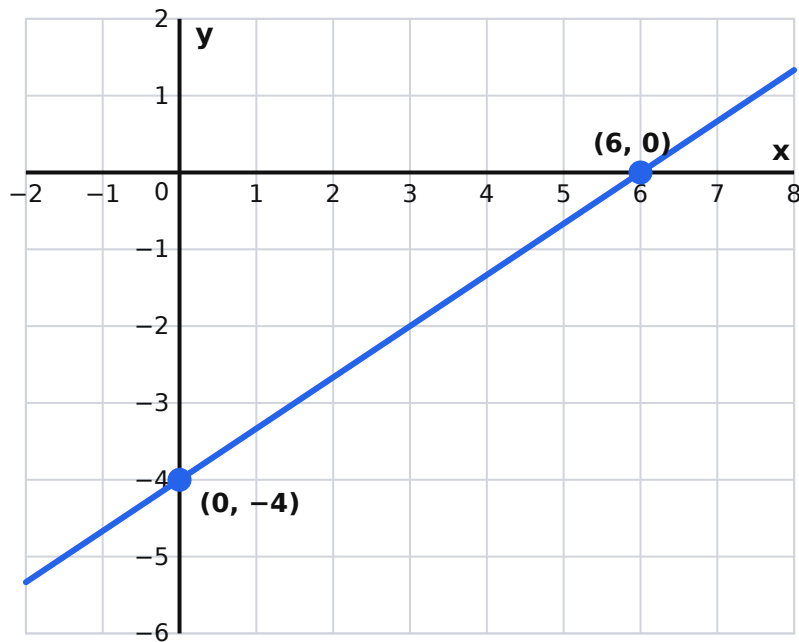
Multiply every term by 5: $5y = -2x + 20$. Add $2x$ to both sides: $2x + 5y = 20$.

Check $(0, 4)$: $2(0) + 5(4) = 20$.

Problem 12: Intercepts and graph

Let $y = 0$: $4x = 24$, so $x = 6$. Let $x = 0$: $-6y = 24$, so $y = -4$.

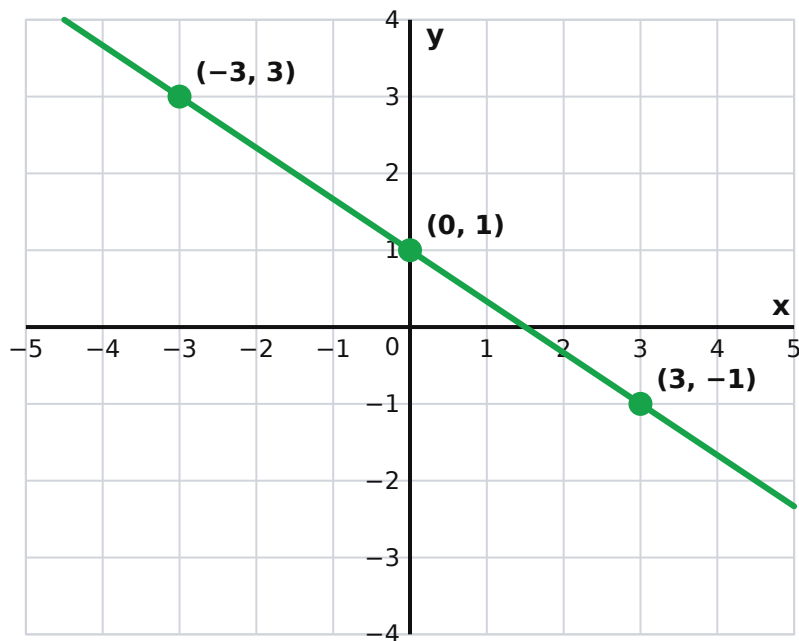
The intercepts are $(6, 0)$ and $(0, -4)$. Draw the line through them.



The line has slope $\frac{2}{3}$.

Problem 13: Graph from slope-intercept

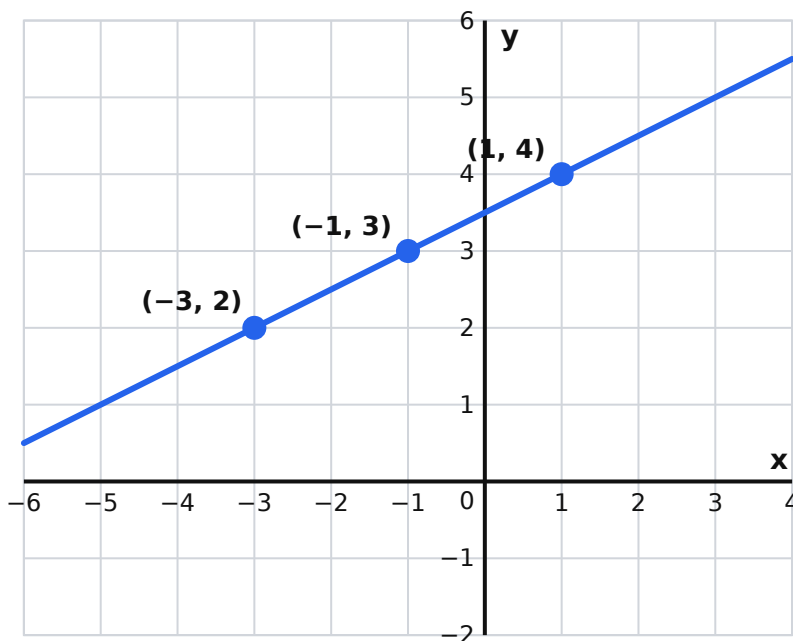
Plot the y-intercept $(0,1)$. The slope $-\frac{2}{3}$ means down 2, right 3: plot $(3,-1)$. Going the other way (up 2, left 3) gives $(-3,3)$.



Three points on the line.

Problem 14: Graph from point-slope

The equation is in point-slope form with $(x_1, y_1) = (-3, 2)$ and $m = \frac{1}{2}$. Plot $(-3, 2)$, then go up 1 and right 2 to $(-1, 3)$, and again to $(1, 4)$.



Three points on the line.

Problem 15: Parallel line

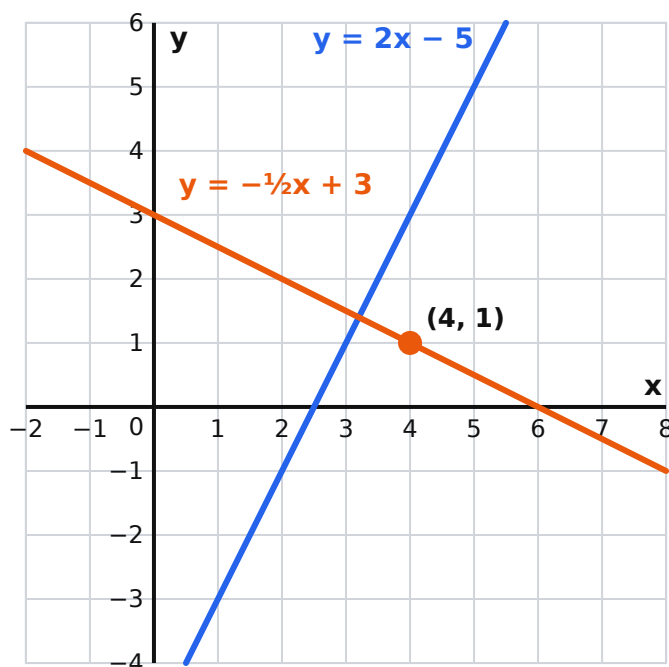
Parallel lines have equal slopes, so $m = 4$. Point-slope form: $y + 2 = 4(x - 3)$.

Distribute: $y + 2 = 4x - 12$. Subtract 2: $y = 4x - 14$.

Problem 16: Perpendicular line

The slope of the given line is 2. The negative reciprocal is $-\frac{1}{2}$. Point-slope form: $y - 1 = -\frac{1}{2}(x - 4)$.

Distribute: $y - 1 = -\frac{1}{2}x + 2$. Add 1: $y = -\frac{1}{2}x + 3$.



The two lines meet at a right angle at $(4,1)$.

Problem 17: Gym membership

- The rate is \$18 per month and the starting amount is \$25: $C = 18m + 25$.
- $C = 18(9) + 25 = 162 + 25 = 187$. The cost is **\$187**.
- $18m + 25 = 277$, so $18m = 252$ and $m = 14$. It takes **14 months**.

Problem 18: Data plan table

- When x increases by 2, y increases by 11 each time (31, 42, 53, 64). The rate of change is constant at $\frac{11}{2} = 5.5$, so the relationship is linear.
- $m = 5.5$. Use (2,31): $31 = 5.5(2) + b$, so $b = 20$. The equation is $y = 5.5x + 20$.
- $y = 5.5(15) + 20 = 82.5 + 20 = 102.5$. It costs **\$102.50**.

Problem 19: Road trip

- $\frac{145-55}{3-1} = \frac{90}{2} = 45$. The speed is **45 miles per hour**.
- $d = 45t + b$. Using (1,55): $55 = 45 + b$, so $b = 10$. The equation is $d = 45t + 10$ (Jamal starts 10 miles from home).
- $d = 45(5) + 10 = 235$. The distance is **235 miles**.

Problem 20: Temperature conversion

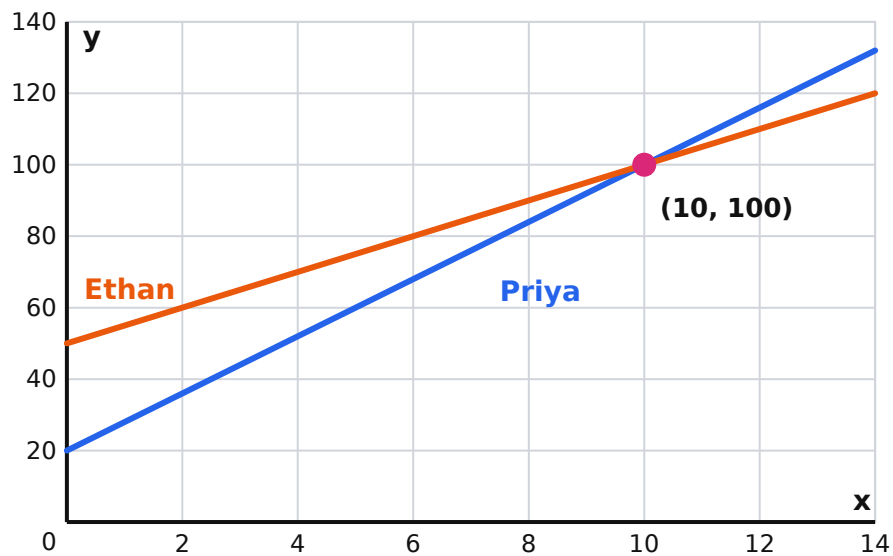
- $m = \frac{212-32}{100-0} = \frac{180}{100} = \frac{9}{5}$. The y-intercept is 32 (the point (0,32)), so $F = \frac{9}{5}C + 32$.
- $F = \frac{9}{5}(25) + 32 = 45 + 32 = 77$. That is 77°F .
- $77 = \frac{9}{5}C + 32$, so $45 = \frac{9}{5}C$ and $C = 45 \cdot \frac{5}{9} = 25$. That is 25°C .

Problem 21: Notebooks and binders

- a. If $y=0$: $3x=60$, so $x=20$: the intercept $(20,0)$ means 20 notebooks and no binders. If $x=0$: $5y=60$, so $y=12$: the intercept $(0,12)$ means 12 binders and no notebooks.
- b. $3(5)+5y=60$, so $5y=45$ and $y=9$. She can buy **9 binders**.

Problem 22: Two savings plans

- a. Priya: $s=8w+20$. Ethan: $s=5w+50$.
- b. Set them equal: $8w+20=5w+50$, so $3w=30$ and $w=10$. Then $s=8(10)+20=100$. After **10 weeks** each has **\$100**.



The graphs cross at (10,100).