

Writing Linear Equations from Graphs and Tables

Name: _____ Date: _____ Score: _____ / 26

Q Quick Review

To write a linear equation, you need two pieces of information: the **slope** (m) and a **point** (or the y -intercept). **From a graph:** read the y -intercept directly off the y -axis, then count rise/run to a clean grid intersection for slope. **From a table:** pick any two rows and use $m = \frac{\Delta y}{\Delta x}$, then use any one point to find b . **From two points:** compute slope first, then substitute one point into $y = mx + b$ to solve for b . A common mistake: using rise/run in the wrong order. Pick a direction and stay consistent — if you go right by Δx , your y change goes *from* the left point to the right point.

PRACTICE

Write the equation of each line.

- A line has slope 2 and crosses the y -axis at 3. Write its equation. _____
- Through (1, 5), (3, 11) _____
- Through (0, 4), (2, 0) _____
- Table: (1, 2), (2, 4), (3, 6), (4, 8) _____
- A table shows (0, 5), (1, 8), and (2, 11). Write the linear equation. _____
- Through (-1, -3), (2, 3) _____
- Through (0, -7), (5, 3) _____
- Table: (1, 10), (2, 8), (3, 6) _____
- Write the equation of the horizontal line through (3, 5). _____
- Vertical through (4, 7) _____
- Through (2, 6), $m = \frac{1}{2}$ _____
- Through (4, -2), (8, -6) _____
- A line goes through the origin and has slope -3. Write its equation. _____
- Table: (0, 0), (1, 4), (2, 8), (3, 12) _____
- Write the equation of the line through (1, -1) and (4, 5). _____
- A line has y -intercept -4 and slope $\frac{1}{3}$. Write its equation. _____
- Write the equation of the line through (6, 2) and (6, 9). _____
- Write the equation of the line through (3, 1) and (7, 1). _____
- A line passes through (-2, 5) and has slope -1. Write its equation. _____
- Table: (5, 12), (10, 17), (15, 22) _____

◆ VISUAL PRACTICE

Use the graph, table, chart, or diagram to answer the question.

21. Use the table to write the linear equation.

| | | | | |
|-----|---|---|----|----|
| x | 0 | 1 | 2 | 3 |
| y | 3 | 7 | 11 | 15 |

Answer: _____

22. Write the equation of the graphed line.

Answer: _____



◆ Word Problems

23. A gym costs \$30 to join and \$10 a month. Write the equation for total cost after m months.

Model: _____

Answer: _____

24. At $t = 0$, a young tree is 3 feet tall. After 5 years, it is 13 feet tall. Write a linear equation for the tree's height.

Model: _____

Answer: _____

25. A printer costs \$80 to buy plus \$0.05 per page. Write total cost after printing p pages.

Model: _____

Answer: _____

26. A scooter rental: 30 min costs \$10, 90 min costs \$22. Write the cost equation.

Model: _____

Answer: _____



Answer Keys

- | | |
|--|---|
| <ol style="list-style-type: none"> 1. $y = 2x + 3$ 2. $y = 3x + 2$ 3. $y = -2x + 4$ 4. $y = 2x$ 5. $y = 3x + 5$ 6. $y = 2x - 1$ 7. $y = 2x - 7$ 8. $y = -2x + 12$ 9. $y = 5$ 10. $x = 4$ 11. $y = \frac{1}{2}x + 5$ 12. $y = -x + 2$ 13. $y = -3x$ | <ol style="list-style-type: none"> 14. $y = 4x$ 15. $y = 2x - 3$ 16. $y = \frac{1}{3}x - 4$ 17. $x = 6$ 18. $y = 1$ 19. $y = -x + 3$ 20. $y = x + 7$ 21. $y = 4x + 3$ 22. $y = 2x - 1$ 23. $C = 10m + 30$ 24. $h = 2t + 3$ 25. $C = 0.05p + 80$ 26. $C = 0.20t + 4$ |
|--|---|

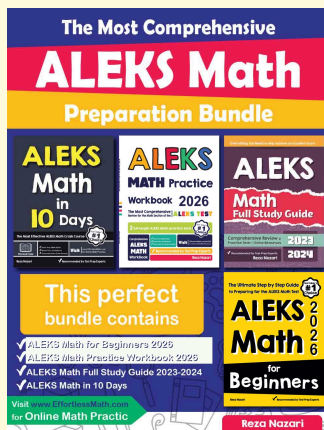
Step-by-Step Tutor Notes

1. In $y = mx + b$, the slope is m and the y -intercept is b . Here $m = 2$ and $b = 3$, so $y = 2x + 3$.
2. Use the labels on the display first; they tell you which count or total belongs in the answer. $m = \frac{11-5}{3-1} = 3$. $5 = 3 + b \Rightarrow b = 2$. This gives $y = 3x + 2$.
3. Line up the two changes first; that keeps the rate from getting mixed up. $b = 4$. Slope: $\frac{0-4}{2-0} = -2$. So the requested value is $y = -2x + 4$.
4. For a table question, slow down and locate the exact row, column, or cell before calculating. Slope 2. $(1, 2)$: $2 = 2 + b \Rightarrow b = 0$. Line through origin. This gives $y = 2x$.
5. The outputs increase by 3 each time x increases by 1, so the slope is 3. The row with $x = 0$ gives $b = 5$.
6. Read the table by matching the correct row and column first, then use the count or total that fits the question. $m = \frac{3-(-3)}{2-(-1)} = 2$. $3 = 2(2) + b \Rightarrow b = -1$. This gives $y = 2x - 1$.
7. Think of slope as the amount the output changes for each 1-unit change in the input. $b = -7$. Slope: $\frac{3-(-7)}{5} = 2$. So the requested value is $y = 2x - 7$.
8. For a table question, slow down and locate the exact row, column, or cell before calculating. Slope -2 . $10 = -2 + b \Rightarrow b = 12$. This gives $y = -2x + 12$.
9. A horizontal line keeps one constant y -value. Since this line passes through $y = 5$, its equation is $y = 5$.
10. Take it one clear step at a time and keep the original question in mind. Vertical means x is constant. Not a function. So the answer is $x = 4$.
11. Use the labels on the display first; they tell you which count or total belongs in the answer. $6 = \frac{1}{2}(2) + b \Rightarrow 6 = 1 + b \Rightarrow b = 5$. This gives $y = \frac{1}{2}x + 5$.
12. For a table question, slow down and locate the exact row, column, or cell before calculating. $m = \frac{-6-(-2)}{8-4} = -1$. $-2 = -4 + b \Rightarrow b = 2$. This gives $y = -x + 2$.
13. The origin gives a y -intercept of 0. With slope -3 , the equation is $y = -3x$.
14. Take it one clear step at a time and keep the original question in mind. Constant ratio $\frac{y}{x} = 4$. Through origin. So the answer is $y = 4x$.
15. The slope is $\frac{5-(-1)}{4-1} = 2$. Use $(1, -1)$ in $y = 2x + b$: $-1 = 2 + b$, so $b = -3$.
16. The slope becomes the coefficient of x , and the intercept is the constant term. That gives $y = \frac{1}{3}x - 4$.
17. Both points have $x = 6$, so this is a vertical line. Vertical lines are written $x = \text{constant}$.
18. Both points have $y = 1$, so this is a horizontal line. Horizontal lines are written $y = \text{constant}$.
19. Use $y = mx + b$ with $m = -1$. Substituting $(-2, 5)$ gives $5 = -(-2) + b = 2 + b$, so $b = 3$.
20. Use the labels on the display first; they tell you which count or total belongs in the answer. Slope 1. $12 = 5 + b \Rightarrow b = 7$. This gives $y = x + 7$.
21. The y -intercept is 3 and the rate of change is 4, so $y = 4x + 3$.
22. Compare the change in output to the change in input, because slope is a rate of change. The slope is 2 and the y -intercept is -1 . So the requested value is $y = 2x - 1$.
23. The joining fee is the starting value, so it is the y -intercept 30. The monthly charge is the slope 10, giving $C = 10m + 30$.
24. The starting height is 3 ft, so $b = 3$. The tree grows $\frac{13-3}{5-0} = 2$ ft per year, so the model is $h = 2t + 3$.
25. The printer purchase is the starting cost, so $b = 80$. Each page adds \$0.05, so the cost model is $C = 0.05p + 80$.
26. Slope: $\frac{22-10}{90-30} = \frac{12}{60} = 0.20$. $10 = 0.20(30) + b = 6 + b \Rightarrow b = 4$. So $C = 0.20t + 4$ (a \$4 base + \$0.20/min).



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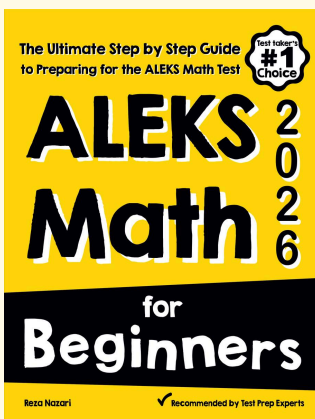
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