Point-Slope and Standard Form

Name: _____	Date: _____	Score: _____ / 24

Quick Review

There are several ways to write the same line. **Point-slope form** is $y - y_1 = m(x - x_1)$ — handy when you know the slope m and one point (x_1, y_1). **Slope-intercept form** is $y = mx + b$, the easiest form for graphing. **Standard form** is $Ax + By = C$, where A, B, and C are integers. You can switch between forms with algebra: distribute and solve for y to reach slope-intercept, or move terms around to reach standard form. They all describe the *same* line.

◇ **Example:** Write the equation of the line through $(3, 5)$ with slope 2 in slope-intercept form.
⇒ We're given a point and a slope, so point-slope form is the natural starting place. Plug in $m = 2$, $x_1 = 3$, $y_1 = 5$: $y - 5 = 2(x - 3)$. Now we just need to clean it up into $y = mx + b$ form. Distribute the 2 on the right: $y - 5 = 2x - 6$. Then add 5 to both sides to get y alone: $y = 2x - 1$. That's the same line, now in the form that's easy to graph.

Answer: $y = 2x - 1$

PRACTICE

Write each line in the requested form.

1. Point-slope: $m = 3,\ (1, 2)$ _____
2. Point-slope: $m = -2,\ (4, 1)$ _____
3. Point-slope: $m = 1,\ (0, 5)$ _____
4. Point-slope: $m = \frac{1}{2},\ (2, 3)$ _____
5. $y - 4 = 2(x - 1)$ to slope-int _____
6. $y - 1 = 3(x - 2)$ to slope-int _____
7. $y + 2 = -1(x - 3)$ to slope-int _____
8. $y - 5 = \frac{1}{2}(x - 4)$ to slope-int _____
9. $y = 2x + 6$ to standard form _____
10. $y = -3x + 4$ to standard form _____
11. $y = x - 7$ to standard form _____
12. $y = 4x$ to standard form _____
13. $2x + y = 8$ to slope-int _____
14. $3x - y = 6$ to slope-int _____
15. $x + 2y = 10$ to slope-int _____
16. $4x + 2y = 12$ to slope-int _____
17. Slope of $3x + y = 9$ _____
18. Slope of $2x - 4y = 8$ _____
19. y-intercept of $x + y = 5$ _____
20. $y - 0 = 5(x - 1)$ to slope-int _____

Word Problems

21. A line passes through the point $(2, 7)$ with slope 3. Write its equation in slope-intercept form. _____
22. A taxi's cost line passes through $(0, 4)$ and has slope 2. Write the equation in standard form. _____
23. A line is given in standard form as $5x + 2y = 20$. What is its slope and y-intercept? _____
24. A line through $(1, 1)$ has slope $\frac{1}{2}$. Write the equation in slope-intercept form. _____

Answer Keys

1. $y - 2 = 3(x - 1)$
2. $y - 1 = -2(x - 4)$
3. $y - 5 = 1(x - 0)$
4. $y - 3 = \frac{1}{2}(x - 2)$
5. $y = 2x + 2$
6. $y = 3x - 5$
7. $y = -x + 1$
8. $y = \frac{1}{2}x + 3$
9. $2x - y = -6$
10. $3x + y = 4$
11. $x - y = 7$
12. $4x - y = 0$
13. $y = -2x + 8$
14. $y = 3x - 6$
15. $y = -\frac{1}{2}x + 5$
16. $y = -2x + 6$
17. -3
18. $\frac{1}{2}$
19. 5
20. $y = 5x - 5$
21. $y = 3x + 1$
22. $2x - y = -4$
23. slope $-\frac{5}{2}$, y-intercept 10
24. $y = \frac{1}{2}x + \frac{1}{2}$

Step-by-Step Explanations

1. Plug into $y - y_1 = m(x - x_1)$: $y - 2 = 3(x - 1)$.
2. Plug into the form: $y - 1 = -2(x - 4)$.
3. Plug in: $y - 5 = 1(x - 0)$, which is just $y - 5 = x$.
4. Plug in: $y - 3 = \frac{1}{2}(x - 2)$.
5. Distribute: $y - 4 = 2x - 2$, then add 4: $y = 2x + 2$.
6. Distribute: $y - 1 = 3x - 6$, then add 1: $y = 3x - 5$.
7. Distribute: $y + 2 = -x + 3$, then subtract 2: $y = -x + 1$.
8. Distribute: $y - 5 = \frac{1}{2}x - 2$, then add 5: $y = \frac{1}{2}x + 3$.
9. Move the $2x$ over: $-2x + y = 6$, or equivalently $2x - y = -6$.
10. Add $3x$ to both sides: $3x + y = 4$.
11. Subtract x from both sides: $-x + y = -7$, or $x - y = 7$.
12. Move $4x$ over: $-4x + y = 0$, or $4x - y = 0$.
13. Subtract $2x$ from both sides: $y = -2x + 8$.
14. Subtract $3x$: $-y = -3x + 6$, then multiply by -1: $y = 3x - 6$.
15. Subtract x: $2y = -x + 10$, then divide by 2: $y = -\frac{1}{2}x + 5$.
16. Subtract $4x$: $2y = -4x + 12$, divide by 2: $y = -2x + 6$.
17. Solve for y: $y = -3x + 9$, so the slope is -3.
18. Solve for y: $-4y = -2x + 8$, so $y = \frac{1}{2}x - 2$; slope $\frac{1}{2}$.
19. Solve for y: $y = -x + 5$, so the y-intercept is 5.
20. Distribute: $y = 5x - 5$ (the $y - 0$ is just y).
21. Start with point-slope: $y - 7 = 3(x - 2)$. Distribute: $y - 7 = 3x - 6$, then add 7: $y = 3x + 1$.
22. Slope-intercept is $y = 2x + 4$. Move the $2x$ over: $-2x + y = 4$, or $2x - y = -4$.
23. Solve for y: $2y = -5x + 20$, so $y = -\frac{5}{2}x + 10$. The slope is $-\frac{5}{2}$ and the intercept is 10.
24. Point-slope: $y - 1 = \frac{1}{2}(x - 1)$. Distribute: $y - 1 = \frac{1}{2}x - \frac{1}{2}$, then add 1: $y = \frac{1}{2}x + \frac{1}{2}$.

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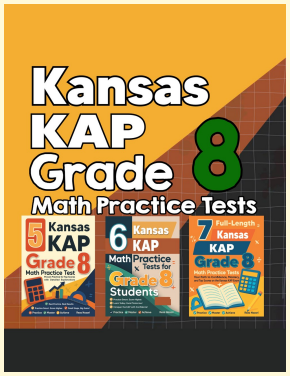

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