Topic 2 Review

Monday, August 31, 2020 5:26 PM

TOPIC 2

Topic Review

TOPIC ESSENTIAL QUESTION

1. Why is it useful to have different forms of linear equations?

Vocabulary Review

Choose the correct term to complete each sentence.

2. The slopes of two perpendicular lines are opposite reciprocals
3. The standard form of a linear equation is $Ax + By = C$, where A, B, and C are integers.
4. Nonvertical lines that are parallel have the same slope and different y-intercepts.
5. The slope-intercept form of a linear equation is $y = mx + b$.
6. You can write the equation of a line using any point (x_1, y_1) and the slope, m, in point-slope form, $y - y_1 = m(x - x_1)$.

- ~~parallel~~
- perpendicular
- ~~point-slope form~~
- ~~reciprocals~~
- ~~slope-intercept form~~
- ~~standard form~~
- y-intercept

Concepts & Skills Review

LESSON 2-1 Slope-Intercept Form

slope: rise/run

$y = mx + b$ — m: slope, b: y-intercept

Quick Review

The **slope-intercept form** of a linear equation is $y = mx + b$, where m is the slope of the line and the y-intercept is b. The slope-intercept form is useful when the slope and the y-intercept of the line are known.

Example

Write the equation of the line in slope-intercept form that passes through (0, 4) and (2, 3).

$m = \frac{4-3}{0-2}$ ····· Use the slope formula.

$= -\frac{1}{2}$

$b = 4$ ····· The line intersects y-axis at (0, 4).

$y = mx + b$ ····· Write the equation in slope-intercept form.

$y = -\frac{1}{2}x + 4$ ····· Substitute $-\frac{1}{2}$ for m and 4 for b.

Practice & Problem Solving

Sketch the graph of each equation.

7. $y = 3x - 1$
8. $y = -1.5x + 3.5$

Write the equation of the line in slope-intercept form that passes through the given points.

9. (2, 0) and (4, 6)
10. (−1, 8) and (5, −2)

11. **Model With Mathematics** Ricardo wants to buy a new tablet computer that costs $1,150. He will make a down payment of $250 and will make monthly payments of $50. Write an equation in slope-intercept form that Ricardo can use to determine how much he will owe after n months.

Slope $m = \frac{y_2 - y_1}{x_2 - x_1}$

TOPIC 2 REVIEW

TOPIC 2 Topic Review 83

7) $y = 3x - 1$ — slope: 3/1 = rise/run; y-int; +3, −1

9) $m = \frac{y_2 - y_1}{x_2 - x_1}$, $m = \frac{(6)-(0)}{(4)-(2)}$, $m = \frac{6}{2} = 3$

$y = mx + b$, $y = 3x + b$

Subst (2, 0) for x & y: $0 = 3(2) + b$, $0 = 6 + b$, $-6 = b$

$\therefore y = 3x - 6$

8) $y = -1.5x + 3.5$ — slope: −1.5 or $-\frac{3}{2}$; y-int

10) $m = \frac{y_2 - y_1}{x_2 - x_1}$, $m = \frac{(-2)-(8)}{(5)-(-1)} = \frac{-10}{6} = -\frac{5}{3}$

$y = mx + b$, $y = -\frac{5}{3}x + b$

Subst (−1, 8) for x & y: $8 = -\frac{5}{3}(-1) + b$, $8 = \frac{5}{3} + b$, $8 - \frac{5}{3} = b$, $\frac{24}{3} - \frac{5}{3} = b$, $\frac{19}{3} = b$

$\therefore y = -\frac{5}{3}x + \frac{19}{3}$

LESSON 2-2 Point-Slope Form

$y - y_1 = m(x - x_1)$ — (x_1, y_1) & m

Quick Review

The **point-slope form** of a linear equation is $y - y_1 = m(x - x_1)$, where m is the slope and (x_1, y_1) is a specific point and (x, y) is any point on the line. The point-slope form is useful when you know the slope and a point that is not (0, b).

Example

Write the equation of the line in point-slope form that passes through the points (2, 2) and (5, 1).

$m = \frac{y_2 - y_1}{x_2 - x_1}$ ····· Find the slope of the line.

$= \frac{1-2}{5-2}$ ····· Substitute (5, 1) for (x_2, y_2) and (2, 2) for (x_1, y_1).

$= -\frac{1}{3}$

$y - y_1 = m(x - x_1)$ ····· Write the equation in point-slope form.

$y - 2 = -\frac{1}{3}(x - 2)$ ····· Substitute $-\frac{1}{3}$ for m and (2, 2) for (x_1, y_1).

or $y - 1 = -\frac{1}{3}(x - 5)$

Practice & Problem Solving

Write the equation in point-slope form of the line that passes through the given point with the given slope.

12. (4, −2); $m = 0.5$ — $y - (-2) = 0.5(x - 4)$ → $y + 2 = 0.5(x - 4)$
13. (−2, 5); $m = -3$ — $y - 5 = -3(x - (-2))$ → $y - 5 = -3(x + 2)$

Write an equation in point-slope form of the line that passes through the given points.

14. (3, 1) and (−5, −2)
15. (1.5, 4) and (−2.5, 6)

16. **Reason** Jeffrey purchased a card for $180 that gives him 20 visits to a new gym and includes a one-time fee for unlimited use of the sauna. After 5 visits, Jeff has $123.75 left on the card, and after 11 visits, he has $74.25 left on the card. Write an equation that Jeffrey can use to determine the cost of each visit and the fee for the sauna use.

$m = \frac{y_2 - y_1}{x_2 - x_1}$

12) $y + 2 = 0.5(x - 4)$

13) $y - 5 = -3(x + 2)$

14) $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-2-1}{-5-3} = \frac{-3}{-8} = \frac{3}{8}$

$y - y_1 = m(x - x_1)$, $y - 1 = \frac{3}{8}(x - 3)$

or $y + 2 = \frac{3}{8}(x + 5)$

15) $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{6-4}{-2.5-1.5} = \frac{2}{-4} = -\frac{1}{2}$ or -0.5

$y - y_1 = m(x - x_1)$, $y - 4 = -0.5(x - 1.5)$

or $y - 6 = -0.5(x + 2.5)$

LESSON 2-3 Standard Form

$Ax + By = C$

Quick Review

The **standard form** of a linear equation is $Ax + By = C$, where A, B, and C are integers. The standard form is useful for graphing vertical and horizontal lines, for finding the

Practice & Problem Solving

17. If $C = 15$, what values of A and B complete $Ax + By = C$ for the graph shown? Write the

y-int; (0, 3); (5, 0)

other variable = 0

17) $3x + 5y = 15$

Quick Review

The **standard form** of a linear equation is $Ax + By = C$, where A, B, and C are integers. The standard form is useful for graphing vertical and horizontal lines, for finding the x- and y-intercepts, and for representing certain situations in terms of constraints.

Example

What are the x- and y-intercepts of the line $3x - 4y = 24$?

Substitute 0 for y and solve for x.

$3x - 4(0) = 24$

$x = 8$

Then substitute 0 for x and solve for y.

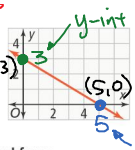
$3(0) - 4y = 24$

$y = -6$

The x-intercept is 8 and the y-intercept is -6.

Practice & Problem Solving

17. If $C = 15$, what values of A and B complete $Ax + By = C$ for the graph shown? Write the standard form of the equation.



Write each equation in standard form.

18. $y = 4x - 5$ **19.** $y - 3 = 5(4 - x)$

Determine the x- and y-intercepts of each line.

20. $5x - 3y = 30$ **21.** $x + 3y = 24$

22. Model With Mathematics Jung-Soon has $25 to spend on prizes for a game at the school fair. Lip balm costs $1.25 each, and mini-notebooks cost $1.50 each. Write a linear equation that can be used to determine how many of each prize she can buy.

other variable = 0

17) $3x+5y=15$

18) $y=4x-5$ slope-int

$+5 \quad -4 \quad +5 \quad -y$

$5 = 4x - y$ or $4x-y=5$

19) $y-3=5(4-x)$ pt-slope

$y-3=20-5x$

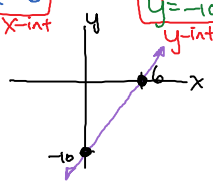
$+5x \quad +3 \quad +3+5x$

$5x+y=23$

20) $5x-3y=30$

x-int: set $y=0$: $5x-3(0)=30$, $5x=30$, $x=6$ x-int

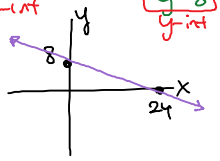
y-int: set $x=0$: $5(0)-3y=30$, $-3y=30$, $y=-10$ y-int



21) $x+3y=24$

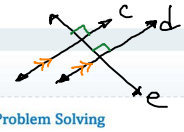
x-int: set $y=0$: $x+3(0)=24$, $x=24$ x-int

y-int: set $x=0$: $(0)+3y=24$, $y=8$ y-int



same slopes

negative reciprocal slopes



c ∥ d

c ⊥ e & d ⊥ e

LESSON 2-4 Parallel and Perpendicular Lines

Quick Review

Two nonvertical lines are **parallel** if they have the same slope, but different y-intercepts. Vertical lines are parallel if they have different x-intercepts. Two nonvertical lines are **perpendicular** if their slopes are opposite reciprocals. A vertical line and a horizontal line are perpendicular if they intersect and form right angles.

Example

Are the graphs of the equations $4y = 2x - 5$ and $y = -2x + 7$ parallel, perpendicular, or neither?

Determine the slope of each line.

$4y = 2x - 5$ $\qquad$ $y = -2x + 7$

$\frac{4y}{4} = \frac{2x-5}{4}$

$y = \frac{1}{2}x - \frac{5}{4}$

The slopes of the lines are $\frac{1}{2}$ and -2, so the graphs of the equations are perpendicular lines.

Practice & Problem Solving

23. The graphs of $3x + 9y = 15$ and $y = mx - 4$ are parallel lines. What is the value of m?

Write the equation for the line that passes through the given point and is parallel to the given line.

24. $(2, 1)$; $y = -3x + 8$ **25.** $(-3, -1)$; $x - 2y = 5$

Write the equation for the line that passes through the given point and is perpendicular to the given line.

26. $(1, 7)$; $x - 4y = 8$ **27.** $(2, 6)$; $y = 0.5x - 3$

Are the graphs of the given pairs of equations parallel, perpendicular, or neither?

28. $y = \frac{1}{4}x - 8$; $2x + y = 5$

29. $3y + 2x = 9$; $y = -\frac{2}{3}x - 4$

TOPIC 2 REVIEW

23) $3x+9y=15$

$-3x \quad -3x$

$\frac{9y}{9} = \frac{-3x+15}{9}$

$m: \frac{-3}{9}$

$\rightarrow -\frac{1}{3}$

24) NEW $y=mx+b$ (slope of -3 OLD line ?)

$1=-3(2)+b$

$1=-6+b$

$+6 \quad +6$

$7=b$

$y=-3x+7$

25) OLD: $x-2y=5$

$-x \quad -x$

$\frac{-2y}{-2} = \frac{-x+5}{-2} \quad -2$

$y=\frac{1}{2}x-\frac{5}{2}$

NEW $y=mx+b$

$-1=(\frac{1}{2})-3+b$

$-1=-\frac{3}{2}+b$

$+\frac{3}{2} \quad +\frac{3}{2}$

$\frac{1}{2}=b$

$\therefore y=\frac{1}{2}x+\frac{1}{2}$

26) OLD: $x-4y=8$

$-x \quad -x$

$\frac{-4y}{-4} = \frac{-x+8}{-4} \quad -4$

$m: \frac{-1}{-4} = \frac{1}{4}$

NEW: $y=mx+b$ neg reciprocal

$7=(-4)1+b$

$7=-4+b$

$+4 \quad +4$

$11=b$

$\therefore y=-4x+11$