3.4 Start Thinking

Equations are useful because they give you a way to represent what happens to y when the value of x is changed.

Think of a situation you can represent with x and y. Write an equation to show their relationship. For your situation, what does it mean when $x = 0$? When $y = 0$? Explain how thinking of these two instances can help you graph your equation.

3.4 Warm Up

Write a rule to relate the variables in the table.

1.

x	1	2	3	4
y	1	4	9	16

2.

x	0	2	4	6
y	1.5	1.3	1.1	0.9

3.

x	1	2	3	4
y	1	8	27	64

4.

x	1	2	3	4
y	9	15	21	27

3.4 Cumulative Review Warm Up

Solve the equation. Justify each step. Check your solution.

1. $6g = 18$

2. $p \div 6 = 2$

3. $-7r = 63$

4. $\frac{x}{7} = 7$

Name_____ Date _____

3.4 Practice A

In Exercises 1–3, graph the linear equation.

1. $x = 4$ **2.** $y = 3$ **3.** $x = -3$

In Exercises 4–7, find the *x*- and *y*-intercepts of the graph of the linear equation.

4. $2x - 5y = 10$ **5.** $3x + 4y = 12$

6. $-3x + 5y = -30$ **7.** $-6x - 4y = 24$

In Exercises 8–13, use intercepts to graph the linear equation. Label the points corresponding to the intercepts.

8. $2x + 4y = 8$ **9.** $3x + 2y = 12$

10. $-5x + 2y = 20$ **11.** $-4x + 4y = 20$

12. $-3x + 4y = 16$ **13.** $-2x + 6y = 24$

14. A dance team has two competitions on the same day. The coaches decide to split the 96-member team, sending some to each competition. Competition A requires four-member dance teams per event, and Competition B requires six-member dance teams per event. The equation $4x + 6y = 96$ models this situation, where x is the number of four-member teams and y is the number of six-member teams.

a. Graph the equation. Interpret the intercepts.

b. Find four possible solutions in the context of the problem.

15. Describe and correct the error in finding the intercepts of the graph of the equation.

$4x - 9y = 36$	$4x - 9y = 36$
$4x - 9(0) = 36$	$4(0) - 9y = 36$
$4x = 36$	$-9y = 36$
$x = 9$	$y = -4$

The intercept is at $(9, -4)$.

16. Write an equation in standard form of a line whose intercepts are fractions. Explain how you know the intercepts are fractions.

Name _____ Date _____

3.4 Practice B

In Exercises 1–3, graph the linear equation.

1. $y = 1$ **2.** $x = -2$ **3.** $y = 0$

In Exercises 4–7, find the *x*- and *y*-intercepts of the graph of the linear equation.

4. $-5x + 7y = -35$ **5.** $-6x - 9y = 54$

6. $4x - 3y = 1$ **7.** $x - 5y = 2$

In Exercises 8–13, use intercepts to graph the linear equation. Label the points corresponding to the intercepts.

8. $-6x + 3y = -18$ **9.** $-3x + 8y = -24$

10. $-x + 4y = 9$ **11.** $2x - y = 3$

12. $-\frac{1}{3}x + y = -3$ **13.** $-\frac{3}{2}x + y = 15$

14. Your club is ordering enrollment gifts engraved with your club logo. Key chains cost \$5 each. Wristbands cost \$2 each. You have a budget of \$150 for the gifts. The equation $5x + 2y = 150$ models the total cost, where x is the number of key chains and y is the number of wristbands.

a. Graph the equation. Interpret the intercepts.

b. Your club decides to order 18 key chains. How many wristbands can you order?

15. Describe and correct the error in finding the intercepts of the graph of the equation.

✗

$$\begin{aligned} 6x + 9y &= 18 \\ 6x + 9(0) &= 18 \\ 6x &= 18 \\ x &= 3 \end{aligned} \qquad \begin{aligned} 6x + 9y &= 18 \\ 6(0) + 9y &= 18 \\ 9y &= 18 \\ y &= 2 \end{aligned}$$

The x-intercept is at $(0, 3)$, and the y-intercept is at $(2, 0)$.

16. Write an equation in standard form of a line whose x-intercept is an integer and y-intercept is a fraction. Explain how you know that the x-intercept is an integer and the y-intercept is a fraction.

Name_____ Date _____

3.4 Enrichment and Extension

Challenge: *x*- and *y*-intercepts

In Exercises 1–12, find the *x*- and *y*-intercepts for the given equation. Assume that *a*, *b*, and *c* are all nonzero real numbers.

1. $ax + by = c$

2. $2ax + 2by = 4c$

3. $2ax + by = c$

4. $c + ax + by = c$

5. $ax + 2by - c = -2$

6. $x + by + c = 5c - 2$

7. $\frac{2}{a}x + \frac{b}{3}y = 6c$

8. $\frac{2}{5}x + \frac{1}{3}y = \frac{1}{15}$

9. $-5x + \frac{4}{5}y = \frac{c}{2}$

10. $\frac{1}{2}x - \frac{1}{4}y = -7$

11. $a^2x + 3by = 6a^3b^2$

12. $2.25x + 1.5y = 3.75$

Name _____ Date _____

3.4 Puzzle Time

Why Did The Horse Go To The Doctor?

Write the letter of each answer in the box containing the exercise number.

Find the *x*- and *y*-intercepts of the graph of the linear equation.

1. $3x + 4y = 24$

2. $-4x - 6y = 12$

3. $x + 9y = 36$

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

5. $y = 3$

6. $7x - 2y = 28$

7. $-\frac{1}{4}x + 2y = 8$

8. $\frac{1}{6}x - \frac{1}{3}y = 9$

9. $x = -14$

10. $13x - 14y = -26$

11. The student council is responsible for setting up the tables for an awards banquet at the end of the year. The council members need to decide what tables they should use. Eight people can sit at a circular table, while 12 people can sit at a rectangular table. There are 144 people who confirmed that they would attend. The equation $8x + 12y = 144$ models this situation, where x is the number of circular tables and y is the number of rectangular tables. Find the x- and y-intercepts.

Answers

E. x-intercept: $(-3, 0)$; y-intercept: $(0, -2)$

R. x-intercept: $(-32, 0)$; y-intercept: $(0, 4)$

Y. x-intercept: $(4, 0)$; y-intercept: $(0, -14)$

O. x-intercept: $(36, 0)$; y-intercept: $(0, 4)$

F. x-intercept: $(-14, 0)$; y-intercept: none

A. x-intercept: $(5, 0)$; y-intercept: $(0, -2)$

V. x-intercept: $(-2, 0)$; y-intercept: $\left(0, \frac{13}{7}\right)$

R. x-intercept: none; y-intercept: $(0, 3)$

H. x-intercept: $(18, 0)$; y-intercept: $(0, 12)$

F. x-intercept: $(54, 0)$; y-intercept: $(0, -27)$

E. x-intercept: $(8, 0)$; y-intercept: $(0, 6)$

9	3	5		11	4	6		8	1	10	2	7