Standard Form

In this lesson, you will learn to use intercepts to graph a line. Recall that a y-intercept is the y-coordinate of a point where a graph crosses the y-axis. The ***x-intercept*** is the x-coordinate of a point where a graph crosses the x-axis.

One form of a linear equation, called ***standard form***, *allows you to find intercepts quickly*. You can use the intercepts to then draw the graph.

KEY CONCEPT: STANDARD FORM OF A LINEAR EQUATION
The ***standard form of a linear equation***, *where A, B, and C are real numbers, and A and B are not both zero is*

$$Ax + By = C$$

PROBLEM 1: FINDING X- AND Y-INTERCPETS
Find the x- and y-intercepts of the graph of each equation.

1. $3x + 4y = 24$ 2. $5x - 6y = 60$ 3. $3x + 8y = -12$ 4. $-3x + 5y = 7$

5. $2x + 4y = 12$ 6. $x - 2y = 2$ 7. $-7x + 6y = 21$ 8. $-5x + 3y = -30$
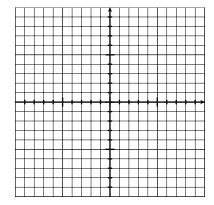
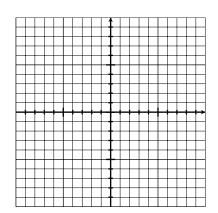**PROBLEM 2: GRAPHING A LINE USING INTERCEPTS**
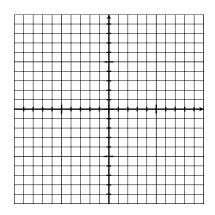
Graph each equation using the x- and y-intercepts.

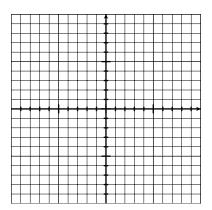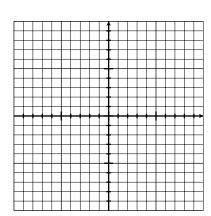9. $x - 2y = -2$ 10. $2x + 5y = 20$ 11. $2x - 3y = 12$
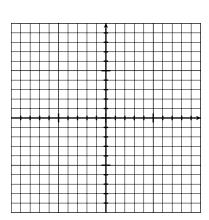
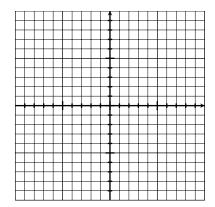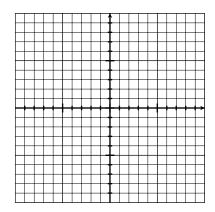12. $-x + 3y = 6$ 13. $6x - 2y = 18$ 14. $-4x + 3y = 18$

PROBLEM 3: GRAPHING HORIZONTAL AND VERTICAL LINES

If $A = 0$ in the standard form $Ax + By = C$, then you can write the equation in the form $y = b$, where b is a constant. If $B = 0$, you can write the equation in the form $x = a$, where a is a constant. The graph of $y = b$ is a **horizontal line**, and the graph of $x = a$ is a **vertical line**.

What is the graph of each equation?
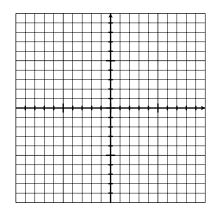
15. $x = 3$
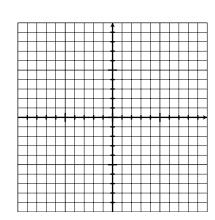
16. $y = -2$

17. $y = 3$

18. $x = -4$

PROBLEM 4: TRANSFORMIING TO STANDARD FORM

Given an equation in slope-intercept form or point-slope form, you can rewrite the equation in standard form using only integers.

Write eqch equation in standard form using integers.

19. $y = -\frac{2}{3}x + 5$

20. $y - 2 = -\frac{1}{5}(x + 6)$

21. $y = \frac{1}{5}x - \frac{3}{7}$

22. $y + 2 = \frac{2}{3}(x - 4)$

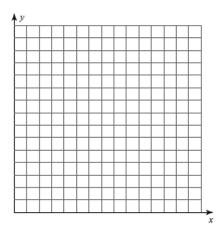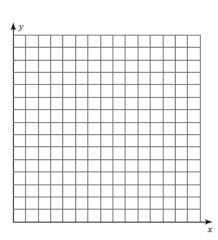23. $y = 2x + 5$ 24. $y + 3 = 4(x - 1)$ 25. $y = -\frac{1}{2}x - 4$ 26. $y - 3 = -\frac{1}{2}(x + 5)$
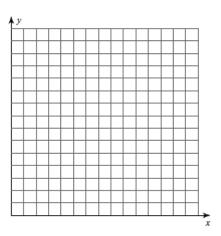
PROBLEM 5: USING STANDARD FORM AS A MODEL

27. A media download store sells songs for $2 each and movies for $12 each. You have $60 to spend. Write and graph an equation that describes the items you can purchase. What are three combinations of numbers of songs and movies you can purchase?

28. In a video game, you earn 5 points for each jewel you find. You earn 2 points for each star you find. Write and graph an equation that represents the numbers of jewels and stars you must find to earn 250 points. What are three combinations of jewels and stars you can find that will earn you 250 points?

29. A store sells T-shirts for $12 each and sweatshirts for $15 each. You plan to spend $120 on T-shirts and sweatshirts. Write and graph an equation that represents this situation. What are three combinations of T-shirts and sweatshirts you can buy for $120?

Name _____   Period _____

Find the x- and y-intercepts of each equation.

1. $3x - y = 9$ 2. $4x + 12y = -18$ 3. $7x - 2y = 4$

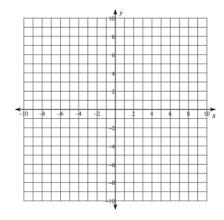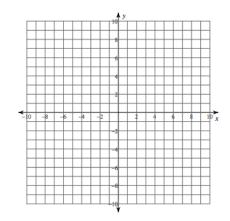## Graph each equation using the x- and y-intercepts.
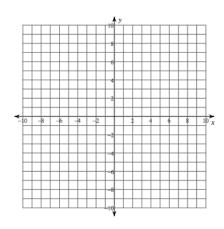
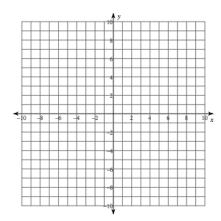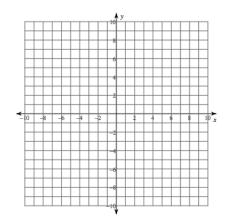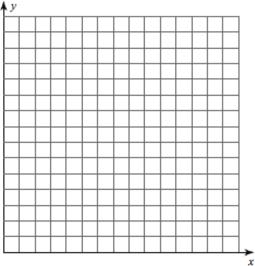4. $-3x + y = 6$ 5. $-2x - 4y = 8$ 6. $2 - y = x - 6$

7. $x = 4$ 8. $y = -2$

Write each equation in standard form using integers.

9. $y = 4x - 7$ 10. $y = -\dfrac{3}{4}x - 4$ 11. $y = \dfrac{7}{2}x + \dfrac{1}{4}$

12. The sophomore class holds a car wash to raise money. A local merchant donates all of the supplies. A wash costs $5 per car and $6.50 per van or truck.
   a.) Define a variable for the number of cars. Define a variable for the number of vans or trucks.
   b.) Write an equation in standard form to relate the number of cars and vans or trucks the students must wash to raise $800.
   c.) Graph the equation.
   d.) Identify three possible combinations of cars and vans or trucks that the students could wash to reach their goal.

13. You only have nickels and dimes in your piggy bank. When you ran your coins through a coin counter, it indicated that you have $5.95. Write an equation in standard form to represent the situation.

Write each equation in slope-intercept form **(y=mx+b).**

14. $8x - 10y = -100$

15. $3x - 27y = 18$

16. Suppose your school is having a talent show to raise money for new music supplies. You estimate that 200 students and 150 adults will attend. You estimate $200 in expenses.
   a.) **Write an equation to find what ticket prices you should set to raise $1000.**
   b.) **Graph your equation.**
   c.) **Choose three possible prices you could set for students' and adults' tickets. Which is the best choice? Explain.**