Name _____

4-2A Graphs of Functions

Objective To understand that the graph of an equation in two variables is the set of all of its solutions plotted in the coordinate plane • To choose and interpret the scale and the origin in graphs

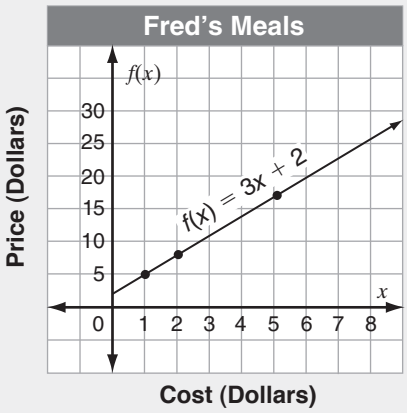
Fred's restaurant uses the equation $y = 3x + 2$ to determine how much to charge for a meal, where x equals the cost of the ingredients for the meal, in dollars, and y equals the price for the meal, in dollars. What are the solutions to the equation? What do they represent?

▶ To find the solutions to the equation, you can make a table and graph the function.

- Choose several values for x, the cost of ingredients. Make a table for the equation $f(x) = 3x + 2$.

x	1	2	5
$y = f(x)$	5	8	17

- Graph. Use the first quadrant, since neither the cost nor the price should be negative.
- Choose scales for the x- and y-axes that will include all values in the table. The input values for ingredient cost range from 1 to 5. The output values for meal price range from 5 to 17.
- The labels on the axes should be numbers that will make the graph easy to interpret. Choose numbers so that the graph is not too large or too small. In this case, intervals of \$5 on the $f(x)$-axis, and \$1 on the x-axis are reasonable.
- The domain of the function, or the independent variable, shows the cost of the ingredients and the range, or the dependent variable, shows the price of the meal. Therefore, each coordinate represents all the possible solutions to the function.



So, the solutions of the equation are the set of ordered pairs of input-output values that lie on the line $y = 3x + 2$. The solutions represent the prices for meals based on the cost of the ingredients.

Think
Graphs can be made to disguise or mislead information. Scales and labels are extremely important to represent data accurately and fairly.

Evaluate $f(x)$ for $x = -4$, 3, and 10. Then choose appropriate scales and intervals for the axes of the graph of the function.

1. $f(x) = 6x$

2. $f(x) = -x - 5$

3. Discuss and Write Look back at the teaching display. Would a scale for the $f(x)$-axis of 0 to 500 with intervals of 100 be a reasonable choice to graph the equation? Explain why or why not.

Name _____

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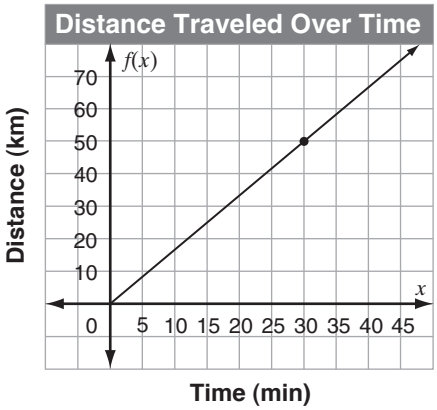
Use the graph for exercises 4–8.



4. What does the origin represent?

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5. What is the scale for the x-axis?

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6. What are the intervals on the x-axis?

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7. What is the scale for the $f(x)$-axis?

_____

8. What are the intervals on the $f(x)$-axis?

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9. What does the point $(30, 50)$ represent?

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Problem Solving

Solve. Use graph paper. Choose appropriate scales and intervals for your graphs.

10. The function $y = \frac{9}{5}x + 32$ converts the temperature in °C, x, to the temperature in °F, y. Graph the function. Use the graph to find the temperature in °F when it is −15°C.

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11. A tub is filled with water. The amount of water left in the tub after draining for x minutes is given by the function $f(x) = 400 - 25x$. Graph the function. Use the graph to find how much time it takes to drain the tub completely.

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12. Sam is saving money to buy a guitar that costs $220. The amount of money he has saved for the guitar after working x hours is given by the function $f(x) = 8.75x + \$18.75$. Graph the function. Use the graph to find how many hours Sam must work in order to have enough money for the guitar.

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13. The amount of profit that Marissa makes from selling handmade bracelets is given by the function $f(x) = 15.25x - 200$, where x is the number of bracelets sold. Graph the function. Use the graph to find the least number of bracelets Marissa must sell in order to make a profit.

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EXPLAIN YOUR REASONING

14. The function $f(x) = 9x + 50$ relates the time Kim works, in hours, to the amount of money that Kim earns, in dollars. How can you determine a scale to use for a graph that shows the amount Kim earns working in one week? Explain.

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