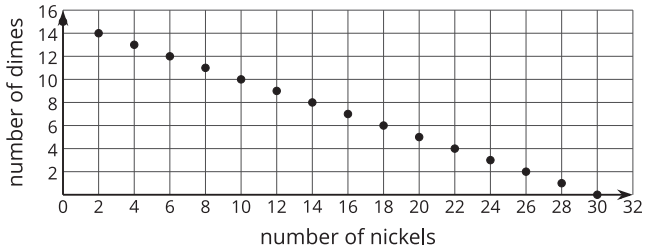
Unit 4 Family Support Materials

Linear Equations and Systems

In this unit, students analyze equations using variables to represent unknown values. For example, a recipe may call for 4 cups of vegetables. If you are going to use mushrooms (m), green beans (g), and broccoli (b), you might write $m + g + b = 4$ to represent the number of cups of each vegetable you plan to use.

$5n + 10d = 150$ may represent the number of dimes and nickels you could use to pay \$1.50 at a parking meter. For this situation, we can see that using more dimes to make \$1.50 means that we can use fewer nickels, and vice-versa.

A graph allows us to see the relationship between dimes and nickels even more clearly. As you move toward the right side of the graph, you are using more nickels and fewer dimes. As you move up the graph, you are using more dimes and fewer nickels.



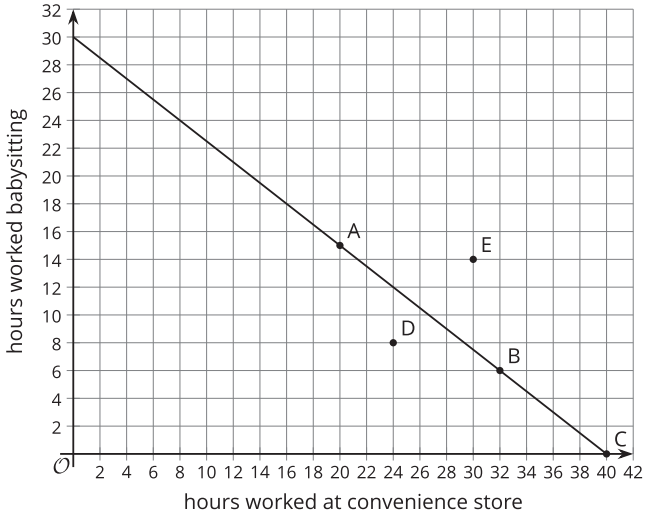
Each point on the graph represents a combination of nickels and dimes that totals \$1.50. For example, if you use 8 nickels, you will need 11 dimes.

Here is a task for you to try with your student:

Priya is saving money to go on a trip. The cost of the trip is \$360. She has a job at a convenience store, where she earns \$9 per hour, and she sometimes babysits for a family in her neighborhood, for which she earns \$12 per hour.

The equation $9x + 12y = 360$ represents all the combinations of hours Priya could work at each job to earn a total of \$360. Here is a graph showing those combinations:

1. What are the coordinates of point A?
2. What does it tell us about the number of hours Priya worked at each job?
3. Answer the same questions about points B and C.
4. Point D is not on the line. How should we interpret point D?
5. Point E is not on the line. How should we interpret point E?



Solution:

1. $(20, 15)$
2. Priya works 20 hours at the convenience store and 15 hours babysitting.
3. Point B: $(32, 6)$. Priya works 32 hours at the convenience store and 6 hours babysitting. Point C: $(40, 0)$. Priya works 40 hours at the convenience store and does not babysit at all.
4. Priya does not make enough money. She works 24 hours at the convenience store and 8 hours babysitting. She has made only \$312, because $24 \cdot 9 + 8 \cdot 12 = 312$.
5. Priya makes more than enough money: \$438. She works 30 hours at the convenience store and 14 hours babysitting. Her total earnings are $30 \cdot 9 + 14 \cdot 12 = 438$.