Unit 4 – Lesson 11 **Name: _____**

Constant Rates **Date: _____ Period: _____**

Focus Standard: 8.EE.B.5 Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. *For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.*

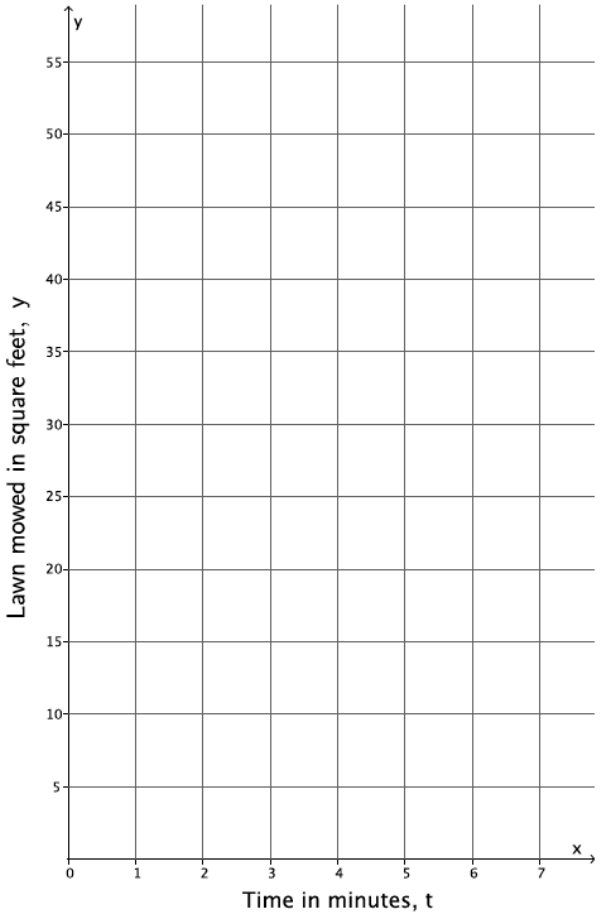
Student Outcomes

- Students know the definition of constant rate in varied contexts as expressed using two variables where one is t representing a time interval.
- Students graph points on a coordinate plane related to constant rate problems.

Example 1

Pauline mows a lawn at a constant rate. Suppose she mows a 35 square foot lawn in 2.5 minutes. What area, in square feet, can she mow in 10 minutes? t minutes?

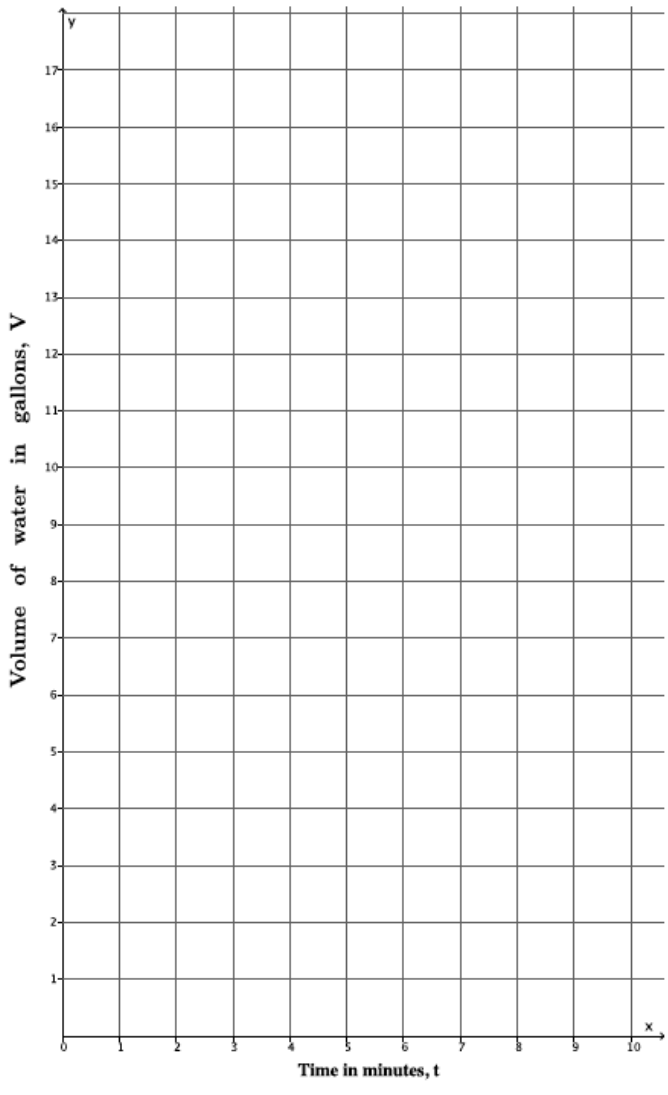
t (time in minutes)	Linear equation:	y (area in square feet)



Example 2

Water flows at a constant rate out of a faucet. Suppose the volume of water that comes out in three minutes is 10.5 gallons. How many gallons of water comes out of the faucet in t minutes?

t (time in minutes)	Linear equation:	V (in gallons)
0		
1		
2		
3		
4		



Exercises

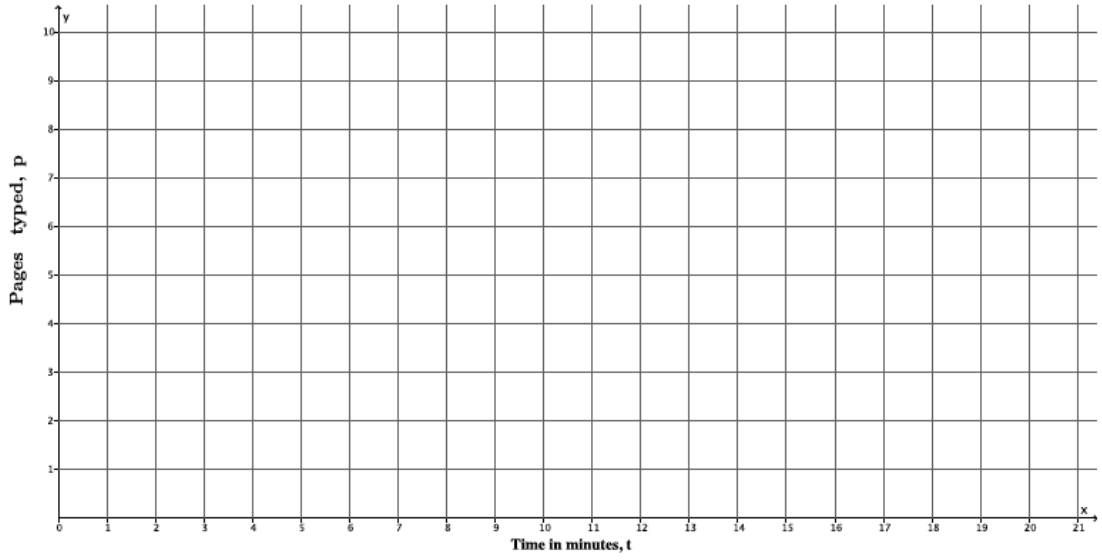
1. Juan types at a constant rate. He can type a full page of text in $3\frac{1}{2}$ minutes. We want to know how many pages, p, Juan can type after t minutes.

   a. Write the linear equation in two variables that represents the number of pages Juan types in any given time interval.

   b. Complete the table below. Use a calculator and round your answers to the tenths place.

t (time in minutes)	Linear equation:	p (pages typed)
0		
5		
10		
15		
20		

   c. Graph the data on a coordinate plane.



   d. About how long would it take Juan to type a 5-page paper? Explain.

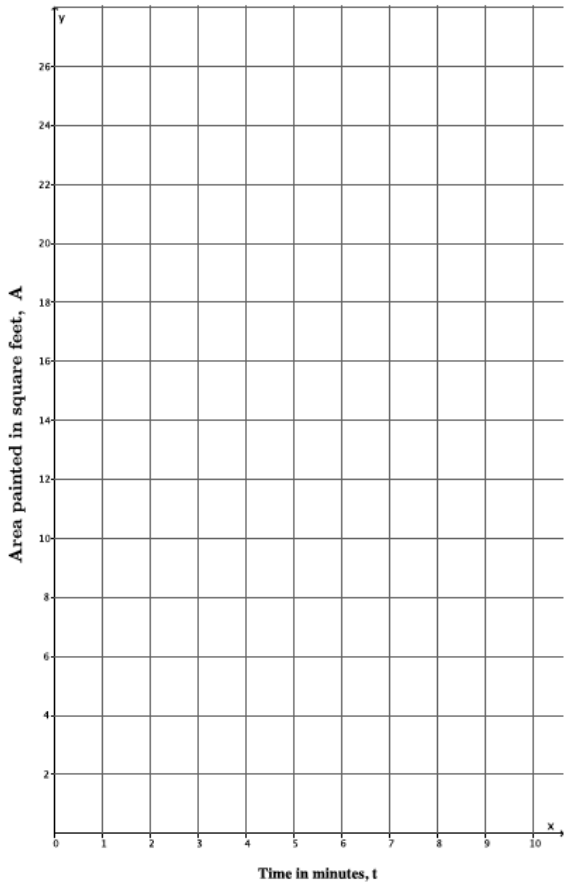
2. Emily paints at a constant rate. She can paint 32 square feet in 5 minutes. What area, A, in square feet, can she paint in t minutes?

   a. Write the linear equation in two variables that represents the number of square feet Emily can paint in any given time interval.

   b. Complete the table below. Use a calculator and round answers to the tenths place.

t (time in minutes)	**Linear equation:**	**A (area painted in square feet)**
0		
1		
2		
3		
4		

c. Graph the data on a coordinate plane.



d. About how many square feet can Emily paint in $2\frac{1}{2}$ minutes? Explain.

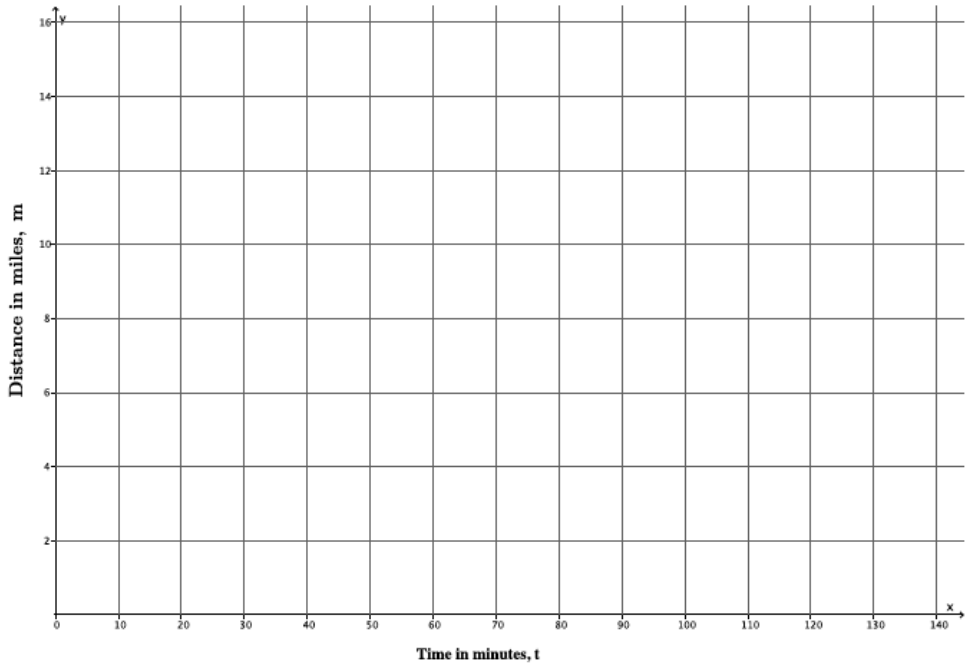
3. Joseph walks at a constant speed. He walked to a store that is one-half mile away in 6 minutes. How many miles, m, can he walk in t minutes?

   a. Write the linear equation in two variables that represents the number of miles Joseph can walk in any given time interval, t.

   b. Complete the table below. Use a calculator and round answers to the tenths place.

t (time in minutes)	**Linear equation:**	**m (distance in miles)**
0		
30		
60		
90		
120		

c. Graph the data on a coordinate plane.



d. Joseph's friend lives 4 miles away from him. About how long would it take Joseph to walk to his friend's house? Explain.

Problem Set

1. A train travels at a constant rate of 45 miles per hour.
   a. What is the distance, d, in miles, that the train travels in t hours?
   b. How many miles will it travel in 2.5 hours?

2. Water is leaking from a faucet at a constant rate of $\frac{1}{3}$ gallons per minute.
   a. What is the amount of water, w, in gallons per minute, that is leaked from the faucet after t minutes?
   b. How much water is leaked after an hour?

3. A car can be assembled on an assembly line in 6 hours. Assume that the cars are assembled at a constant rate.
   a. How many cars, y, can be assembled in t hours?
   b. How many cars can be assembled in a week?

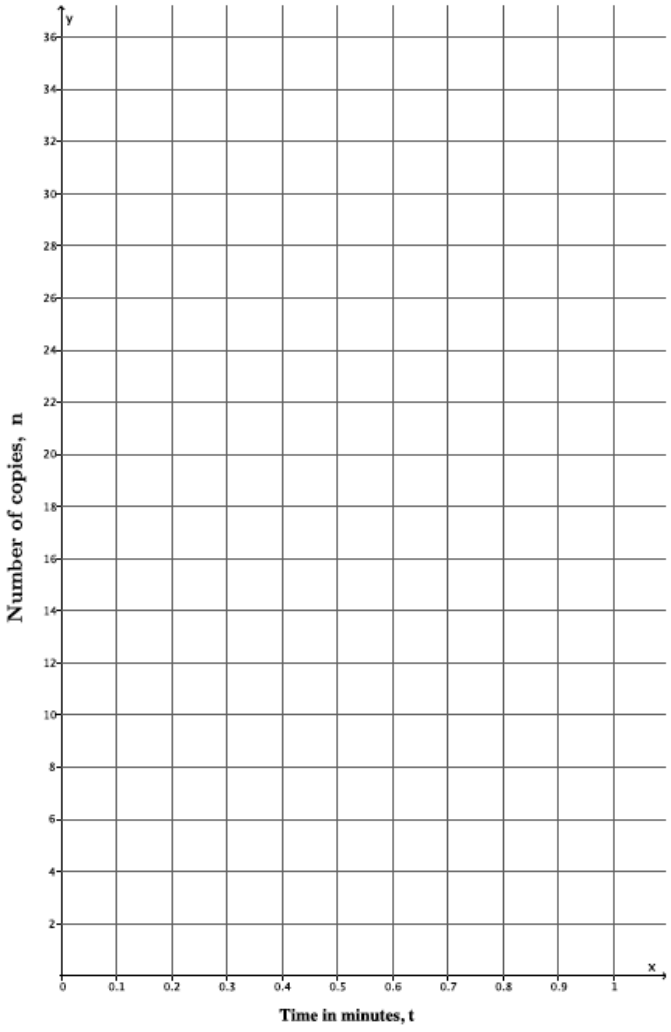
4. A copy machine makes copies at a constant rate. The machine can make 80 copies in $2\frac{1}{2}$ minutes.

   a. Write an equation to represent the number of copies, n, that can be made over any time interval, t.

   b. Complete the table below.

t (time in minutes)	Linear equation:	n (number of copies)
0		
0.25		
0.5		
0.75		
1		

c. Graph the data on a coordinate plane.



d. The copy machine runs for 20 seconds, then jams. About how many copies were made before the jam occurred? Explain.

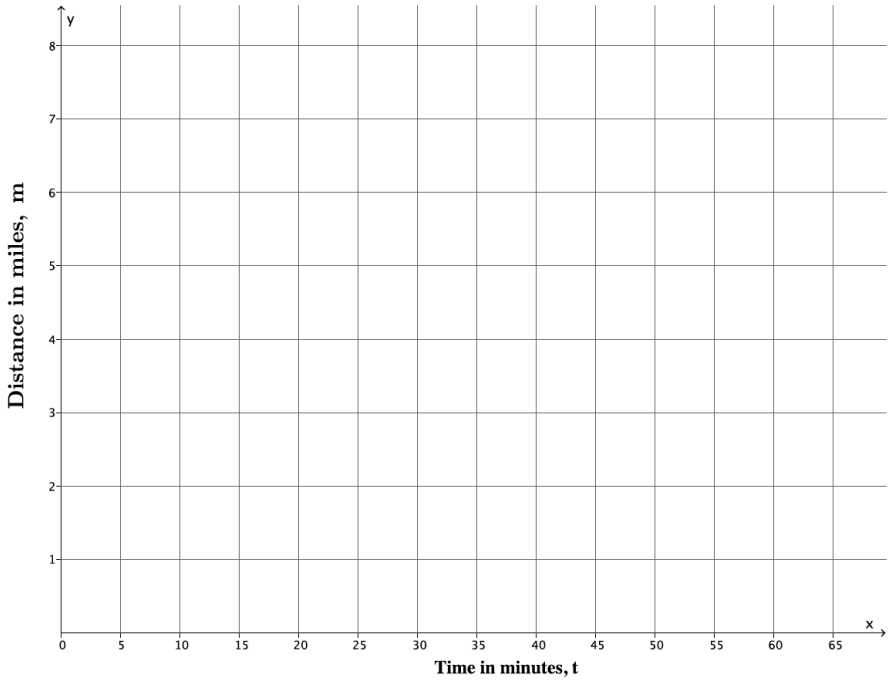
5. Connor runs at a constant rate. It takes him 34 minutes to run 4 miles.

a. Write the linear equation in two variables that represents the number of miles Connor can run in any given time interval, t.

b. Complete the table below. Use a calculator and round answers to the tenths place.

t (time in minutes)	Linear equation:	m (distance in miles)
0		
15		
30		
45		
60		

c. Graph the data on a coordinate plane.



d. Connor ran for 40 minutes before tripping and spraining his ankle. About how many miles did he run before he had to stop? Explain.