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LEARNING OBJECTIVE: We will look at constant rates using two variables and graph points related to constant rate problems. (G8M4L10)

CONCEPT DEVELOPMENT:

When we express a constant rate as a relationship between two variables, we can create **tables** to show the relationship and **graph** this relationship on a coordinate plane.

Example: Pauline mows a lawn at a constant rate. Suppose she mows 35 square feet in 2.5 minutes. How many square feet can she mow in *x* minutes?

Equation in 2 variables:

$\frac{y}{x} = \frac{\text{area (sq. ft)}}{\text{time (min)}}$ $\quad x\left(\frac{y}{x}\right) = \left(\frac{35}{2.5}\right)x$

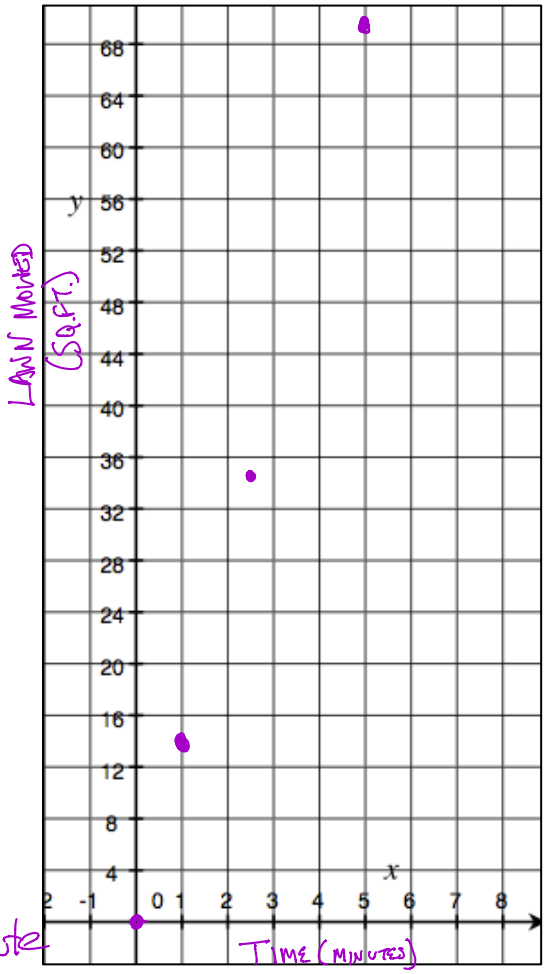
$y = \frac{35}{2.5}x$

$y = 14x$

Table:

Time (in minutes x)	Equation: $y = 14x$	Lawn mowed (in sq. feet) y
2.5	$y = 14(2.5)$	35
5	$y = 14(5)$	70
10	$y = 14(10)$	140
1	$y = 14(1)$	14

Graph:



> At 0 minutes, 0 lawn mowed

> Pauline mows 14 sq. ft in 1 minute

> Graph exist in Q1 only

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GUIDED PRACTICE:

Steps for Expressing Rates as Equations, Tables and in Graphs

1. Begin by creating a linear equation using 2 variables that includes the rate.
2. Create a table and fill in the values.
3. Label and create a graph based on the table of values.

Water leaks out of a faucet at a constant rate. In 4 minutes, 35 milliliters of water dripped out. How many milliliters of water leak out in *x* minutes?

Linear Equation (in two variables)

$\frac{y}{x} = \frac{mL}{min}$ $\frac{y}{x} = \frac{35}{4}$

$4y = 35x$

$\frac{4y}{4} = \frac{35x}{4}$

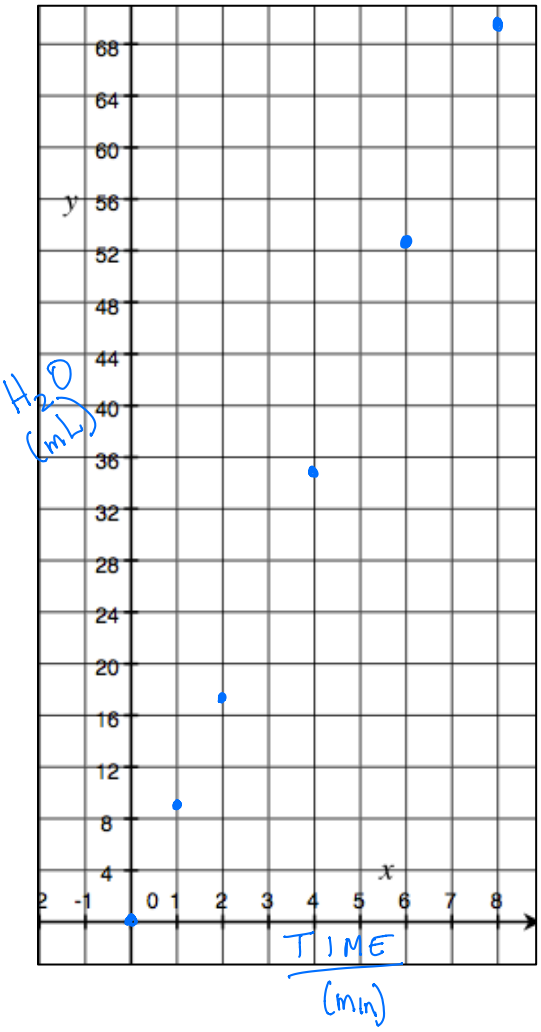
$y = \frac{35}{4}x$

$y = 8.75x$

The leak is 8.75 mL/min.

Table of values

Time (in minutes) x	Linear equation $y=8.75x$	Water (in mL) y
1	$y=8.75(1)$	8.75
2	$y=8.75(2)$	17.50
4	$y=8.75(4)$	35
6	$y=8.75(6)$	52.50
8	$y=8.75(8)$	70.



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Kaia has a part time job as a babysitter. She worked last Friday evening and earned $32.50 for working 2.5 hours. How much money would she earn in *x* hours?

Linear Equation (in two variables)

dollars / hrs.

$\frac{y}{x} = \frac{32.5}{2.5}$

$y = \frac{32.5}{2.5}x$

$y = 13x$

Kaia gets paid $13/hr.

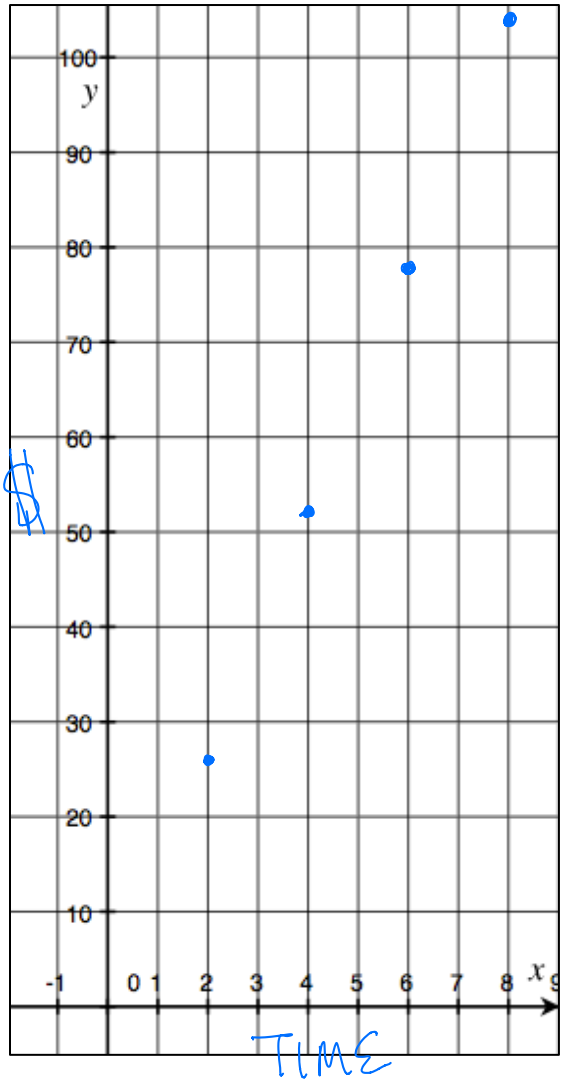

Table of values

Time (in hours) x	Linear Equation $y = 13x$	Money earned (in dollars) y
2	$y = 13(2)$	26
4	$y = 13(4)$	52
6	$y = 13(6)$	78
8	$y = 13(8)$	104

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Lucas types at a constant rate. He can type one full page of text in $3\frac{1}{2}$ minutes. How many pages can type in *x* minutes?

Linear Equation (in two variables)

$\frac{\text{Pages}}{\text{minute}} = \frac{y}{x} = \frac{1}{3.5}$

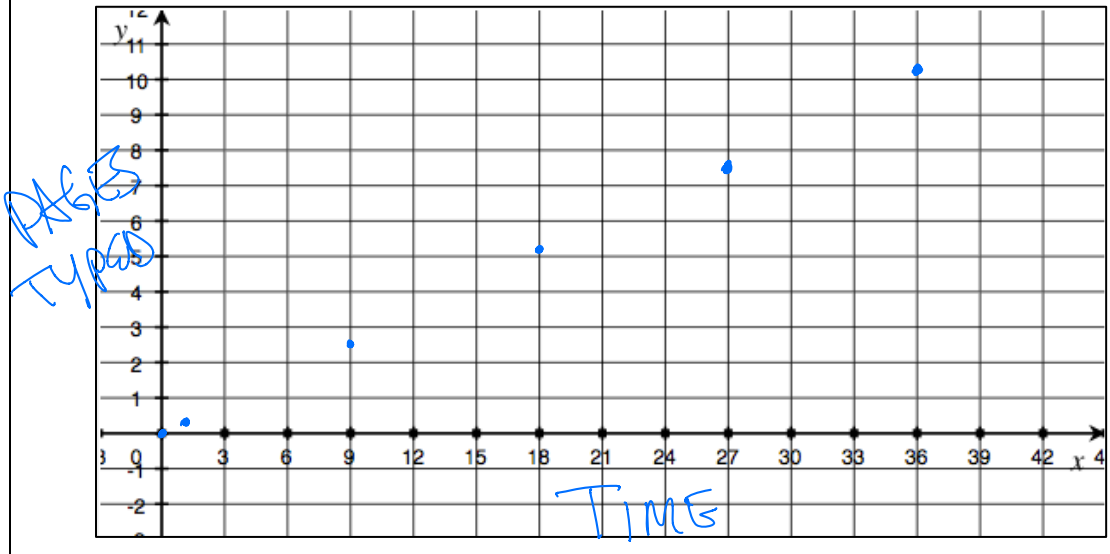
$y = \frac{1}{3.5}x$

$y = \frac{2}{7}x$

→ He types $\frac{2}{7}$ of a page in 1 min

Table of Values

Time (in minutes) x	Linear Equation $y = \frac{2}{7}x$	Pages typed y
1	$y = \frac{2}{7}(1)$	$\frac{2}{7}$
9	$y = \frac{2}{7}(9)$	$\frac{18}{7} = 2\frac{4}{7}$
18	$y = \frac{2}{7}(18)$	$\frac{36}{7} = 5\frac{1}{7}$
27	$y = \frac{2}{7}(27)$	$\frac{54}{7} = 7\frac{5}{7}$
36	$y = \frac{2}{7}(36)$	$\frac{72}{7} = 10\frac{2}{7}$



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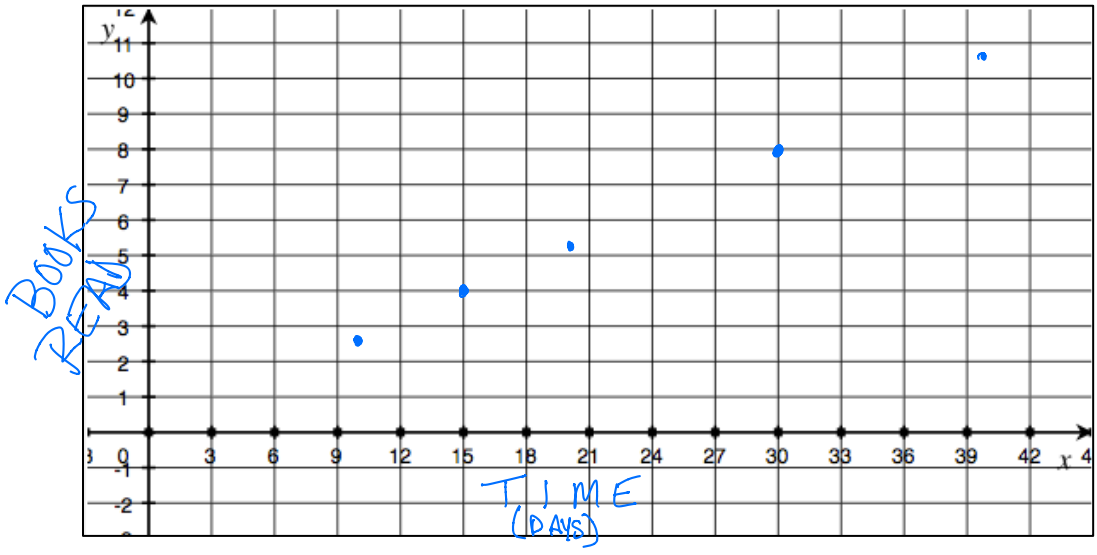
Rachel loves to read. She loves reading so much that she reads 4 books every 15 days. How many books can she read in *x* days?

Linear Equation (in two variables)

$y = \frac{4}{15}x$

Table of Values

Time (in days) x	Linear Equation $y = \frac{4}{15}x$	Books read y
10		$2\frac{2}{3}$
20		$5\frac{1}{3}$
30		8
40		$10\frac{2}{3}$



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Independent Practice:

Activating Prior Knowledge:

Closure:

Teacher Notes:

Lesson 11 from ENY Module 4, Grade 8. Can also give the Yummy Math light bulbs activity as independent practice.
Homework is Lesson 11 problem set.