

# Teacher Notes

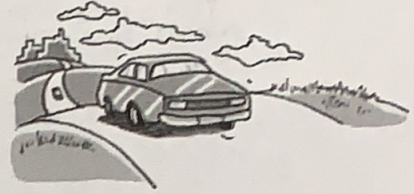
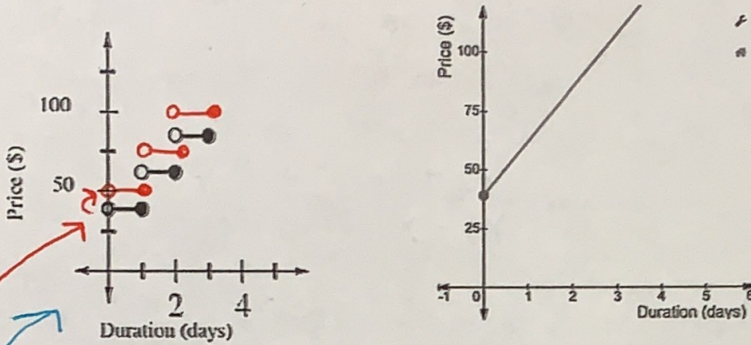
## 2.2.5 How can I model the relationship?



### Developing a Mathematical Model

2-109.

At Zoom Rent a Car, the average cost to rent a car is \$39 for the first day and an additional \$23 for each additional day.



Why would our graph look like the one on the left and not the one on the right? Explain.

this is the correct graph because the price of the rental stays constant over the entire day and shouldn't be increasing as the day goes on like the graph on the right.

2-110.

Refer to your work in problem 2-109. Describe how the graph would be transformed if the current average cost of a car rental has increased to \$50 for the first day.

If the price increased to \$50 for the first day it would change the graph to move up \$11.

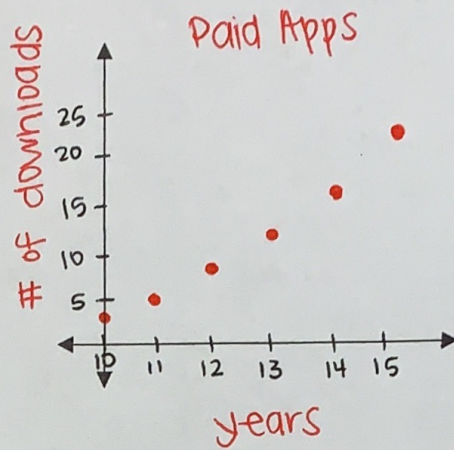
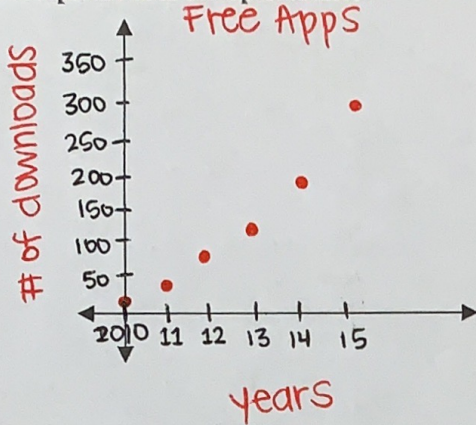
2-111.

The Marketing Director of Zoom Rent a Car, Tess LaCarre, has branched out to form a new company. Ms. LaCarre has created an app that allows its users to comparison shop for a rental car, but she is not sure whether the app should be free or not. She has hired your research team to make predictions about the future of apps in 2020, using the following data.

Year	# of downloads of free apps (billions)	Year	# of downloads of paid apps (billions)
2010	22	2010	3
2011	40.5	2011	5
2012	73.5	2012	8
2013	120	2013	12
2014	189	2014	16.5
2015	288	2015	22



a. Graph the data on separate axes.



Notes:

Average Rate of Change Formula:  $= \frac{y_2 - y_1}{x_2 - x_1}$

b. The average rate of change is the change in the dependent quantity divided by the change in the independent quantity for two distinct points on a graph (i.e., the slope of the line containing those points). Using the data in the tables, what is the average rate of change for each type of app from 2010 to 2015?

Free Apps

$$\begin{aligned} x_1 &= 2010 \\ x_2 &= 2015 \\ y_1 &= 22 \\ y_2 &= 288 \end{aligned}$$

$$\frac{288 - 22}{2015 - 2010} = \frac{266}{5}$$

**53.2**

Paid Apps

$$\begin{aligned} x_1 &= 2010 \\ x_2 &= 2015 \\ y_1 &= 3 \\ y_2 &= 22 \end{aligned}$$

$$\frac{22 - 3}{2015 - 2010} = \frac{19}{5}$$

**3.8**

c. Can you use the average rate of change to help you predict the number of apps that will be downloaded in 2020? Why or why not?

Answers vary

2-114.

b. What is the average rate of change in percentage of free apps downloaded from 2010 to 2015?

$$\frac{93 - 88}{2015 - 2010} = \frac{5}{5} = \boxed{1}$$

d. Using this analysis, does your recommendation for Ms. LaCarre change?

Answers vary

Year	% of free apps downloaded
2010	88
2011	89
2012	90
2013	91
2014	92
2015	93