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Calculating the Slope of a Line

This tutorial covers **how to**:

- calculate the slope of a straight line

1 Rise Over Run

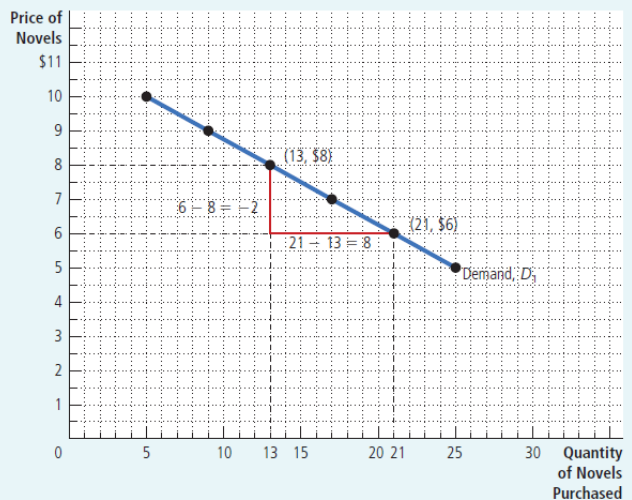
Algebra is all about x s and y s; economics is all about P s and Q s. But everything you learned about algebra in the context of (x, y) applies to economics in the context of (Q, P) . Names and symbols don't matter.

The slope of a straight line is the ratio of change in y (i.e., the rise) to the change in x (i.e., the run), and that's true for P and Q , too. Let's explore this using Emma's demand curve for novels D_1 in Mankiw's (2018) Figure A-5.

FIGURE A-5

Calculating the Slope of a Line

To calculate the slope of the demand curve, we can look at the changes in the x - and y -coordinates as we move from the point (21 novels, \$6) to the point (13 novels, \$8). The slope of the line is the ratio of the change in the y -coordinate (-2) to the change in the x -coordinate ($+8$), which equals $-\frac{1}{4}$.



Notice that the number of novels Q replaces x on the horizontal axis, and the price of novels P replaces y on the vertical axis.

Emma buys 13 novels if the price is \$8 per novel. If the price drops to \$6, she buys 21 novels.

The change in price is

$$\$6 - \$8 = -\$2$$

and the corresponding change in quantity demanded is

$$21 - 13 = 8$$

The slope of demand curve D_1 is the ratio of the change in the price of novels ($-\$2$) to the change in Emma's quantity demanded of novels (8 novels).

$$-\frac{2}{8} = -\frac{1}{4}$$

dollars per novel.

What does the slope tell us? The slope of Emma's demand curve is a measure of the sensitivity of her book buying to the price of novels. We're usually interested in the rate at which her quantity demanded of novels varies with the price of novels; that's the change in quantity *per dollar*. The slope of her novel demand curve is actually the inverse of what we're usually interested in. So, since the slope of her demand curve is $-1/4$ dollars per novel, the rate at which she varies her quantity demanded of novels is -4 novels per dollar.

Practice Question

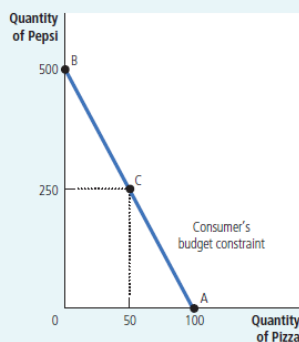
In Mankiw's (2018, Chapter 21) Figure 1, the three points A, B, and C are on a line. What is the slope of the line between points A and C? Also compute the slope between points B and C to confirm that the slope doesn't change along this, or any other, straight line.

The budget constraint shows the various bundles of goods that the consumer can buy for a given income. Here the consumer buys bundles of pizza and Pepsi. The table and graph show what the consumer can afford if her income is \$1,000, the price of pizza is \$10, and the price of Pepsi is \$2.

Number of Pizzas	Liters of Pepsi	Spending on Pizza	Spending on Pepsi	Total Spending
100	0	\$1,000	\$ 0	\$1,000
90	50	900	100	1,000
80	100	800	200	1,000
70	150	700	300	1,000
60	200	600	400	1,000
50	250	500	500	1,000
40	300	400	600	1,000
30	350	300	700	1,000
20	400	200	800	1,000
10	450	100	900	1,000
0	500	0	1,000	1,000

FIGURE 1

The Consumer's Budget Constraint



Did you compute the change from A to C or the change from C to A? Either way, you get the

same answer. Where you start and end doesn't matter for computing slopes. It's one less thing to remember.

Reference

Mankiw, N. Gregory. *Principles of Economics*, 8/e. Cengage Learning, 2018.

Additional Resources

For questions about this topic, see a **Stat** or **Pre Calc** tutor at the Dolciani Mathematics Learning Center (Hunter East, 7th floor) or any tutor in the Economics Tutoring Center (Hunter West, 15th floor).

The Dolciani Mathematics Learning Center also provides related tutorials on several platforms—CDs, DVDs, and online. Online access is through PLATO. Visit the front desk at the Math Learning Center to create a PLATO account.

Resources at the Dolciani Mathematics Learning Center

<i>Topic</i>	<i>Situational DVDs</i>	<i>Tutorial CDs/DVDs</i>	PLATO
slope	J10	V3, X5, Z7, Z8	Support for Graphing
linear graphs		A4, V3, Z7, Z8	Support for Graphing

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