

## Chapter 3

# SUPPLY AND DEMAND

*Essentials of Economics in Context* (Goodwin, et al.), 2<sup>nd</sup> Edition

### Overview and Objectives

*This chapter presents traditional supply-and-demand analysis, including discussions of the slopes of the curves, factors that shift the curves, equilibrium, and market adjustment. The chapter also discusses the topic of elasticity.*

After reading and reviewing this chapter, the student should be able to:

1. Interpret supply and demand curves.
2. Understand the difference between a change in supply (demand) and a change in the quantity supplied (demanded).
3. List the nonprice determinants of supply by businesses and demand by households.
4. Understand the theory of market adjustment to eliminate a shortage or surplus.
5. Explain how price adjusts due to changes in supply and demand.
6. Define elasticity of demand and differentiate between elastic and inelastic demand.
7. Calculate the elasticity of demand.
8. Define elasticity of supply and differentiate between elastic and inelastic supply.

### Key Term Review

demand  
supply  
market price  
market quantity sold  
perfectly competitive market  
self-correcting market  
individual supply  
market (or aggregate) supply  
supply schedule  
supply curve  
change in the quantity supplied  
change in supply  
nonprice determinants of supply  
demand schedule  
demand curve  
market (or aggregate) demand

individual demand  
change in the quantity demanded  
change in demand  
nonprice determinants of demand  
substitute good  
complementary good  
surplus  
equilibrium  
market-clearing equilibrium  
shortage  
theory of market adjustment  
market disequilibrium  
elasticity  
price elasticity of demand  
price-inelastic demand  
price-elastic demand

price-inelastic demand (technical definition)	inferior goods
price-elastic demand (technical definition)	markup (or cost-plus) pricing
unit-elastic demand	price elasticity of supply
normal goods	income elasticity of demand

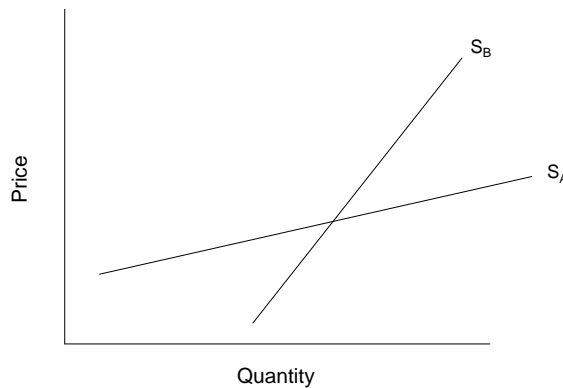
## Active Review

### *Fill in the Blank*

1. A curve indicating the quantities that buyers are willing to purchase at various prices is known as a(n) \_\_\_\_\_ curve.
2. Mark would like to buy a new car for \$20,000. However, he doesn't have any savings and he doesn't qualify for a loan. Thus, his desire for a car does not translate into \_\_\_\_\_ demand.
3. Tabitha needs furniture for her room. She is deciding between a medium-sized couch and a large armchair. Either the couch or the armchair could fulfill her need for sitting space in the room. The couch and the armchair can be referred to as \_\_\_\_\_ goods.
4. When people eat french fries, they like to put ketchup on them. Due to an increase in the price of french fries, total sales of french fries decrease. At the same time, ketchup sales also decrease. This phenomenon can be explained by noting that french fries and ketchup are \_\_\_\_\_ goods.
5. Surplus and shortage are both instances of \_\_\_\_\_.
6. In general, in a basic model showing supply and demand, if the supply curve shifts to the right, equilibrium price will \_\_\_\_\_ and equilibrium quantity supplied will \_\_\_\_\_.
7. When you drop by the only coffee shop in your neighborhood, you notice that the price of a cup of coffee has increased considerably since last week. You decide it's not a big deal, since coffee isn't a big part of your overall budget, and you buy a cup of coffee anyway. Most of the other coffee drinkers who frequent the coffee shop make a similar calculation. Thus, the demand for coffee in your neighborhood is relatively \_\_\_\_\_.
8. You sell muffins for one dollar each. If you raise your price by even one penny, you will lose all your customers. The demand curve for your muffins is thus \_\_\_\_\_.

9. The elasticity of demand is calculated as the percent change in \_\_\_\_\_ divided by the percent change in \_\_\_\_\_.
10. The responsiveness of demand to income is known as the \_\_\_\_\_ of demand.
11. The income elasticity of demand is \_\_\_\_\_ for inferior goods and \_\_\_\_\_ for normal goods.

**For Question #12, refer to the following graph:**



12. For a given price range, which of the supply curves in the graph shown above is characterized by a relatively greater elasticity of supply? \_\_\_\_\_

*True or False*

13. The price of limes could be a nonprice determinant of the supply of lemons.
14. Tastes and preferences act as nonprice determinants of demand.
15. In general, an increase in demand tends to increase equilibrium price and decrease equilibrium quantity.
16. If both supply and demand increase, the price of the good will also increase.
17. If demand increases and supply decreases, the price of the good will increase.
18. Perfectly elastic demand refers to a situation in which any price change for the good in question, no matter how small, will produce an "infinite" change in quantity demanded.
19. When the seller increases the price charged for a good with an elastic demand, the seller's revenues will go up.
20. Elasticity is the same as the slope of the demand curve.

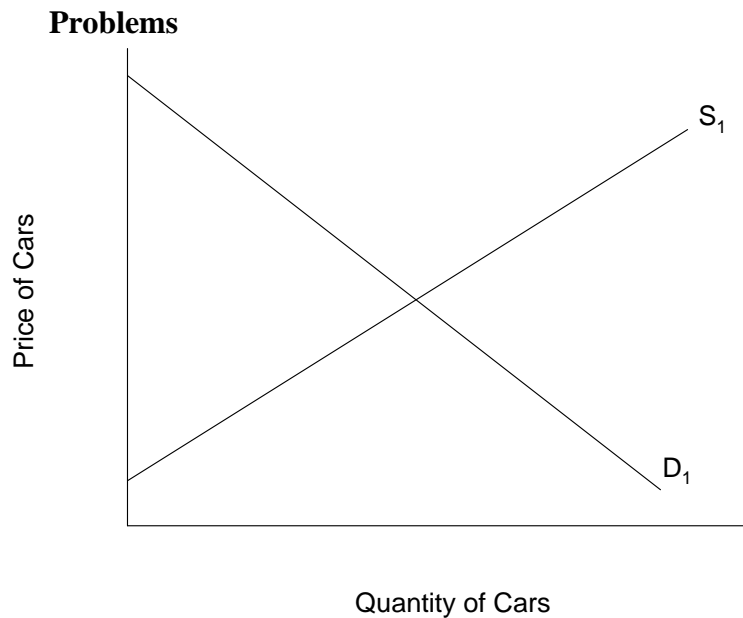
21. If a good is inferior and its price rises, the income effect will encourage greater expenditures, at the same time as the substitution effect pushes toward lower expenditures.

*Short Answer*

22. There are ten restaurants in your town. On a given night, each restaurant has the ability to produce up to twenty full course dinners at a price of \$20 each. What is the total market supply of full course dinners tonight, at a price of \$20? \_
23. Name six nonprice determinants of supply, for a producing business.
24. Why do demand curves generally slope downward?
25. Suggest a possible exception to the "law of demand," in which people buy less of a good as its price increases. \_
26. Explain the difference between a *change in quantity demanded* and a *change in demand*.
27. Describe a possible case in which adjustment to equilibrium may take many years, or not happen at all. \_\_\_\_
28. A new movie is released after having been heavily promoted to teenagers. On the first night, the tickets sell out and there are still teenagers waiting outside theaters, desperate to see the movie and unable to get a ticket. Is this market in equilibrium? Explain.

29. Name the three main reasons why demand for a good or service might be inelastic.

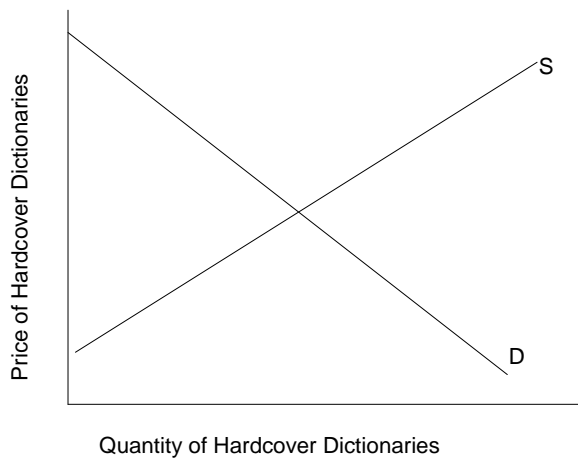
30. A 20% increase in the price of milk leads to a 10% reduction in the quantity of milk demand. What is the price elasticity of demand for milk?



1. For the following questions, refer to the graph shown above.

- Label the equilibrium point as  $E_1$ , the equilibrium quantity as  $Q_1$ , and the equilibrium price as  $P_1$ .
- Show how the supply curve will change if car manufacturers achieve a technological breakthrough that allows them to produce cars more cheaply.
- If the price stayed at  $P_1$ , would a surplus or a shortage result from the technological breakthrough described in part (b)? Answer in words, and show on the graph.

- d. Assuming market forces work quickly, show the new equilibrium price to which the market will adjust. Label this point as  $E_2$ . Label the new equilibrium quantity as  $Q_2$ , and the new equilibrium price as  $P_2$ .
- e. In words, summarize the information that you have shown in your adjustments to the graph in parts (a) through (d).



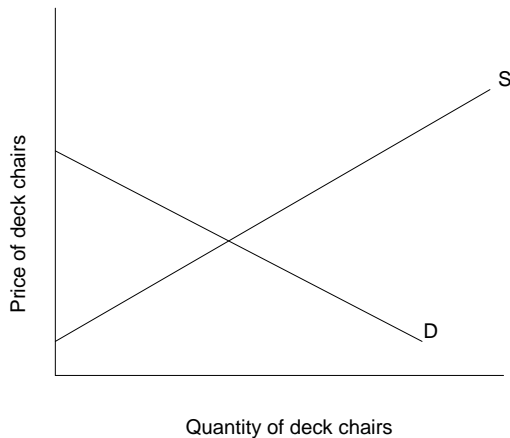
2. The graph above shows supply and demand for hardcover English dictionaries. Suppose that a new dictionary resource is created on the Internet, decreasing people's interest in buying large dictionaries in book form. For the questions below, state the answer in words and, where relevant, diagram your answer.

- a. What happens to the demand curve for hardcover dictionaries, as a result of this Internet innovation? (Answer in words and diagram.)
- b. What happens to the supply curve as a result of the Internet innovation? (Answer in words and diagram.)

- c. What happens to the price of hardcover dictionaries as a result of the innovation? Show the new price level on the graph you drew for part (b).
- d. Suggest one or more factors that could prevent this market from adjusting to equilibrium.

3. Refer again to the graph above, showing the market for hardcover dictionaries. What are the two types of change in this market that would lead the equilibrium price to *rise*?

4. In a popular new movie, a central character spends much of his time sitting on a white deck chair. Suddenly, white deck chairs come into fashion and everybody wants one. The graph below shows the market for deck chairs *before* the movie came out.

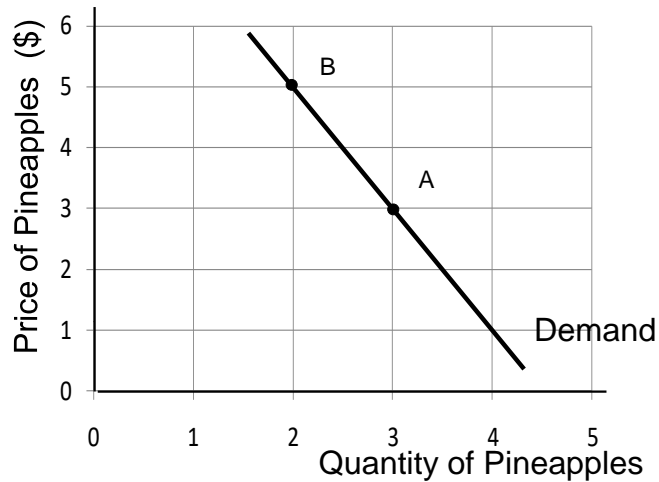


- a. On the diagram above, show what happens to the market for deck chairs as a result of the movie.
  - b. Show the size of the shortage that exists in the short term, before the market adjusts to equilibrium.
  - c. Label the new equilibrium point as  $E_2$ .
5. Using the same example of the market in white deck chairs, describe and, on separate graphs, show the changes in equilibrium price and quantity that would occur in response to the following events.

- a. A key input for making deck chairs becomes more expensive (*ceteris paribus*).
  - b. In a highly publicized event, someone falls off a poorly constructed deck chair and sustains a serious head injury (*ceteris paribus*).
6. Draw a diagram of a perfectly inelastic demand curve. Suggest an example of a good for which demand might be perfectly elastic.
7. A limited number of World War I uniforms have been preserved. No matter how much buyers are willing to pay for these uniforms as collectors items, there's no way to increase the quantity of uniforms in existence. Show the supply curve for authentic World War I uniforms.

**For Problem #8, refer to the following graph:**





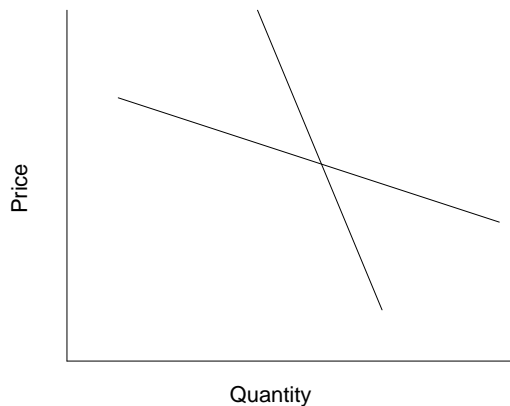
8. The graph above shows the demand curve for pineapples.

a. Calculate the amount of revenue the seller would receive if the price is set at \$3.

b. Calculate the amount of revenue the seller would receive if the price is set at \$5.

c. Reasoning from the results you just calculated, is the demand for bananas elastic or inelastic, in this range of prices? How do you know?

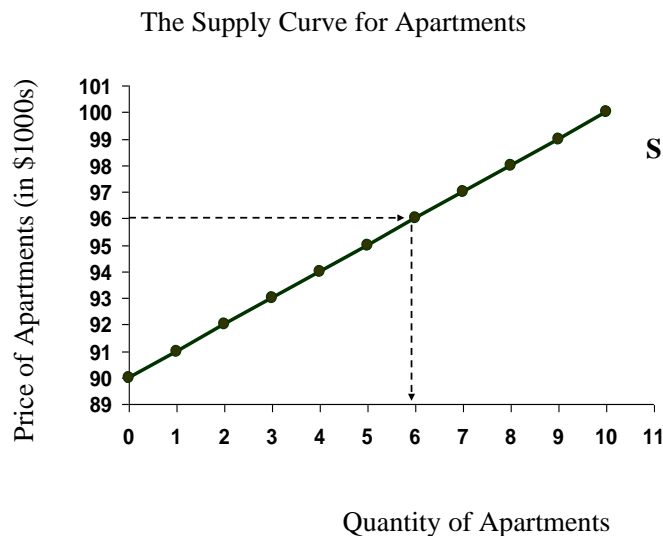
9. Suppose the demand for oranges is more price elastic in the demand for chocolate. On the graph below, indicate which line represents the demand for oranges, and which represents the demand for chocolate.



**Self Test**

1. Suppose when the price of shirts increases from \$20 to \$25, the quantity supplied increases. This change is best described as ...
  - a. movement along a supply curve.
  - b. a change in supply.
  - c. movement along a demand curve.
  - d. a change in demand.
  - e. none of the above.
  
2. Which one of the following statements is false?
  - a. Demand curves tend to slope downward.
  - b. The relationship between price and quantity demanded is generally positive.
  - c. The relationship between price and quantity supplied is generally direct.
  - d. At equilibrium, the quantity demanded equals the quantity supplied.
  - e. A shortage occurs when the quantity demanded exceeds the quantity supplied.

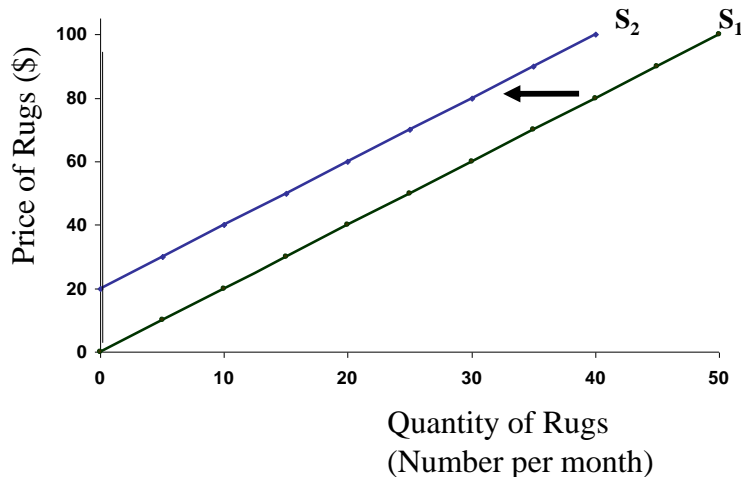
**Questions 3 and 4 refer to the following graph:**



3. In the graph above, up to ten apartments may be available for sale. Suppose that ten more apartment owners enter the market, for a total of twenty available apartments. These new entrants into the market would be willing to sell their apartments for any price above \$90,000. Which of the following statements accurately describes the resulting change in the supply curve?
  - a. The supply curve shifts upward.
  - b. The supply curve shifts to the right.
  - c. The supply curve shifts to the left.
  - d. The supply curve becomes longer.
  - e. The supply curve can no longer be represented by a straight line.

4. In the situation described in Question #3, how many apartment owners would be willing to sell their apartments for \$91,000?
- None
  - One
  - Two
  - Ten
  - Eleven
5. Which of the following statements is true, regarding the supply of a particular good, and that good's own price?
- A price increase shifts the supply curve to the right.
  - A price decrease shifts the supply curve to the right.
  - A price increase shifts the supply curve downward.
  - A price change alone does not shift the supply curve.
  - A price change is the only way to shift the supply curve.

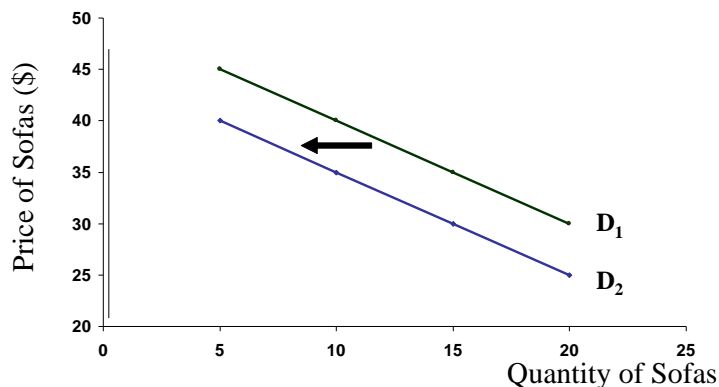
**Question #6 refers to the following graph.**



6. The graph shown above depicts two possible supply curves for production of handmade rugs.  $S_1$  is the initial supply curve, and  $S_2$  is the new supply curve after a change has occurred in the market. Which of the following events could have caused this shift?
- Several rug makers have left the market, making handmade rugs more scarce.
  - Several new rug makers have entered the market, making handmade rugs more plentiful.
  - The price of thread used in rugs has dropped, making it cheaper to produce rugs.
  - Rugs have come into fashion, so buyers want more of them.
  - Rugs have gone out of fashion, so buyers want fewer of them.

7. Which of the following is *not* an example of a “nonprice determinant of supply” of handmade rugs?
- Available technology for making rugs.
  - The price of looms for weaving rugs.
  - Number of rug producers.
  - Price of related goods and services.
  - Price of handmade rugs.
8. Suppose the number of engineers graduating from college increases at the same time as the demand for engineers increases. Which one of the following is true?
- The number of engineers employed will increase, and engineer wages will increase.
  - The number of engineers employed will increase, and engineer wages will decrease.
  - The number of engineers employed will increase, but the effect on engineer wages is ambiguous.
  - Engineer wages will increase, but the effect of the number of engineers employed is ambiguous.
  - The effect on both engineer wages and the number of engineers employed is ambiguous.

**Question #9 refers to the following graph.**

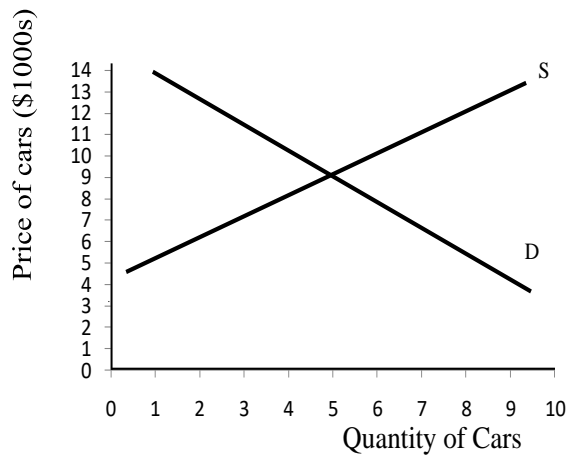


9. Assume that sofas and arm chairs are substitute goods. The graph shown above illustrates the demand curve for sofas. Which of the following events could have triggered the shift in demand from D<sub>1</sub> to D<sub>2</sub>, as shown above?
- The price of sofas increased.
  - The price of armchairs increased.
  - The price of labor for making sofas increased.
  - The price of sofas decreased.
  - The price of armchairs decreased.

10. A bike shop in a small town has received a shipment of 10 new bicycles. The shop offers the bikes for sale at a price of \$300 each. At this price, however, there are only two people in town who are willing to buy a bicycle. This situation can be described as

- a. disequilibrium
- b. shortage
- c. surplus
- d. equilibrium
- e. both a and c are correct

**Questions 11 to 13 refer to the graph below.**



11. When the price of cars is \$5000, which of the following terms is not an accurate description of the situation?

- a. Quantity demanded exceeds quantity supplied.
- b. A shortage exists.
- c. The market is in disequilibrium.
- d. Fewer than five cars are available for sale.
- e. The market is in equilibrium.

12. Beginning from the price of \$5000, which of the following events would be predicted by the theory of market adjustment?

- a. Some buyers who are willing to pay more will bid the price of cars up.
- b. The market will remain in disequilibrium.
- c. Prices will fall.
- d. All buyers will remain in the market.
- e. The supply and demand curves will shift to achieve equilibrium.

13. Now suppose that the local government invests in a new, very efficient fleet of buses. Now, it is easy and affordable to get from one place to another without having your own car. What change in the graph shown above is most likely to result from the new bus service?
- a. The supply curve shifts to the right.
  - b. The supply curve shifts to the left.
  - c. The demand curve shifts to the right.
  - d. The demand curve shifts to the left.
  - e. None of the above.
14. Suppose there is a drought that reduces the harvest of corn. At the same time, the demand for corn increases due to expanded use of ethanol fuels. Which one of the following statements is true?
- a. The price of corn will increase, but the effect on the quantity of corn sold is ambiguous.
  - b. The price of corn will decrease, but the effect on the quantity of corn sold is ambiguous.
  - c. The quantity of corn sold will increase, but the effect on the price of corn is ambiguous.
  - d. The quantity of corn sold will decrease, but the effect on the price of corn is ambiguous.
  - e. The effect on both the quantity of corn sold and the price of corn is ambiguous.
15. Which one of the following would be most likely to increase (shift to the right) the demand curve for public transportation?
- a. Increasing the frequency of bus stops
  - b. Lower fares for bus tickets
  - c. Lower prices for airline tickets
  - d. Higher gasoline prices
  - e. Lower automobile prices
16. The price of milk doubles, but the quantity demanded changes very little. Which of the following would *not* be a likely explanation for this phenomenon?
- a. There isn't a good substitute for milk.
  - b. People feel they need milk, rather than just wanting it.
  - c. Demand for milk is highly price elastic.
  - d. Milk is not a very big part of most people's budget.
  - e. All of the above are likely explanations for this phenomenon

17. Suppose a study finds that as people's incomes rise, they tend to buy fewer subway tokens because they are more likely to have a car. This would mean that subway tokens are
- a. normal goods
  - b. inferior goods
  - c. price elastic goods
  - d. price taker goods
  - e. supply elastic goods
18. A 4% increase in the price of tomatoes leads to a 1% reduction in the quantity of tomatoes demanded. The price elasticity of demand for tomatoes is:
- a. -0.5
  - b. -0.6
  - c. -0.25
  - d. -1.25
  - e. -4.0
19. Which of the following goods is most likely to have high price elasticity of demand?
- a. A staple food.
  - b. A good that forms a very small part of a person's total budget.
  - c. A good for which there are many close substitutes.
  - d. A vital medicine.
  - e. None of the above.
20. Suppose a grocery store normally sells 100 cartons of milk per day and the price elasticity of demand for milk is 1.7. If the store lowers the price of milk by 10%, about how many cartons of milk will it then sell per week?
- a. 117
  - b. 83
  - c. 85
  - d. 100
  - e. 101.7

## Answers to Active Review Questions

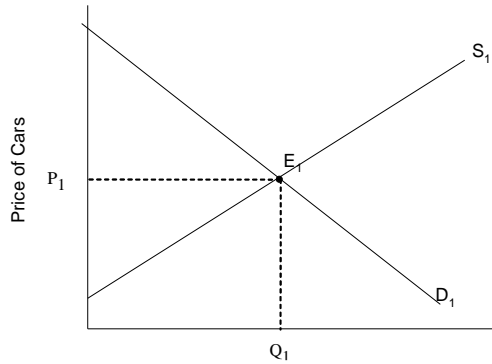
1. demand
2. effective
3. substitute
4. complementary
5. disequilibrium
6. decrease, increase
7. price inelastic
8. perfectly price elastic
9. quantity demanded; price
10. income elasticity
11. negative, positive
12.  $S_A$  (the flatter curve)
13. True. For example, if limes command a high price, lemon producers might switch to lime production, thus decreasing the total supply of lemons available.
14. True.
15. False. In general, an increase in demand tends to increase both equilibrium price and equilibrium quantity.
16. False. The impact of these changes on equilibrium price is ambiguous.
17. True.
18. True.
19. False.
20. False.
21. True.
22. Market supply is 200.
23. Available technology of production; resource prices; number of producers; producer expectations about future prices and technology; prices of related goods and services; physical supply of a natural resource.
24. The demand curve slopes downward because in general, the higher the price of the good, the fewer people will want to buy it.
25. Occasionally, people will want more of a good if it is sold as a "prestige" good at a high price. This phenomenon might sometimes be observed with specialty foods, clothes, or cars.
26. "Change in quantity demanded" refers to movement *along* the demand curve. For example, if the price of apples rises, all other things being equal, people will buy fewer apples; thus, the quantity demanded will decrease. A "change in demand" refers to a situation in which the entire demand curve shifts. For example, if a large number of new people move into your neighborhood, there will be a larger pool of people interested in buying apples at the local grocery store.
27. One example is the shortage of nursing staff in health care settings, a shortage that has existed for decades. You may come up with other real-life or hypothetical examples. For example, adjustment to equilibrium might take a long time in a housing market; sellers might keep prices high for a period of time, hoping to find takers, even though few people are willing to purchase homes at those prices.
28. No, this market is not in equilibrium; there is a shortage of movie tickets.



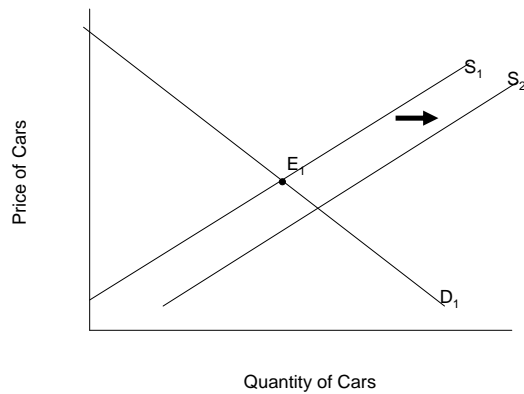
29. There are very few good, close substitutes for the good or service; it is a good or service that people feel they need, rather than just want; or the good or service is a very small part of a buyer's budget.
30. -0.5

### Answers to Problems

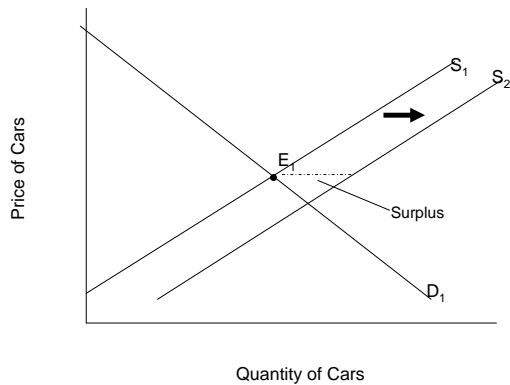
1.a.



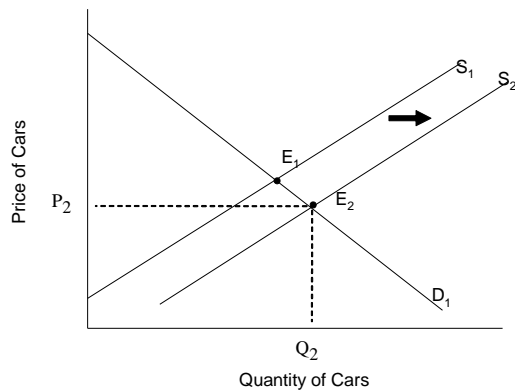
1. b.



1. c. The shift in the supply curve creates a temporary surplus.

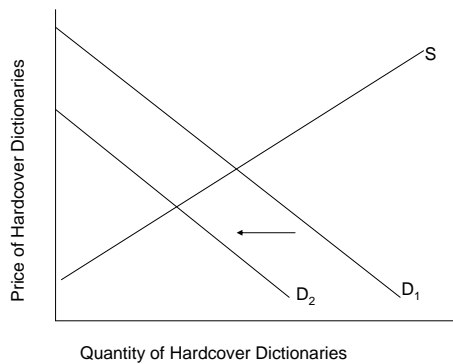


1. d.



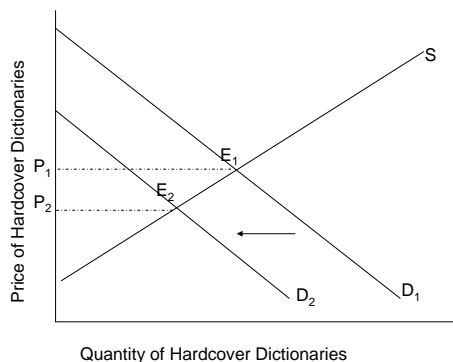
1. e. The supply curve has shifted to the right. The equilibrium price has fallen, and equilibrium quantity has risen.

2. a. The demand curve shifts to the left.



2. b. The supply curve does not shift.

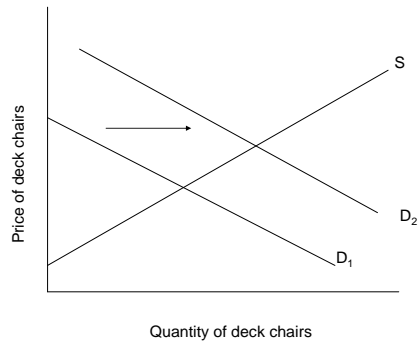
2. c. The price of hardcover dictionaries at the new equilibrium,  $E_2$ , is lower.



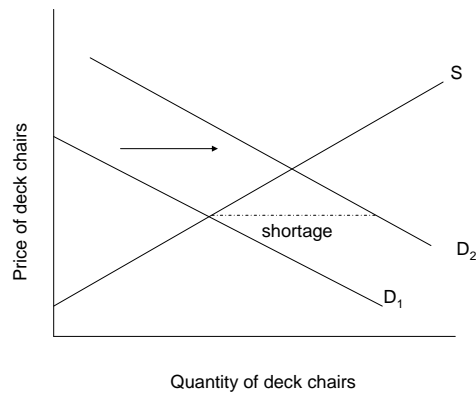
d. Many answers are possible here. For example, dictionary producers might continue charging high prices out of habit, failing to recognize – or not wanting to admit – that demand has changed significantly.

3. The equilibrium price could rise as a result of the supply curve shifting to the left (i.e. a decrease in supply), or as a result of the demand curve shifting to the right (i.e. an increase in demand).

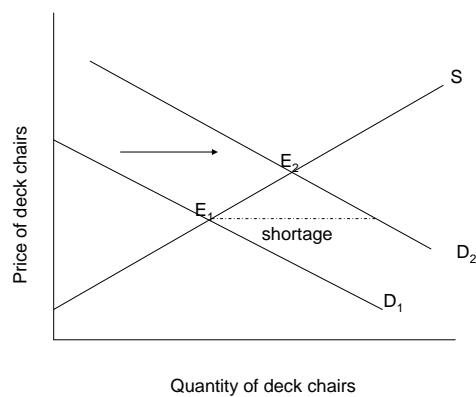
4. a.. The demand curve shifts to the right, as shown below.



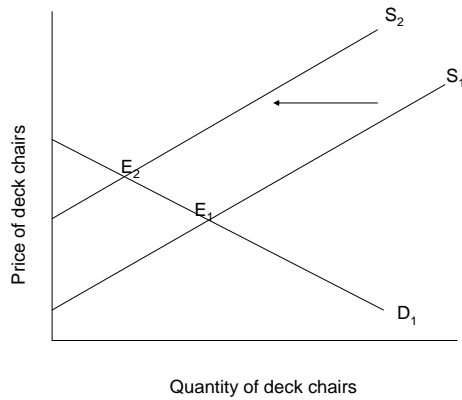
4. b.



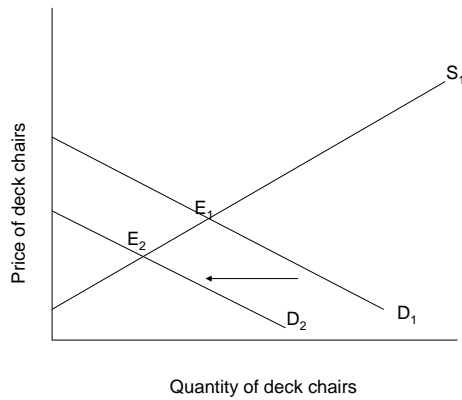
4. c.



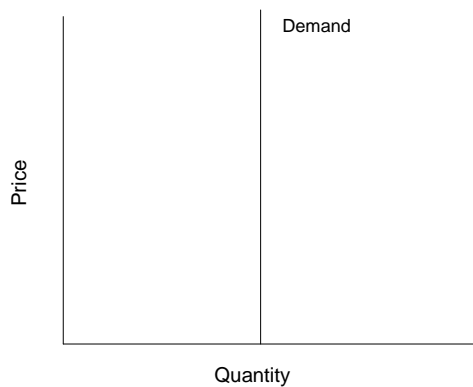
5. a. The supply curve shifts to the left, leading to a higher equilibrium price and lower equilibrium quantity.



5. b. The demand curve shifts to the left, leading to a lower equilibrium price and lower equilibrium quantity.

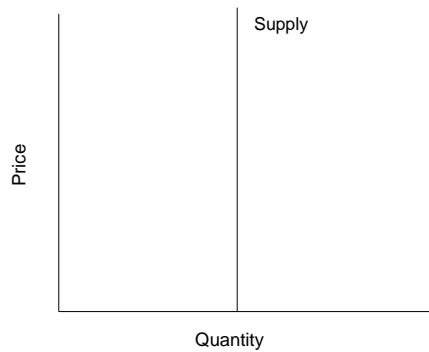


6.



The textbook suggests the example of a medication that you must take every day in order to survive. Provided that you have the money to pay for it, your demand is likely to be perfectly inelastic over a range of prices, since skipping a pill would mean losing your life.

7.



8.

- a. Revenue (at point A) = Price  $\times$  Quantity =  $\$3 \times 3 = \$9$
- b. Revenue (at point B) =  $\$5 \times 2 = \$10$
- c. In this case, an increase in price from \$3 to \$5 raises revenues from \$9 to \$10. When a price increase leads to higher revenues (that is, when revenues move in the same direction as the price), demand is **inelastic**.

9. We cannot tell which demand curve is more elastic, because the scale is not shown. To compare the elasticities of the two curves based on their appearance, they would have to be on the same scale and passing through the same point.

### Answers to Self Test Questions

- |       |       |
|-------|-------|
| 1. a  | 11. e |
| 2. b  | 12. a |
| 3. b  | 13. d |
| 4. e  | 14. a |
| 5. d  | 15. d |
| 6. a  | 16. c |
| 7. e  | 17. b |
| 8. c  | 18. c |
| 9. e  | 19. c |
| 10. e | 20. a |