CHAPTER

4

The Market Forces of Supply and Demand

Goals

In this chapter you will

- Learn what a competitive market is
- Examine what determines the demand for a good in a competitive market
- Examine what determines the supply of a good in a competitive market
- See how supply and demand together set the price of a good and the quantity sold
- Consider the key role of prices in allocating scarce resources in market economies

Outcomes

After accomplishing these goals, you should be able to

- List the two characteristics of a competitive market
- List the factors that affect the amount that consumers wish to buy in a market
- List the factors that affect the amount that producers wish to sell in a market
- Draw a graph of supply and demand in a market and find the equilibrium price and quantity
- Shift supply and demand in response to an economic event and find the new equilibrium price and quantity

Strive for a Five

The supply-and-demand model is an extremely important—some would say the most important—economic model. The simple supply-and-demand model as discussed in this and the next two chapters is a significant portion of the microeconomics AP test, usually between 15-20 percent of the test. The model is also important for macroeconomics as it is the basis for the foreign exchange market as well as countless other graphs. Topics of particular importance:

- The law of supply
- The law of demand
- The determinates of supply and demand
- The supply-and-demand model
- Equilibrium
- Disequilibrium: surplus and shortage

Key Terms

- *Market*—A group of buyers and sellers of a particular good or service
- *Competitive market*—A market in which there are many buyers and sellers so that each has a negligible impact on the market price
- *Monopoly*—Market with only one seller
- *Quantity demanded*—The amount of a good that buyers are willing and able to purchase
- *Law of demand*—The claim that, other things equal, the quantity demanded of a good falls when the price of the good rises
- *Demand schedule*—A table that shows the relationship between the price of a good and the quantity demanded
- *Demand curve*—A graph of the relationship between the price of a good and the quantity demanded
- *Normal good*—A good for which, other things equal, an increase in income leads to an increase in demand
- *Inferior good*—A good for which, other things equal, an increase in income leads to a decrease in demand
- *Substitutes*—Two goods for which an increase in the price of one leads to an increase in the demand for the other
- *Complements*—Two goods for which an increase in the price of one leads to a decrease in the demand for the other
- *Quantity supplied*—The amount of a good that sellers are willing and able to sell
- *Law of supply*—The claim that, other things equal, the quantity supplied of a good rises when the price of the good rises
- *Supply schedule*—A table that shows the relationship between the price of a good and the quantity supplied
- *Supply curve*—A graph of the relationship between the price of a good and the quantity supplied
- *Equilibrium*—The quantity supplied and the quantity demanded at the equilibrium price
- *Equilibrium price*—The price that balances quantity supplied and quantity demanded
- *Equilibrium quantity*—A situation in which the price has reached the level where quantity supplied equals quantity demanded
- *Surplus*—A situation in which quantity supplied is greater than quantity demanded

- *Shortage*—A situation in which quantity demanded is greater than quantity supplied
- *Law of supply and demand*—The claim that the price of any good adjusts to bring the quantity supplied and quantity demanded for that good into balance

Chapter Overview

Context and Purpose

Chapter 4 is the first chapter in a three-chapter sequence that deals with supply and demand and how markets work. Chapter 4 shows how supply and demand for a good determine both the quantity produced and the price at which the good sells. Chapter 5 will add precision to our discussion of supply and demand by addressing the concept of elasticity—the sensitivity of the quantity supplied and quantity demanded to changes in economic variables. Chapter 6 will address the impact of government policies on prices and quantities in markets.

The purpose of Chapter 4 is to establish the model of supply and demand. The model of supply and demand is the foundation for our discussion for the remainder of this text. For this reason, time spent studying the concepts in this chapter will return benefits to you throughout your study of economics. Many instructors would argue that this chapter is the most important chapter in the text.

Chapter Review

Introduction In a market economy, supply and demand determine both the quantity of each good produced and the price at which each good is sold. In this chapter, we develop the determinants of supply and demand. We also address how changes in supply and demand alter prices and change the allocation of the economy's resources.

Markets and Competition

A market is a group of buyers and sellers of a particular good or service. It can be highly organized like a stock market or less organized like the market for ice cream. A competitive market is a market in which there are many buyers and sellers so that each has a negligible impact on the market price.

A *perfectly competitive* market has two main characteristics:

- The goods offered for sale are all exactly the same.
- The buyers and sellers are so numerous that no one buyer or seller can influence the price.

If a market is perfectly competitive, both buyers and sellers are said to be *price takers* because they cannot influence the price. The assumption of perfect competition applies well to agricultural markets because the product is similar and no individual buyer or seller can influence the price.

If a market has only one seller, the market is known as a *monopoly*. Other types of markets fall between the extremes of perfect competition and monopoly.

Demand

The behavior of buyers is captured by the concept of demand. The quantity demanded is the amount of a good that buyers are willing and able to purchase. Although many things determine the quantity demanded of a good, the *price* of the good plays a central role. The law of demand states that, other things equal, an increase in the price of a good reduces the quantity demanded of the good, while a decrease in the price of a good increases the quantity demanded of the good.

The demand schedule is a table that shows the relationship between the price of a good and the quantity demanded. The demand curve is a graph of this relationship with the price on the vertical axis and the quantity demanded on the horizontal axis. The demand curve is downward sloping due to the law of demand.

Market demand is the sum of the quantities demanded for each individual buyer at each price. That is, the market demand curve is the horizontal sum of the individual demand

curves. The market demand curve shows the total quantity demanded of a good at each price, while all other factors that affect how much buyers wish to buy are held constant.

- **Shifts in the Demand Curve** When people change how much they wish to buy at each price, the demand curve shifts. If buyers increase the quantity demanded at each price, the demand curve shifts to the right, which is called an *increase in demand*. Alternatively, if buyers decrease the quantity demanded at each price, the demand curve shifts to the left, which is called a *decrease in demand*. The most important factors that shift demand curves are:
  - *Income:* A normal good is a good for which an increase in income leads to an increase in demand. An inferior good is a good for which an increase in income leads to a decrease in demand.
  - *Prices of Related Goods:* If two goods can be used in place of one another, they are known as substitutes. When two goods are substitutes, an increase in the price of one good leads to an increase in the demand for the other good. If two goods are used together, they are known as complements. When two goods are complements, an increase in the price of one good leads to a decrease in the demand for the other good.
  - *Tastes:* If your preferences shift toward a good, it will lead to an increase in the demand for that good.
  - *Expectations:* Expectations about future income or prices will affect the demand for a good today.
  - *Number of Buyers:* An increase in the number of buyers will lead to an increase in the market demand for a good because there are more individual demand curves to horizontally sum.

A demand curve is drawn with price on the vertical axis and quantity demanded on the horizontal axis while holding other things equal. Therefore, a change in the price of a good represents a movement along the demand curve while a change in income, prices of related goods, tastes, expectations, and the number of buyers causes a shift in the demand curve.

Supply

The behavior of sellers is captured by the concept of supply. The quantity supplied is the amount of a good that sellers are willing and able to sell. Although many things determine the quantity supplied of a good, the *price* of the good is central. An increase in the price of a good makes production of the good more profitable. Therefore, the law of supply states that, other things equal, an increase in the price of a good increases the quantity supplied of the good, while a decrease in the price of a good reduces the quantity supplied of the good.

The supply schedule is a table that shows the relationship between the price of a good and the quantity supplied. The supply curve is a graph of this relationship with the price on the vertical axis and the quantity supplied on the horizontal axis. The supply curve is upward sloping due to the law of supply.

Market supply is the sum of the quantity supplied for each individual seller at each price. That is, the market supply curve is the horizontal sum of the individual supply curves. The market supply curve shows the total quantity supplied of a good at each price, while all other factors that affect how much producers wish to sell are held constant.

- **Shifts in the Supply Curve** When producers change how much they wish to sell at each price, the supply curve shifts. If producers increase the quantity supplied at each price, the supply curve shifts right, which is called an *increase in supply*. Alternatively, if producers decrease the quantity supplied at each price, the supply curve shifts left, which is called a *decrease in supply*. The most important factors that shift supply curves are:
  - *Input Prices:* A decrease in the price of an input makes production more profitable and increases supply.
  - *Technology:* An improvement in technology reduces costs, makes production more profitable, and increases supply.

- *Expectations:* Expectations about the future will affect the supply of a good today.
- *Number of Sellers:* An increase in the number of sellers will lead to an increase in the market supply for a good because there are more individual supply curves to horizontally sum.

A supply curve is drawn with price on the vertical axis and quantity supplied on the horizontal axis while holding other things equal. Therefore, a change in the price of a good represents a movement along the supply curve while a change in input prices, technology, expectations, and the number of sellers causes a shift in the supply curve.

Supply and Demand Together

When placed on the same graph, the intersection of supply and demand is called the market's equilibrium. Equilibrium is a situation in which the price has reached the level where quantity supplied equals quantity demanded. The equilibrium price, or the market-clearing price, is the price that balances the quantity demanded and the quantity supplied. When the quantity supplied equals the quantity demanded at the equilibrium price, we have determined the equilibrium quantity.

The market naturally moves toward its equilibrium. If the price is above the equilibrium price, the quantity supplied exceeds the quantity demanded and there is a surplus, or an excess supply, of the good. A surplus causes the price to fall until it reaches equilibrium. If the price is below the equilibrium price, the quantity demanded exceeds the quantity supplied and there is a shortage, or an excess demand for the good. A shortage causes the price to rise until it reaches equilibrium. This natural adjustment of the price to bring the quantity supplied and the quantity demanded into balance is known as the law of supply and demand.

When an economic event shifts the supply or the demand curve, the equilibrium in the market changes, resulting in a new equilibrium price and quantity. When analyzing the impact of some event on the market equilibrium, employ the following three steps:

- Decide whether the event shifts the supply curve or demand curve or both.
- Decide which direction the curve shifts.
- Use the supply-and-demand diagram to see how the shift changes the equilibrium price and quantity.

A shift in the demand curve is called a "change in demand." It is caused by a change in a variable that affects the amount people wish to purchase of a good *other than the price of the good*. A change in the price of a good causes a movement along a given demand curve and is called a "change in the quantity demanded." Likewise, a shift in the supply curve is called a "change in supply." It is caused by a change in a variable that affects the amount producers wish to supply of a good *other than the price of the good*. A change in the price of a good causes a movement along a supply curve and is called a "change in the quantity supplied."

For example, a frost that destroys much of the orange crop causes a decrease in the supply of oranges (supply of oranges shifts to the left). This increases the price of oranges and decreases the quantity demanded of oranges. In other words, a decrease in the supply of oranges increases the price of oranges and decreases the quantity of oranges purchased.

If both supply and demand shift at the same time, there may be more than one possible outcome for the changes in the equilibrium price and quantity. For example, if demand were to increase (shift right) while supply were to decrease (shift left), the price will certainly rise but the impact on the equilibrium quantity is ambiguous. In this case, the change in the equilibrium quantity depends on the magnitudes of the shifts in supply and demand.

Conclusion: How Prices Allocate Resources

Markets generate equilibrium prices. These prices are the signals that guide the allocation of scarce resources. Prices of products rise to the level necessary to allocate the products to those who are willing to pay for them. Prices of inputs (such as labor) rise to the level necessary to induce people to do the jobs that need to be done. Prices coordinate decentralized decision making so that no jobs go undone, and there is no shortage of goods and services for those willing and able to pay for them.

Helpful Hints

1. By far, the greatest difficulty students have when studying supply and demand is distinguishing between a "change in demand" and a "change in the quantity demanded" and between a "change in supply" and a "change in the quantity supplied." It helps to remember that "demand" is the entire relationship between price and quantity demanded. That is, demand is the entire demand curve, not a point on a demand curve. Therefore, a change in demand is a shift in the entire demand curve, which can only be caused by a change in a determinant of demand other than the price of the good. A change in the quantity demanded is a movement along the demand curve and is caused by a change in the price of the good. Likewise, "supply" refers to the entire supply curve, not a point on the supply curve. Therefore, a change in supply is a shift in the entire supply curve, which can only be caused by a change in a determinant of supply other than the price of the good. A change in the quantity supplied is a movement along the supply curve and is caused by a change in the price of the good.

2. If both supply and demand shift at the same time and we do not know the magnitude of each shift, then the change in either the price or the quantity must be ambiguous. For example, if there is an increase in supply (supply shifts right) and an increase in demand (demand shifts right), the equilibrium quantity must certainly rise, but the change in the equilibrium price is ambiguous. Do this for all four possible combinations of changes in supply and demand. You will find that if you know the impact on the equilibrium price with certainty, then the impact on the equilibrium quantity must be ambiguous. If you know the impact on the equilibrium quantity with certainty, then the impact on the equilibrium price must be ambiguous.

Self-Test

Multiple-Choice Questions

1. In a market economy,
   a. supply determines demand and demand, in turn, determines prices.
   b. demand determines supply and supply, in turn, determines prices.
   c. the allocation of scarce resources determines prices and prices, in turn, determine supply and demand.
   d. supply and demand determine prices and prices, in turn, allocate the economy's scarce resources.
   e. the market allocates scarce resources without regard to supply and demand.

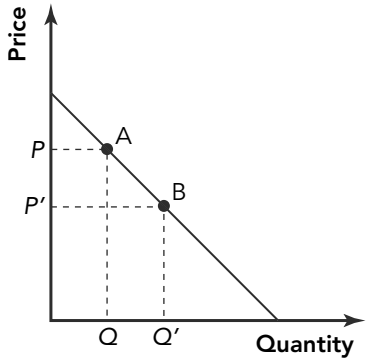
2. Which of the following sets are arranged from most competitive to least competitive?
   a. absolute competition, monopolistic competition, imperfect competition
   b. perfect competition, oligopoly, monopolistic competition, monopoly
   c. perfect competition, monopolistic competition, oligopoly, monopoly
   d. oligopoly, perfect competition, monopolistic competition, monopoly
   e. absolute competition, imperfect competition, monopolistic competition, monopoly

3. The term "price takers" refers to buyers and sellers in
   a. perfectly competitive markets.
   b. monopolistic markets.
   c. markets that are regulated by the government.
   d. markets in which buyers cannot buy all they want and/or sellers cannot sell all they want.
   e. markets in which buyers and sellers take the price and adjust it to meet market conditions.

4. If a good is normal, then an increase in income will result in
   a. an increase in the demand for the good.
   b. a decrease in the demand for the good.
   c. a movement down and to the right along the demand curve for the good.
   d. a movement up and to the left along the demand curve for the good.
   e. a decrease in the quantity demanded of the good.

5. Two goods are substitutes when a decrease in the price of one good
   a. decreases the demand for the other good.
   b. increases the demand for the other good.
   c. decreases the quantity demanded of the other good.
   d. increases the quantity demanded of the other good.
   e. decreases the demand for that good.

Figure 4-1



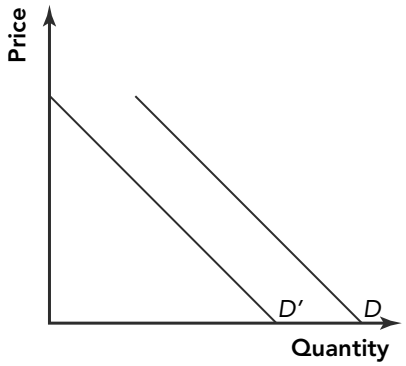
6. **Refer to Figure 4-1**. The movement from point A to point B on the graph is caused by a.an increase in price.
   b. a decrease in price.
   c. a decrease in the price of a substitute good.
   d. an increase in income.
   e. an increase in the price of a complimentary good.

Table 4-1

Price	Aaron's Quantity Demanded	Angela's Quantity Demanded	Austin's Quantity Demanded	Alyssa's Quantity Demanded
$0.00	20	16	4	8
$0.50	18	12	6	6
$1.00	14	10	2	5
$1.50	12	8	0	4
$2.00	6	6	0	2
$2.50	0	4	0	0

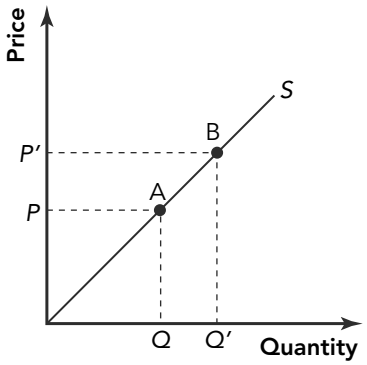
7. **Refer to Table 4-1.** Whose demand does *not* obey the law of demand?
   a. Aaron's
   b. Angela's
   c. Austin's
   d. Alyssa's
   e. None of them conform to the law of demand.

Figure 4-2



8. **Refer to Figure 4-2**. The movement from D to D' could be caused by
   a. an increase in price.
   b. a decrease in the price of a complement.
   c. a technological advance.
   d. a decrease in the price of a substitute.
   e. a decrease in the price.

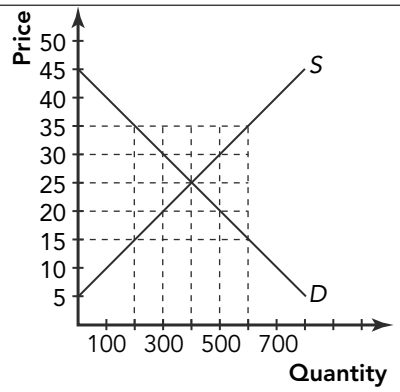
Figure 4-3



9. **Refer to Figure 4-3**. The movement from point A to point B on the graph is caused by a.a decrease in the price of the good.
   b. an increase in the price of the good.
   c. an advance in technology.
   d. a decrease in input prices.
   e. a decrease in the demand for the good.

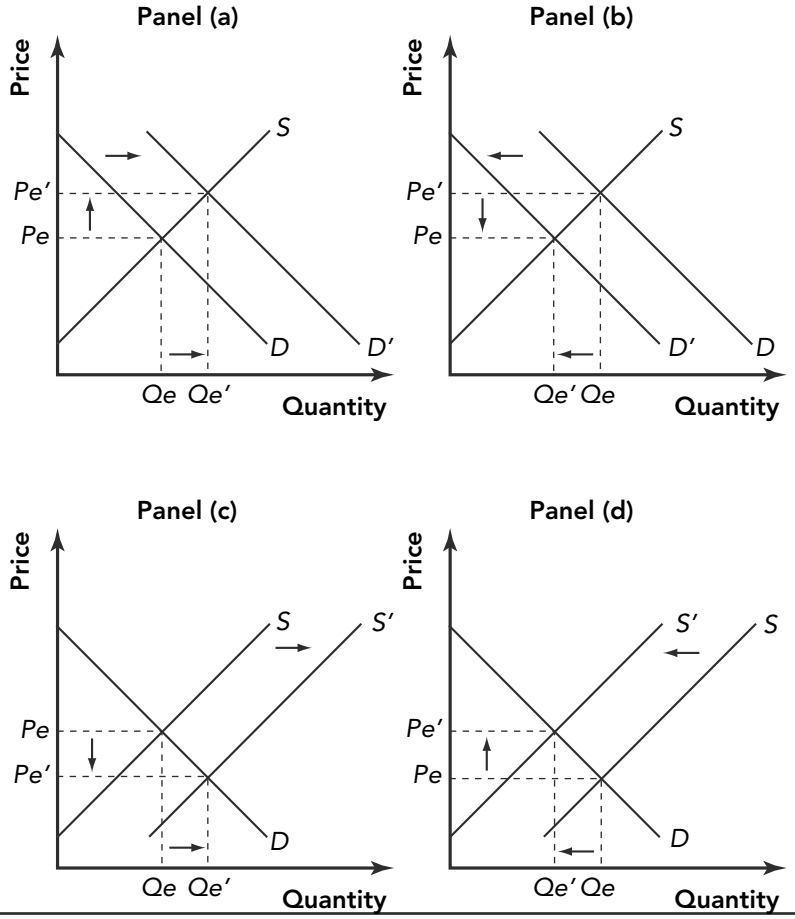
10. Which of the following changes would *not* shift the demand curve for a good or service?
    a. a change in income
    b. a change in the price of the good or service
    c. a change in expectations about the future price of the good or service d
    . a change in the price of a related good or service
    e. a change in the number of buyers in the market for that good or service

Figure 4-4



11. **Refer to Figure 4-4**. At a price of $15,
    a. there would be a shortage of 200 and the law of supply and demand predicts that the price will fall from $15 to a lower price.
    b. there would be a shortage of 600 and the law of supply and demand predicts that the price will rise from $15 to a higher price.
    c. there would be a shortage of 400 and the law of supply and demand predicts that the price will rise from $15 to a higher price.
    d. there would be a surplus of 400 and the law of supply and demand predicts that the price will fall from $15 to a lower price.
    e. there would be a surplus of 400 and the law of supply and demand predicts that the price will rise from $15 to a higher price.

Figure 4-5



12. **Refer to Figure 4-5**. Suppose the events depicted in Panel (a) and Panel (c) were illustrated on a single graph. A definite result of the two events combined would be a. an increase in the equilibrium quantity.
    b. an increase in the equilibrium price.
    c. an increase in the equilibrium price and equilibrium quantity.
    d. a decrease in the equilibrium price and equilibrium quantity.
    e. a decrease in the equilibrium price.

13. Suppose the number of buyers in a market increases and a technological advancement occurs also. What would we expect to happen in the market?
    a. Equilibrium price would decrease, but the impact on equilibrium quantity would be ambiguous.
    b. Equilibrium price would increase, but the impact on equilibrium quantity would be ambiguous.
    c. Equilibrium quantity would decrease, but the impact on equilibrium price would be ambiguous.
    d. Equilibrium quantity would increase, but the impact on equilibrium price would be ambiguous.
    e. Equilibrium quantity and equilibrium price would both be ambiguous.

14. Which of the following events would cause both the equilibrium price and equilibrium quantity of number two potatoes (an inferior good) to increase?
    a. an increase in the supply of number two potatoes
    b. a decrease in the supply of number two potatoes
    c. a decrease in the incomes of number two potato consumers
    d. an increase in the incomes of number two potato consumers
    e. an increase in the price of number two potatoes

15. What would happen to the equilibrium price and quantity of coffee if the wages of coffee-bean pickers fell and the price of tea fell?
    a. Price would fall and the effect on quantity would be ambiguous.
    b. Price would rise and the effect on quantity would be ambiguous.
    c. Quantity would fall and the effect on price would be ambiguous.
    d. Quantity would rise and the effect on price would be ambiguous.
    e. Price would rise and quantity would rise.

Free Response Questions

1.

Price	Quantity Demanded Per Month	Quantity Supplied Per Month
$5	6,000	10,000
$4	8,000	8,000
$3	10,000	6,000
$2	12,000	4,000
$1	14,000	2,000

    a. Using the information in the table, draw a correctly labeled graph of the market for flashlights. Make certain to label the equilibrium price and equilibrium quantity.
    b. What are the equilibrium price and the equilibrium quantity?
    c. Suppose the price is currently $5. What problem would exist in the market? What would you expect to happen to price?
    d. Suppose the price is currently $2. What problem would exist in the market? What would you expect to happen to price?

2. Suppose we are analyzing the market for hot chocolate. Using a correctly labeled graph, illustrate the impact each of the following would have on demand or supply. Also, show how equilibrium price and equilibrium quantity would change.
    a. Winter starts and the weather turns sharply colder.
    b. The price of tea, a substitute for hot chocolate, falls.
    c. The price of cocoa beans, an ingredient in making hot chocolate, decreases.
    d. The price of whipped cream, a complimentary good for hot chocolate, falls.
    e. A better method of harvesting cocoa beans is introduced.
    f. The Surgeon General of the United States announces that hot chocolate cures acne.
    g. Protesting farmers dump millions of gallons of milk, causing the price of milk, an ingredient in hot chocolate, to rise.
    h. Consumer income falls because of a recession, and hot chocolate is considered a normal good.
    i. Producers expect the price of hot chocolate to increase next month.
    j. Currently, the price of hot chocolate is $0.50 per cup above equilibrium.

Solutions

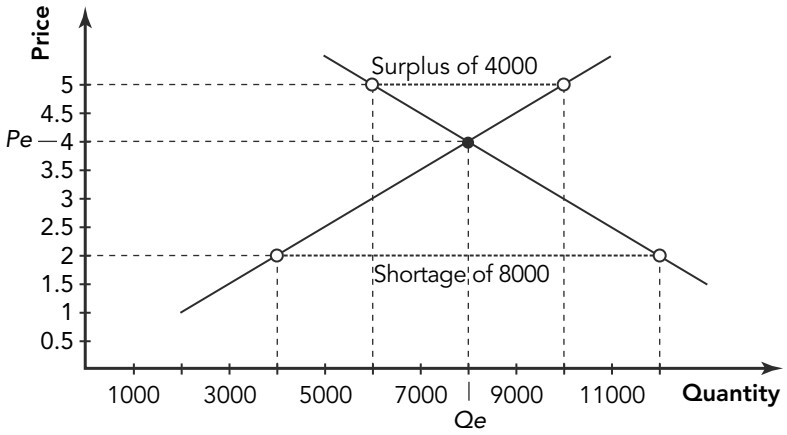
Multiple-Choice Questions

1. d TOP: Market economics
2. c TOP: Perfect competition
3. a TOP: Perfect competition
4. a TOP: Normal goods
5. a TOP: Substitutes
6. b TOP: Demand curve
7. c TOP: Law of demand
8. d TOP: Substitutes
9. b TOP: Supply curve
10. b TOP: Demand curve
11. c TOP: Shortage
12. a TOP: Demand/ Quantity supplied
13. d TOP: Equilibrium
14. c TOP: Tastes
15. a TOP: Equilibrium

Free Response Questions

1.

a.



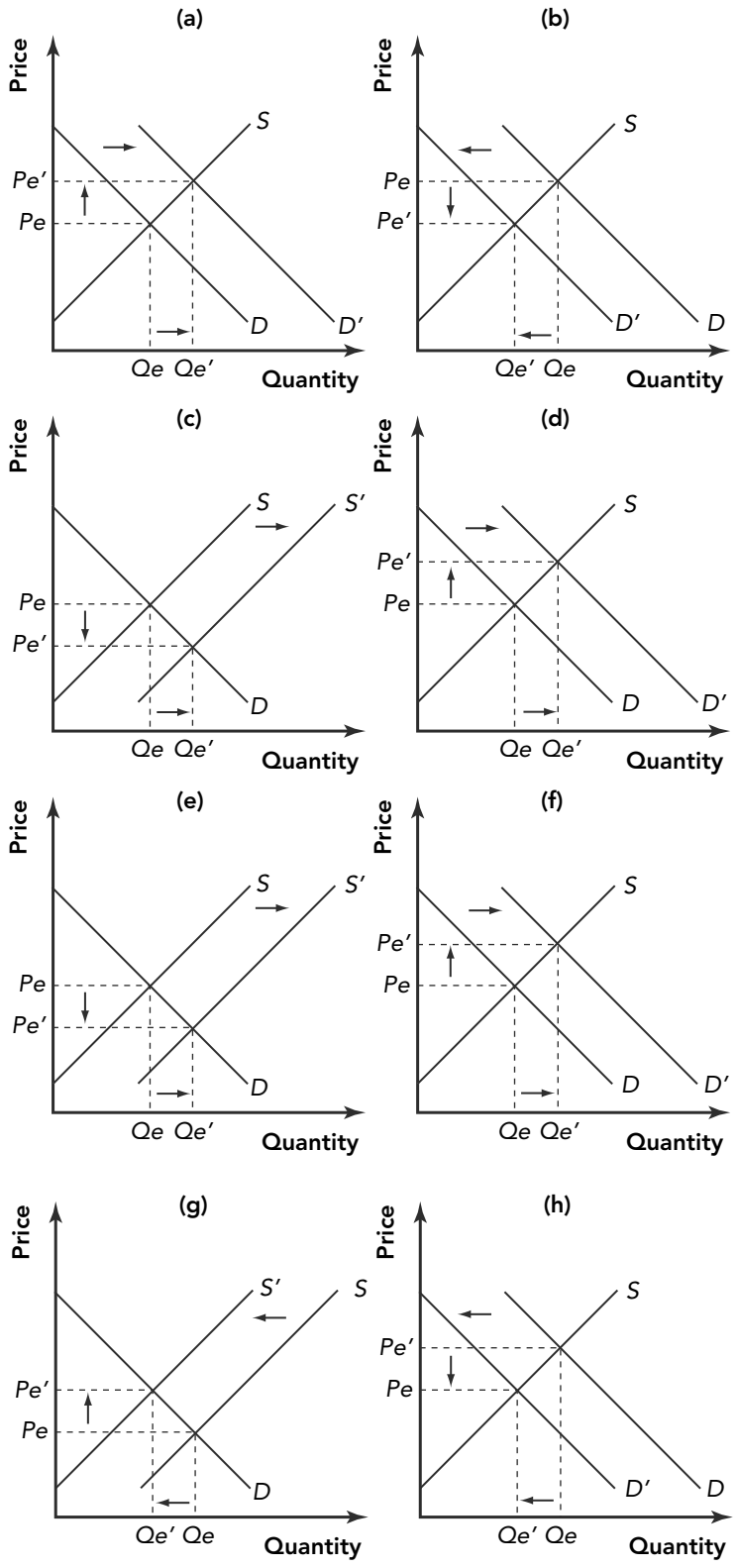
b. The equilibrium price (Pe) is $4 and the equilibrium quantity (Qe) is 8,000.

c. A surplus of 4,000 flashlights would be the problem in the market, and we would expect the price to fall.

d. A shortage of 8,000 flashlights would be the problem in the market, and we would expect the price to rise.

TOP: Equilibrium/Shortage/Surplus

2. In (j), a price above equilibrium will affect both quantity demanded and quantity supplied and will cause a surplus in the market. It will not cause either demand or supply to shift.


(a)
Price
S
Pe′
Pe
D
D′
Qe Qe′
Quantity
(b)
Price
S
Pe
Pe′
D′
D
Qe′ Qe
Quantity
(c)
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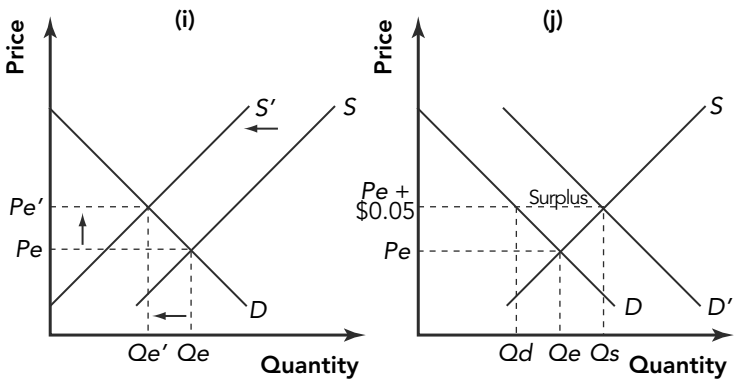

TOP:Demand/Supply