1. Describe alternative methods of allocating scarce resources.
   A. Market Price
   B. Command
   C. Majority Rule
   D. Contest
   E. First-Come, First-Served
   F. Sharing Equally
   G. Lottery
   H. Personal Characteristics
   I. Force

2. Distinguish between value and price and define consumer surplus.
   A. Demand and Marginal Benefit
   B. Consumer Surplus

3. Distinguish between cost and price and define producer surplus.
   A. Supply and Marginal Cost
   B. Producer Surplus

4. Evaluate the efficiency of the alternative methods of allocating scarce resources.
   A. Marginal Benefit Equals Marginal Cost
   B. Total Surplus is Maximized
   C. The Invisible Hand
   D. Underproduction and Overproduction
     1. Underproduction
     2. Overproduction
   E. Obstacles to Efficiency
     1. Price and Quantity Regulations
     2. Taxes and Subsidies
     3. Externalities
     4. Public Goods and Common Resources
     5. Monopoly
     6. High Transactions Costs
   F. Alternatives to the Market
5. Explain the main ideas about fairness and evaluate claims that competitive markets result in unfair outcomes.
   A. It’s Not Fair If the Result Isn’t Fair
      1. Utilitarianism
      2. The Big Tradeoff
      3. Make the Poorest as Well Off as Possible
   B. It’s Not Fair If the Rules Aren’t Fair
      1. A Price Hike in a Natural Disaster

CHAPTER ROADMAP

■ What’s New in this Edition?
Chapter 6 has an entirely new checkpoint, Checkpoint 6.1 “Describe alternative methods of allocating scarce resources.” Checkpoint 6.4 is modified so that it discusses the efficiency of markets and also the efficiency of the alternative methods of allocating resources. These modifications help students appreciate the efficiency of competitive markets.

■ Where We Are
We explore the conditions of market efficiency and whether market outcomes are fair. On the consumer side, we make the distinction between value and price. On the producer side, we make the distinction between cost and price. We mention factors that prevent efficiency from occurring.

■ Where We’ve Been
We’ve explored the motivation behind studying economics. We’ve also developed the demand and supply model that helps us visualize how markets operate and demonstrates the efficient allocation of resources.

■ Where We’re Going
The next chapter continues to use the demand and supply framework to study government intervention in the market. Chapter 7 studies price ceilings, price floors, and price supports and demonstrates how these policies can lead to inefficiency.
IN THE CLASSROOM

Class Time Needed
You might be able to complete this chapter in one session, but because this material is so important, consider using two sessions and making sure that students understand why efficiency requires the equality of marginal benefit and marginal cost and why underproduction and overproduction lead to deadweight losses.

An estimate of the time per checkpoint is:

- 6.1 Resource Allocation Methods—10 to 15 minutes
- 6.2 Value, Price, and Consumer Surplus—10 to 25 minutes
- 6.3 Cost, Price, and Producer Surplus—10 to 25 minutes
- 6.4 Are Markets Efficient?—25 to 35 minutes
- 6.5 Are Markets Fair?—10 to 15 minutes
6.1 Resource Allocation Methods

- Because resources are scarce, they must be allocated. There are a variety of allocation methods that can be used:
  - Market price: The people who are willing and able to pay the price get the resource.
  - Command: A command system allocates resources by the order of someone in authority. Current examples are North Korea and Cuba.
  - Majority rule: A vote determines who gets the resource. Elected governments allocate some of our resources.
  - Contest: The winner gets the resource. Contests work well when the efforts of the players are hard to monitor and reward directly. An example is the contest of top executives to become the next CEO.
  - First-come, first-served: National parks and tickets to college football games often are allocated using first-come, first-served.
  - Sharing equally: Works well with small groups, for example, roommates.
  - Lottery: The winner gets the resource. Landing slots at some airlines and some draft choices in the NBA are allocated using lotteries.
  - Personal characteristics: People with the right characteristics get the resource. This method can lead to discrimination.
  - Force: The strongest gets the resource. Theft is an example; so, too, is taxation.

6.2 Value, Price, and Consumer Surplus

Demand and Marginal Benefit

- The value of one more unit of a good or service is its marginal benefit. Marginal benefit is measured as the maximum price that people are willing to pay for another unit of a good or service.
- The willingness to pay for a good or service determines the demand for it. So, as illustrated in the figure, a demand curve for a good or service is also its marginal benefit curve.
- The demand curve in the figure shows that the maximum price a person is willing to pay for the 6,000,000th gallon of milk per month is $3, so $3 is the value and marginal benefit of this gallon.
- Consumer surplus is the marginal benefit from a good or service minus the price paid for it, summed over the units purchased.
The figure illustrates the consumer surplus as the shaded triangle when the price is $3 per gallon.

6.3 Cost, Price, and Producer Surplus

Supply and Marginal Cost
- The cost of one producing more unit of a good or service is its marginal cost. Marginal cost is the minimum price that producers must receive to induce them to produce another unit of the good or service. And the minimum acceptable price determines the quantity supplied. So, as illustrated in the figure, a supply curve for a good or service is also its marginal cost curve.
- The supply curve in the figure shows that the minimum price a producer must receive to be willing to produce the 6,000,000th gallon of milk per month is $3, so $3 is the marginal cost of this gallon.
- Producer surplus is the price of a good minus the marginal cost of producing it, summed over the quantity produced. The figure illustrates the producer surplus as the shaded triangle when the price is $3 per gallon.

6.4 Are Markets Efficient?

Marginal Benefit Equals Marginal Cost
- A competitive equilibrium is the quantity at which the quantity demanded equals the quantity supplied. In the figure, the equilibrium quantity is 6 million gallons.
- The efficient quantity is the quantity at which the marginal benefit of the last unit produced equals its marginal cost. In the figure, the efficient quantity is 6 million gallons.
- Because the demand curve is the same as the $MB$ curve and the supply curve is the same as the $MC$ curve, the quantity that sets the $MB$ equal to the $MC$ also sets the quantity demanded equal to the quantity
supplied and so is the equilibrium quantity. The equilibrium quantity is, therefore, also the efficient quantity.

**Total Surplus is Maximized**
The total surplus from a good or service is the sum of the producer surplus plus the consumer surplus. As the figure shows, when the efficient quantity of milk is produced, the sum of the consumer surplus and producer surplus is maximized.

**The Invisible Hand**
Adam Smith, in his 1776 book *The Wealth of Nations*, articulated how competition led self-interested consumers and producers to make choices that unintentionally promote the social interest as if they were led by an “invisible hand.”

**Underproduction and Overproduction**
- If the market does not produce the efficient quantity, it will either produce less than the efficient quantity—underproduction—or produce more than the efficient quantity—overproduction.
- In either case, a deadweight loss occurs. A deadweight loss is the decrease in the consumer surplus and producer surplus that results from producing an inefficient quantity of a good. The figure illustrates the deadweight loss from overproduction of milk and from underproduction.

**Obstacles to Efficiency**
- The key obstacles to achieving an efficient allocation of resources in a market are:
  - Price and Quantity Regulations: Price regulations include price ceilings (which sets the highest legal price) and price floors (which set the lowest legal price). If a price regulation makes the equilibrium price illegal, it leads to inefficiency. Quantity regulations can limit the amount that can be produced and so lead to inefficiency.
  - Taxes and Subsidies: Taxes and subsidies place a wedge between the prices consumers pay and the prices producers receive. Both can lead to inefficiency.
  - Externalities: Externalities mean that the demand curve is not the same as the marginal benefit curve and/or the supply curve is not the same as the marginal cost curve. In these cases, the equilibrium quantity is not the same as the efficient quantity.
  - Public Goods: Public goods lead to a free-rider problem, in which people do not pay for their share of the good, which can lead to inefficient underproduction.
  - Common Resources: Common resources are generally over-used because no one owns the resource so inefficiency occurs.
• Monopoly: A monopoly is a firm that is the sole provider of a good or service. To maximize its profit, a monopoly produces less than the efficient quantity and so creates inefficiency.

• High transactions costs: The opportunity cost of buying and selling in a market is the transactions costs. If transactions costs become too high, the market might under-produce.

Alternatives to the Market
• When a market overproduces or underproduces, on of the alternative allocation methods might work better.

• Managers in firms issue commands and avoid the transactions costs of having to pay for each individual bit of work.

• First-come, first-serve is used in many instances, such as lines at the ATM, rather than buying a spot in the line.

• Sometimes, however, the deadweight loss is the result of a self-interested group taking advantage of majority rule to benefit themselves at a cost to everyone else.

6.4 Are Markets Fair?

It’s Not Fair If the Result Isn’t Fair
• Utilitarianism adopts this view. Utilitarianism is a principle that states that we should strive to achieve “the greatest happiness for the greatest number.” This principle argues that fairness requires equality of incomes, which requires that incomes be redistributed.

• Redistribution leads to the big tradeoff, the tradeoff between efficiency and equity. The tradeoff occurs because taxes decrease people’s incentives to work, thereby decreasing the size of the “economic pie.” In addition, taxes lead to administration costs that also decrease the economic pie.

It’s Not Fair If the Rules Aren’t Fair
• This perspective relies means equality of economic opportunity rather than equality of economic outcomes. Robert Nozick suggests government should promote fairness by establishing property rights for individuals and allowing only voluntary exchange of these resources. If private property rights are enforced, if voluntary exchange takes place in a competitive market, and if there are none of the obstacles to efficiency listed before, then the competitive market is fair.

Students generally expect to be graded based on their performance in the class. This scheme is a “fair rules” view of fairness. Discuss this observation with the class, and then ask if it would be fairer to grant everyone an A—a “fair results” view. How about automatically giving every student a C or a D or an F—would this be fair? If automatically giving students an A is fair, why isn’t it equally fair to automatically give each student an F? Or, suppose on the final day of class, the rules of the course are changed so that regardless of a student’s previous scores, the student will be given an A—is this change fair? What if the student was automatically given an F—is this change fair?
### Lecture Launchers

1. Launch your lecture by drawing a demand curve and telling your students that this curve has two interpretations. The common interpretation, that the students have seen many times before, starts at a price, goes horizontally to the demand curve, and then down vertically to the quantity. The interpretation of this approach is the “standard” one: At the given price, the demand curve shows the quantity demanded. But then point out to the students that it is possible to pick a quantity, go vertically up to the demand curve, and then horizontally to the price. The interpretation of this method differs from the first. The interpretation here is that for the given quantity, the demand curve shows the maximum price for which someone is willing to buy the selected quantity. Point out that the maximum price equals the value to the consumer and that the value also equals the marginal benefit. Thus you have demonstrated to the students that the demand curve is the same as the marginal benefit curve. (When I make this demonstration, I use actual numbers for the price and quantity because I think using numbers makes the otherwise abstract discussion more concrete and approachable, but you can opt to forgo numbers and use symbols. The choice is yours.)

2. Although done just with words and a diagram, this chapter explains the astonishing so-called “first fundamental theorem of welfare economics” that under appropriate conditions, a competitive equilibrium is Pareto efficient. Though the textbook does not discuss Pareto efficiency, if you choose you can provide your students with more background to this astonishing result. It begins with Adam Smith’s invisible hand conjecture. Some progress was made by Vilfredo Pareto (1848–1923), an Italian economist (see http://cepa.newschool.edu/het/profiles/pareto.htm), who defined an efficient allocation as one in which it is not possible to rearrange the use of resources an make someone better off without making someone else worse off. But Adam Smith’s conjecture did not receive formal proof until the 1950s. Sir John Hicks, Kenneth Arrow, and Gerard Debreu, are credited with the major contributions to welfare economics and all received the Nobel Prize in Economic Sciences for their work (see http://www.nobel.se/economics/laureates/1972/index.html for Sir John Hicks, and http://www.nobel.se/economics/laureates/1983/index.html for Kenneth Arrow and Gerard Debreu. Lionel McKenzie (University of Rochester) is also credited with a major independent statement of the theorem and some economists refer to it as the Arrow-Debreu-McKenzie theorem. The A-D-M proof is deeper and more restricted that the arm waving words and diagrams of a principles text. But we do not mislead our students by being enthusiastic and amazed at the astonishing proposition. Selfish people all pursuing their own ends and making themselves as well off as pos-
possible end up allocating resources in such a way that no one can be made better off (qualified by the exceptions that we quickly note in the chapter.)

3. Don't get hung up on the mechanics of how the obstacles to efficiency work. Just note at this stage that they bring either underproduction or overproduction and emphasize the deadweight loss that they generate. You will go into the details in later chapters. The list is a guide to what is coming.

4. You could spend the rest of the course talking about and discussing equity, fairness, or distributive justice as it is sometimes called. The textbook contains a nice section laying out the basics needed to discuss fairness. This material is not standard and you'll be hard pressed to find it in any other principles text. It is included here because students are very curious about what is fair. And the news media writes and talks of little else when it discusses economic issues.

   Some years ago, Jim Tobin told Michael Parkin a nice test of whether a person is a liberal or a conservative. It also generates a good classroom discussion. Here’s how it goes. Give the students the following scenario and question: You are at an oasis in a large desert and you have some ice cream in an unmovable refrigerator. (Ice cream is the only food available). The people in the next oasis some miles away have no ice cream (and no other food) and are too old and infirm to travel. You have plenty of ice cream and you can transport it to the next oasis, but on the journey, some of it will melt. Now the question: How much of the ice cream would have to survive the journey for it to be worth transporting to the next oasis? The most liberal would transport if only the smallest percentage survived the journey. The most conservative would want a large proportion to survive before undertaking the redistribution.

■ Land Mines

1. The consumer surplus, producer surplus, and deadweight loss are all generally triangular in shape. Indeed, if you draw only linear demand and supply curves and do not make either curve vertical or horizontal, these surpluses and any deadweight loss are triangles. So, it is a good idea to remind your students of the formula for calculating the area of a triangle. Make sure to do several examples of the calculation for both consumer and producer surplus. Remind them that this area represents a dollar value. This reminder is especially useful when you quantify the deadweight losses created by monopolies, quotas, subsidies, etc. Many students just see the loss to society as a loss of jobs or less output, but you can create more intuition by putting the loss in dollar terms.
2. It always helps to use colored chalk, overheads, or PowerPoint slides when dividing up the demand-supply graph into producer surplus, consumer surplus, and deadweight loss. By using colored chalk or the other techniques, you can refer to area by color (“The red area shows consumer surplus and the green area shows the deadweight loss.”) The size of the areas are much more apparent. Additionally, you don’t need to go back to the screen or board to try to outline the area.
ANSWERS TO CHECKPOINT EXERCISES

■ CHECKPOINT 6.1 Resource Allocation Methods

1a. Market price
1b. First-Come, First-Serve and Market Price.
1c. Majority rule
1d. Contest

■ CHECKPOINT 6.2 Value, Price, and Consumer Surplus

1a. The value of the 15th cone is $2.50.
1b. A consumer is willing to pay $3.50 for the 5th cone.
1c. The consumer surplus is the difference between the marginal benefit, which is what a consumer is willing to pay for the 5th cone and the price paid for the cone. The consumer’s marginal benefit for the 5th cone is $3.50 and the price is $2.50, so the consumer surplus equals $1.00.
1d. Fifteen cones are bought. The consumer surplus is the triangular area below the demand curve and above the market price. The area of a triangle equals $\frac{1}{2} \times (\text{base}) \times (\text{height})$, which is $\frac{1}{2} \times (15 \, \text{cones}) \times ($1.50 per cone) = $11.25.
1e. The total expenditure on cones is 15 cones $\times$ $2.50 per cone, which equals $37.50.
1f. The total benefit from the cones is the area under the demand curve, composed of total expenditure of $37.50 plus consumer surplus of $11.25, which equals $48.75.
1g. If demand doubles, then the consumer surplus increases. If the demand doubles, so that at every price consumers now buy double the quantity of cones they had previously purchased, the area of the consumer surplus triangle equals $\frac{1}{2} \times (30 \, \text{cones}) \times ($1.50 per cone) = $22.50.

■ CHECKPOINT 6.3 Cost, Price, and Producer Surplus

1a. The opportunity cost of the 15th cone is $2.50.
1b. The minimum supply price of the 5th cone is $1.50.
1c. Producer surplus is the price of a good minus the marginal cost of producing it, which is its opportunity cost. On the 5th cone, the producer surplus is $2.50 – $1.50, which is $1.00.
1d. Fifteen cones are sold. The producer surplus is the triangular area above the supply curve and below the market price. The area of a triangle equals $\frac{1}{2} \times (\text{base}) \times (\text{height})$, which is $\frac{1}{2} \times (15 \, \text{cones}) \times ($1.50 per cone) = $11.25.
1e. The total revenue from ice cream cones is 15 cones $\times$ $2.50 per cone, which equals $37.50.
1f. Total cost can be calculated as the area under the supply curve between the y-axis and the quantity of 15 ice cream cones. Alternatively, this area equals total revenue minus producer surplus, $37.50 – $11.25, which is $26.25.

1g. If the price of a cone falls to $2.00 per cone, producer surplus decreases to $5.00. The change in producer surplus is $11.25 – $5.00, which equals $6.25.

**CHECKPOINT 6.4 Are Markets Efficient?**

1a. The equilibrium price of a cone is $2.50 per cone and equilibrium quantity is 15 cones.

1b. In market equilibrium, consumer surplus is $11.25.

1c. In market equilibrium, producer surplus is $11.25.

1d. The market for ice cream cones efficient because 15 cones are produced and this is the quantity for which the marginal cost equals marginal benefit and the sum of consumer surplus and producer surplus is a maximum.

1e. If output is limited to 10 cones per day, the market is not efficient. When 10 cones per day are produced, the marginal cost of the 10th cone, $2.00, does not equal the marginal benefit from the 10th cone, $3.00. The market is underproducing.

1f. The deadweight loss is equal to the triangular area between demand and supply curves from 10 cones per day to 15 cones per day. The area of the triangle equals \( \frac{1}{2} \times (\text{base}) \times (\text{height}) \), which is \( \frac{1}{2} \times (5 \text{ cones}) \times ($1.00 \text{ per cone}) = $2.50.\)

1g. If the government requires 20 cones to be produced per day, the market is not efficient. When 20 cones are produced, the marginal cost of the 20th cone, $3.00, does not equal marginal benefit from the 10th cone, $2.00. The market is overproducing.

1h. The deadweight loss is equal to the triangular area between the supply and demand curves from 15 cones per day to 20 cones per day. The area of a triangle equals \( \frac{1}{2} \times (\text{base}) \times (\text{height}) \), which is \( \frac{1}{2} \times (5 \text{ cones}) \times ($1.00 \text{ per cone}) = $2.50.\)

**CHECKPOINT 6.5 Are Markets Fair?**

1a. The people who value the rooms the most will occupy the rooms because they will be the people willing to pay the highest price for the rooms.

1b. The consumers who occupy the rooms are the consumers who receive the consumer surplus.

1c. Presuming there is no resale of rooms from one renter to another at a higher rent than the homeowner charges, the homeowners renting the rooms receive the producer surplus. If there is resale, then the reselling renters also receive producer surplus.

1d. The outcome is efficient.
1e. The outcome is unfair based on the fair-results principle because poor people can’t afford to rent a room. So, the rooms will be shared unequally. The outcome is fair based on the fair-rules principle because the homeowners’ property rights are enforced and there is voluntary exchange between the homeowners and renters.

1f. The outcome is fair based on the fair-rules idea and unfair based on the fair results idea.
ANSWERS TO CHAPTER CHECKPOINT EXERCISES

1a. The equilibrium quantity is 200 sandwiches and the equilibrium price is $4 a sandwich. Figure 6.1 can be used to calculate the consumer surplus. The consumer surplus equals the area of the triangle above the price and below the demand curve. The area of the triangle is $1/2 \times \text{base} \times \text{height}$, so the consumer surplus is $1/2 \times (200 \text{ sandwiches}) \times ($4 \text{ a sandwich}$), which is $400.

1b. Figure 6.1 can be used to calculate the producer surplus. The producer surplus equals the area of the triangle below the price and above the supply curve. This area is $1/2 \times (200 \text{ sandwiches}) \times ($4 \text{ a sandwich}$), which is $400.

1c. The efficient quantity is 200 sandwiches.

1d. If the quantity demanded of sandwiches decreases by 100 per hour at each price, the new equilibrium price of a sandwich is $3 and the new equilibrium quantity is 150. This consumer surplus equals the area of the triangle above the price and below the demand curve and so is equal to $1/2 \times (150 \text{ sandwiches}) \times ($3 \text{ a sandwich}$), which is $225. The producer surplus equals the area of the triangle below the price and above the supply curve and so is equal to is $1/2 \times (150 \text{ sandwiches}) \times ($3 \text{ a sandwich}$), which is $225.

1e. If the quantity supplied of sandwiches decreases by 100 per hour at each price, the new equilibrium price of a sandwich is $5 and the new equilibrium quantity is 150. This consumer surplus equals the area of the triangle above the price and below the demand curve and so is equal to $1/2 \times (150 \text{ sandwiches}) \times ($3 \text{ a sandwich}$), which is $225. The producer surplus equals the area of the triangle below the price and above the supply curve and so is equal to is $1/2 \times (150 \text{ sandwiches}) \times ($3 \text{ a sandwich}$), which is $225.

2a. If only 100 sandwiches are produced, the deadweight loss equals the area of the darkened triangle in Figure 6.1. This area is $1/2 \times (100 \text{ sandwiches}) \times ($4 \text{ a sandwich}$), which is $200.

2b. Rationing sandwiches might be fair based on the “fair results” principle because everyone has an equal number of sandwiches. However, because Sandwiches To Go, Inc. is restricting the number of sandwiches it produces, some customers might go without. If the “fair results” view incorporates these consumers into the picture, then the rationing is unfair because not
every consumer has a sandwich. The “fair rules” approach is likely to consider the rationing fair, because all exchanges are voluntary. But, it is worth noting that Sandwiches To Go, Inc. is restricting its production and so creating a deadweight loss.

3a. The consumer surplus before the flood is $40,000. The consumer surplus during the flood is $122,500. Consumer surplus increases during the flood. The producer surplus before the flood is $40,000. The producer surplus during the flood is $122,500. The producer surplus increases during the flood.

3b. The allocation of resources is efficient before and during the flood because at the equilibrium, marginal cost equals marginal benefit.

3c. If the government allocated sandbags, the allocation method is command. The effect on the producer surplus of the companies selling sandbags depends on the price the government paid. If the government paid the higher, post-flood price, the firms’ producer surplus is unchanged. If the government required the companies to sell the sandbags to the government at the lower, pre-flood price, the firms’ producer surplus decreased. If the government hands out the sandbags for “free” so that everyone gets an equal share, people who have low marginal benefit from a sandbag (people who live on high ground) will sell their sandbags to people whose marginal benefit is higher, because their homes are on lower ground. The families selling the sandbags gain producer surplus. The consumer surplus with the government rationing increases because some families with high marginal benefit will get some sandbags from the government for “free.” Their consumer surplus increases.

3d. The rationing outcome is efficient as long as the government allows people to resell the sandbags. These resales allocate the sandbags to the families that place the highest value on them, so the allocation is efficient. If the government allows no resales, then the allocation is inefficient.

3e. Assuming the government allows resales, the resulting distribution is unfair according to the fair results view because sandbags are unequally shared. Because the government must raise taxes to finance its purchase of sandbags and taxes are not voluntary, the outcome is unfair according to the fair rules view.

4a. This method of allocation is based on personal characteristics. Two otherwise identical people pay different prices for water if one is a farmer and the other is not.

4b. Water use is probably not efficient. Because farmers face a lower price, the quantity of water they consume is greater than the quantity of water consumed by otherwise identical non-farmers. As a result, the marginal benefit of farmers is less than the marginal benefit of otherwise identical non-farmers. Presumably, however, the marginal cost of supplying water to the
two groups is the same. So there is overuse of water in farm uses and underuse of water in other uses.

4c. By the “fair results” approach, the question of fairness depends on relative incomes of farmers and city dwellers. If farmers have lower incomes, the lower price for water is fair. If farmers have higher incomes, then the lower price of water is not fair. Under the “fair rules” approach, the different prices are fair because transactions are voluntary.

5a. If farmers are charged the same price for water as city residents, farmers’ costs increase. The increase in costs decreases the supply of agricultural products, so the price of agricultural produce rises and the quantity decreases. Consumer surplus decreases and producer surplus also decreases.

5b. Market price is the allocation scheme.

5c. Water use would be more efficient. Prior to the change, farmers were paying less than the marginal cost and so there was overuse of water in farm uses. After the change farmers pay the marginal cost and so the marginal benefit equals the marginal cost.

5d. By the “fair results” approach, the question of fairness depends on relative incomes of farmers and city dwellers. If farmers have higher incomes, the higher price for water, which decreases their income, is fair. If farmers have lower incomes, then the higher price of water is not fair. Under the “fair rules” approach, the change is fair because transactions remain voluntary.

6a. The students find the question of efficiency difficult because they have not yet studied price discrimination. Price discrimination, such as that in the question, helps move the economy toward efficiency from a strict single-price monopoly outcome. But the students do not yet realize this point. So the students’ answers should be in terms of whether this arrangement sets the marginal benefit of attendance equal to the marginal cost. The arrangement is not fair under the fair results view because not everyone can visit the museums. Fairness using a fair rules approach seems correct because all exchanges are voluntary.

6b. The long lines mean that the allocation scheme has changed to first-come, first-served. The problem with the first-come, first-served scheme is that it does not necessarily ration the good or service to those people with the highest marginal benefit. A person with a very high marginal benefit who accidentally oversleeps might well not get to see the exhibition. So first-come, first-served does not guarantee that marginal benefit equals marginal cost and hence is inefficient. Using the market price does insure that marginal benefit equals marginal cost and so is efficient.

6c. Under a “fair results” approach, the question of fairness depends on the relative income of students and others. Making the common-sense assumption that students have lower incomes than others, a higher price for stu-
dents is not fair. Under the “fair rules” approach, the change is fair because transactions remain voluntary.

7a. If the price is $15 a haircut, Zoe makes the larger producer surplus.
7b. If the price is $10 a haircut, Dan makes the larger producer surplus.
7c. The outcomes are not fair according to the utilitarian view because Dan and Zoe do not have the same income.
7d. The outcomes are fair according to John Rawls if any redistribution of income leads to a fall in the income of the person with the higher income.
7e. The outcomes are fair according to Robert Nozick as long as all purchases and sales of haircuts are voluntary.

8. The compensation arrangement is efficient as long as the marginal benefit from winning equals the marginal cost of winning and the marginal benefit from coming in second equals the marginal cost of coming in second. The fair results approach to fairness asserts that the compensation scheme is unfair because income is not equally distributed. The fair rules approach asserts that the scheme is fair because the players voluntarily enter the tournament and the symmetry principle is not violated.

9. The compensation for male and female golfers might differ because of different levels of revenue that the tours can collect. The men’s golf tour is more popular and gets higher paying sponsors and sells its shows to television networks for higher prices, resulting in a bigger economic pie to split among its players. Women’s golf is less popular and so cannot attract as many high-paying sponsors. In tennis, however, the popularity of women’s tennis is comparable to that of men’s tennis. So the compensation arrangements might be efficient and are definitely efficient if they are such that the marginal benefit of winning equals the marginal cost. The compensation arrangements are unfair under the “fair results” approach because incomes are different among winners and losers and among men and women golfers. The compensation arrangements are fair under the “fair rules” approach.

10. Under a fair rules approach, it is fair that Roger Federer wins as many championships as he does because he is earning his income using his private property—his tennis skills. If a rule limiting wins was enacted, the “fair-rules” principle is violated because Mr. Federer is unable to sell his private property. Under a fair results approach, it is unfair because Mr. Federer’s income soars well beyond that of any other competitor. A fair results proponent argues in favor of a rule limiting the number of times a player can win because a limit would help equalize incomes.
Critical Thinking

11a. It is likely that they will propose two allocation schemes: sharing equally and first-come, first-serve.

11b. Probably of the two, first-come, first serve is most efficient because that way the book won’t lie unused if either Ratna or Sara want it but it’s the other roommates time to use the book.

11c. Of the allocation methods, sharing equally is fair under the “fair results” view if Sara and Ratna are otherwise comparable. The first-come, first-serve allocation method is not necessarily fair under the “fair results” approach if either Ratna or Sara winds up with more time using the book. Under the “fair rules” approach, sharing equally and first-come, first-serve are both fair because both have equality of opportunity to use the book.

12a. People in poor countries argue that drugs, music, software, and textbooks are dominated by monopolies, that is, one company produces Cipro, one company sells recordings by Brittny Spears, and so forth. When a market is controlled by a monopoly, less than the efficient quantity is produced. So people in poor countries assert that violating patents and copyrights allows more to be produced. They argue that production moves to where marginal benefit equals marginal cost, consumer surplus increases, and the deadweight loss decreases. Producer surplus also decreases. Producers from rich countries argue that they spend millions of dollars to develop new drugs, music, software, and textbooks. And, unless they are given protection by patents and copyrights, they are not be able to afford to spend these millions, which would mean that new drugs, music, software, and textbooks will not be developed. So producers argue that by making cheap copies illegal, the efficient amount of new products are developed. If cheap copies are allowed, producers argue that there is underproduction of new products, so that consumer surplus and producer surplus both decrease and a deadweight loss results.

12b. Using the “fair results” approach to fairness, it is fair for people in poor countries to create cheap copies. These people are poor and so by creating cheap copies, their consumption of goods and services increases. Using the “fair rules” approach to fairness, it is not fair for people in poor countries to create cheap copies. By making cheap copies, they are violating the copyrights and patents of the owners and so they are taking the private property of owners.

12c. People in the poor countries assert that a fine creates inefficiency because by manufacturing cheap copies, they are creating efficiency. Because a fine makes it less likely for the poor countries to produce cheap copies, a fine decreases consumer surplus and creates a deadweight loss. Producer surplus increases. Producers in rich countries say a fine creates efficiency be-
cause the fine limits the production of cheap copies and gives producers the incentive to develop new drugs, music, software, and textbooks.

12d. The “fair results” approach to fairness concludes that the fine is unfair because poorer people are being fined. The “fair rules” approach to fairness concludes that the fine is fair because the fine helps protect producers’ private property.
Web Exercises

13a. The major resource allocation problem at LaGuardia Airport is allocating landing and take-off slots on its runways.

13b. The FAA allocated landing slots by conducting a lottery.

13c. Using the lottery to allocate landing slots is not efficient because there is no guarantee that the airlines with high marginal benefit will receive the slots. Under a “fair results” approach, the lottery is probably not fair because it likely did not allocate the slots to the “poorest” airlines, that is, the airlines owned by the poorest individuals. Under a “fair rules” approach, the lottery was fair in the sense that there was equality of opportunity. However, the landing slots are a valuable property and they are owned by the government rather than a private individual. To the extent that a “fair rules” approach needs the property to be owned by individuals, then the basis of the lottery was unfair because the slots were not owned by individuals.

13d. Selling the slots at the market price, probably determined by an auction, would lead to an efficient use of the slots.

13e. Selling the slots is fair according to the “fair rules” approach. It is probably not fair according to the “fair results” view. For fairness according to the “fair results” approach, the slots need to be allocated to airlines owned by the poorest individuals. It is difficult to see how such an allocation could be reached: Command would work but the government would need to undertake an extensive investigation into the ownership of the airlines. Even then, if an airline is owned by one rich person and the many poor people, it is difficult to see whether this airline should be granted slots.

13f. According to Nozick, allocating the slots according to slots has no big tradeoff. Allocating slots according to command would have a big tradeoff because it is unlikely that airlines with the highest marginal benefit from a slot would be the airlines that received the slots.

14a. Price controls on gasoline would increase the quantity of gasoline demanded and decrease the quantity supplied. There would be a shortage of gasoline and gasoline would be underproduction of gasoline.

14b. Because there is underproduction of gasoline, the marginal cost of the last gallon of gasoline produced would fall and the marginal benefit would rise. Producer surplus would decrease. Consumer surplus, once the effect of the lines created by the shortage are taken into account, decreases. A deadweight loss is created.

14c. The price controls on gasoline would be unfair. According to the “fair results” approach, there is no guarantee that the poor will be able to buy more gasoline with the price control. Under the “fair rules” approach, voluntary transactions are prohibited.
15a. The scarce resources being discussed are resources that could be used to produce light rail or other means of transportation. For instance, examples of some of the scarce resources include the time of the workers, the concrete used in the construction of the light rail or other transportation mode, and the steel used in the construction.

15b. If the government proposal to construct a light rail system is supported, then the allocation of resources is by command. If the legislators decide to allow the voters to vote on the proposal, then the allocation of resources will be done by majority rule. If the proposal made in the report to institute congestion-based prices for highways is implemented, then resources are being allocated by the market price.

15c. The report concludes that the light rail system is inefficient because it is significantly more costly than alternative means of transportation. The report essentially concludes that creating any light rail system would have a marginal cost that exceeds its marginal benefit, so there would be over-production of light rail transportation services.

15d. The report concludes that a light rail system is unfair because many taxpayers in many areas would pay more in taxes than they would receive in benefits. The winners would be people who ride the light rail (and pay only 5 percent of its cost) and residents in Tempe and Phoenix. Losers include taxpayers in all other local suburbs. Taxpayers in suburbs other than Tempe and Phoenix as well as taxpayers in Tempe and Phoenix who do not rides the light rail have their incomes lowered as a result of the project. People who ride the light rail gain an advantage on everyone else.

15e. The students’ answers will differ. An alert student ought to include at least some market price mechanism because congestion-based pricing is mentioned in the article.
**Questions**

**CHECKPOINT 6.2 Value, Price, and Consumer Surplus**

1. Figure 6.2 shows the demand for soft drinks. Use the figure to answer the following questions:

1a. What is the value of the 30th can of soft drink?
1b. What is the willingness to pay for the 10th can of soft drink?
1c. What is the consumer surplus on the 10th can of soft drink if the price is 50¢ a can?
1d. What are the quantity of soft drinks bought and the consumer surplus if the price is 50¢ per can?
1e. What is the total amount paid for the soft drinks in question (d)?
1f. What is the total benefit from the soft drinks bought in question (d)?
1g. If the price of a soft drink rises to $1.00 a can, what is the change in the consumer surplus?

**CHECKPOINT 6.3 Cost, Price, and Producer Surplus**

2. Figure 6.3 shows the supply of soft drinks. Use the figure to answer the following questions:

2a. What is the marginal cost of the 30th can of soft drink?
2b. What is the minimum supply price of the 10th can of soft drink?
2c. What is the producer surplus on the 10th can of soft drink if the price is $1.50 a can?
2d. What are the quantity of soft drinks produced and the producer surplus if the price is $1.50 a can?
2e. What is the total revenue from the soft drinks sold in question (d)?
2f. What is the cost of producing the soft drinks sold in question (d)?
2g. If the price of a soft drink falls to $1.00 a can, what is the change in the producer surplus?
CHECKPOINT 6.4 Are Markets Efficient?

3. Figure 6.4 shows the market for soft drinks. Use the figure to answer the following questions:

3a. What are the equilibrium price and equilibrium quantity of soft drinks?
3b. In market equilibrium, what is the consumer surplus?
3c. In market equilibrium, what is the producer surplus?
3d. Is the market for soft drinks efficient? Why?
3e. If the government restricted producers to 10 cans of soft drinks a day, would the market for soft drinks be efficient? Why?
3f. In the situation described in part (e), what is the deadweight loss?
3g. If the government passed a law requiring producers of soft drinks to sell 20 cans a day, would the market for soft drinks be efficient? Why or why not?
3h. In the situation described in part (g), what is the deadweight loss?

4. Figure 6.5 shows the market for carnations. In recent years, the U.S. government has removed a quantity regulation (a quota) on imported carnations. Suppose that in 1990, the United States only allowed florists to import 30 tons of carnations each week. As a result, the supply curve of carnations to the United States, which is not the same as the “supply=marginal cost” curve, was vertical at 30 tons. The price at that time was $400 a ton of carnations. Today, the regulations have been removed and florists now import 60 tons of carnations and the price is $300 a ton of carnations.

4a. What were the producer and consumer surplus while the quantity regulation was in effect? What was the deadweight loss?
4b. What is the producer and consumer surplus now that the regulation has been removed?
4c. Which outcome is efficient, with the regulation or without?
CHECKPOINT 6.5 Are Markets Fair?
5. Figure 6.6 shows the market for electrical generators before and after a hurricane, with the demand curves labeled “before” and “after.”

5a. What is the producer surplus and consumer surplus before the hurricane?
5b. What is the producer surplus and consumer surplus after the hurricane?
5c. What is the equilibrium price and quantity after the hurricane? Is this outcome efficient?
5d. Under which rule is the outcome after the hurricane fair?

6. A drought has drastically reduced the water available in a desert town. The only store decides to sell the bottled water it has at the highest price that people are willing to pay.

6a. Who gets to consume the water?
6b. Who receives the consumer surplus on water?
6c. Who receives the producer surplus on water?
6d. Is the outcome efficient?
6e. Is this outcome fair or unfair?
6f. By what principle of fairness is the outcome fair or unfair?

Answers

CHECKPOINT 6.2 Value, Price, and Consumer Surplus
1a. The value of the 30th can of soft drink is $0.50.
1b. A consumer is willing to pay $1.50 for the 10th can of soft drink.
1c. The consumer surplus is the difference between the marginal benefit, which is what a consumer is willing to pay for the 10th can and the price paid for the can. The consumer’s marginal benefit from the 10th can is $1.50 and the price is $0.50, so the consumer surplus equals $1.00.
1d. 30 cans of soft drink are bought. The consumer surplus is the area below the demand curve and above the market price. The area of this triangle equals $1/2 \times (\text{the base}) \times (\text{the height})$, so the consumer surplus equals $1/2 \times (30 \text{ cans}) \times ($1.50), which is $22.50.
1e. The total amount paid = 30 cans × $0.50 = $15.00.
1f. The total benefit = $15.00 + $22.50 = $37.50.
1g. If the price of soft drinks rises to $1.00 per can, consumer surplus falls to $10. The change in consumer surplus is $10.00 − $22.50, which is −$12.50.

■ CHECKPOINT 6.3 Cost, Price, and Producer Surplus

2a. The marginal cost of the 30th can is $2.00.
2b. The minimum supply price of the 10th can is $1.00.
2c. Producer surplus is the price of a good minus the marginal cost of producing it, which is its opportunity cost. On the 10th can, the producer surplus is $1.50 − $1.00, which is $0.50.
2d. 20 cans of soft drinks are produced. The producer surplus is the triangular area above the supply curve and below the market price. The area of a triangle equals 1/2 × (base) × (height), which is 1/2 × (20 cans) × ($1.00) = $10.00.
2e. The total revenue is equal to 20 cans × $1.50, which is $30.00.
2f. The total cost can be calculated as the area under the supply curve. Alternatively, the cost equals the total revenue minus the producer surplus, which is $30.00 − $10.00 = $20.00.
2g. If the price falls to $1.00 a can, producer surplus decreases to $2.50. The change in producer surplus is $2.50 − $10.00, which is −$7.50.

■ CHECKPOINT 6.4 Are Markets Efficient?

3a. The equilibrium price and equilibrium quantity are $1.25 and 15 cans.
3b. At market equilibrium, consumer surplus = $5.63.
3c. Producer surplus = $5.63.
3d. The market is efficient because 15 cans are produced and this is the quantity at which marginal cost equals marginal benefit. Resources are efficiently used.
3e. If output is limited to 10 cans per day, the market is not efficient because when 10 cans are produced, the marginal cost ($1.00) does not equal marginal benefit ($1.50). The market is underproducing.
3f. The deadweight loss equals $1.25.
3g. If the government requires 20 cans to be produced each day, the market is not efficient because at 20 cans, marginal cost ($1.50) does not equal marginal benefit ($1.00). The market is overproducing.
3h. The deadweight loss equals $1.25.
4a. While the quantity regulation is in effect, producer surplus is $9,750 and consumer surplus is $1,500. The deadweight loss is $3,750.
4b. With the regulation removed, producer surplus is $9,000 and consumer surplus is $6,000.
4c. The situation without the quantity regulation is efficient because without it marginal benefit equals marginal cost.

CHECKPOINT 6.5 Are Markets Fair?
5a. Before the hurricane, the producer surplus is $2,250 and the consumer surplus is $750.
5b. After the hurricane, the producer surplus is $4,000 and the consumer surplus is $1,000.
5c. The equilibrium price is $200 and the equilibrium quantity is 40 generators a week. The outcome is efficient because marginal benefit equals marginal cost.
5d. According to the “fair-rules” principle, the outcome is fair because there is voluntary exchange of private property.
6a. The people who value the water the most consume the water because they will be the people willing to pay a high price for the water.
6b. The consumers who drink the water are the consumers who receive the consumer surplus.
6c. If there are no resales of water from one buyer to another at a higher price than the store charges, the store selling the water receives the producer surplus. If there are resales, then the reselling purchasers also receive producer surplus.
6d. The outcome is efficient.
6e. The outcome is unfair based on the fair-results principle because poor people can’t afford to buy the water, so the water is shared unequally. The outcome is fair based on the fair-rules principle because the store’s property rights are enforced and there is voluntary exchange between the store and buyers.
6f. The outcome is fair based on the fair-rules idea and unfair on the fair results idea.
USING EYE ON THE U.S ECONOMY

The Invisible Hand and e-Commerce

You can use this example to show consumer and producer surplus and how they differ for different individuals. Remind students that market demand curves are the addition of individual demand curves and therefore consumer surplus differs across people. (The same is true for supply curves.) As a result, as the cold drink vendor sells cold drinks, most people receive a consumer surplus from their purchase (the market price is less than the value they place on the drink). And the vendor is receiving producer surplus from selling cold drinks (the market price is greater than his marginal cost). That’s typically the end of the story.

For the man on the bench though, it’s not the cold drink that provides the consumer surplus, but the umbrella, so he offers to buy the umbrella. Once the man on the bench makes the offer for the umbrella, the vendor realizes that he can realize a producer surplus from selling the umbrella, too. What price did the man offer for the umbrella? A price low enough to provide him some consumer surplus. What price was the vendor willing to accept? A price high enough to provide him some producer surplus.