Part 1

Demand Curves, Movements along Demand Curves, and Shifts in Demand Curves

Part A: A Change in Demand versus a Change in Quantity Demanded

Student Alert: **The distinction between a "change in demand" and a "change in quantity demanded" is very important!**

Table 1-4.1 shows the market demand for a hypothetical product: Greebes. Study the data and plot the demand for Greebes on the graph in Figure 1-4.1. Label the demand curve D, and answer the questions that follow.
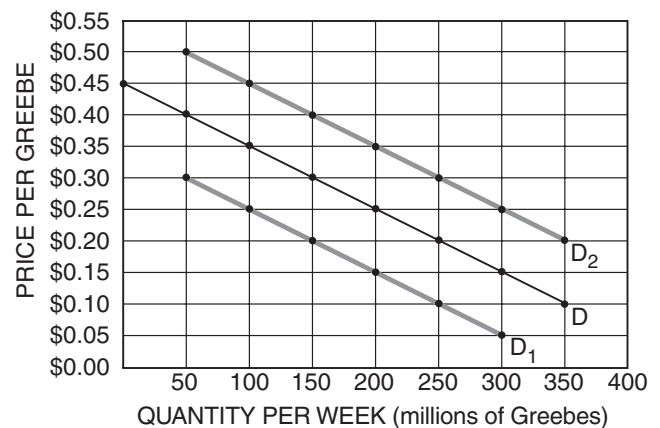
Table 1-4.1
Demand for Greebes

Price (per Greebe)	Quantity demanded per week (millions of Greebes)
$0.10	350
$0.15	300
$0.20	250
$0.25	200
$0.30	150
$0.35	100
$0.40	50
$0.45	0

Figure 1-4.1
Demand for Greebes

1. The data for demand curve D indicate that at a price of $0.30 per Greebe, buyers would be willing to buy __*150*__ million Greebes. All other things held constant, if the price of Greebes increased to $0.40 per Greebe, buyers would be willing to buy __*50*__ million Greebes. Such a change would be a decrease in (*demand* / ***quantity demanded***). All other things held constant, if the price of Greebes decreased to $0.20, buyers would be willing to buy __*250*__ million Greebes. Such a change would be called an increase in (*demand* / ***quantity demanded***).

Now, let's suppose there is a change in federal income-tax rates that affects the disposable income of Greebe buyers. This change in the *ceteris paribus* (all else being equal) conditions underlying the original demand for Greebes will result in a new set of data, shown in Table 1-4.2. Study these new data, and add the new demand curve for Greebes to the graph in Figure 1-4.1. Label the new demand curve D_1 and answer the questions that follow.

Table 1-4.2
New Demand for Greebes

Price (per Greebe)	Quantity demanded per week (millions of Greebes)
$0.05	300
$0.10	250
$0.15	200
$0.20	150
$0.25	100
$0.30	50

2. Comparing the new demand curve (D_1) with the original demand curve (D), we can say that the change in the demand for Greebes results in a shift of the demand curve to the (***left*** / *right*). Such a shift indicates that at each of the possible prices shown, buyers are now willing to buy a (***smaller*** / *larger*) quantity; and at each of the possible quantities shown, buyers are willing to offer a (*higher* / ***lower***) maximum price. The cause of this demand curve shift was a(n) (***increase*** / *decrease*) in tax rates that (*increased* / ***decreased***) the disposable income of Greebe buyers.

Now, let's suppose that there is a dramatic change in people's tastes and preferences for Greebes. This change in the *ceteris paribus* conditions underlying the original demand for Greebes will result in a new set of data, shown in Table 1-4.3. Study these new data, and add the new demand curve for Greebes to the graph in Figure 1-4.1. Label the new demand curve D_2 and answer the questions that follow.

Table 1-4.3
New Demand for Greebes

Price (per Greebe)	Quantity demanded per week (millions of Greebes)
$0.20	350
$0.25	300
$0.30	250
$0.35	200
$0.40	150
$0.45	100
$0.50	50

3. Comparing the new demand curve (D_2) with the original demand curve (D), we can say that the change in the demand for Greebes results in a shift of the demand curve to the (*left / **right***). Such a shift indicates that at each of the possible prices shown, buyers are now willing to buy a (*smaller / **larger***) quantity; and at each of the possible quantities shown, buyers are willing to offer a (*lower / **higher***) maximum price. The cause of this shift in the demand curve was a(n) (***increase*** / *decrease*) in people's tastes and preferences for Greebes.

Part B: Do You Get It?

Now, to test your understanding, choose the answer you think is the best in each of the following multiple-choice questions.

4. All other things held constant, which of the following would *not* cause a change in the demand (shift in the demand curve) for motorcycles?

   (A) A decrease in consumer incomes

   (B) A decrease in the price of motorcycles. This will cause an increase in the "quantity demanded" of motorcycles.

   (C) An increase in the price of bicycles

   (D) An increase in people's tastes and preferences for motorcycles

5. "Rising oil prices have caused a sharp decrease in the demand for oil." Speaking precisely, and using terms as they are defined by economists, choose the statement that best describes this quotation.

   (A) The quotation is correct: an increase in price causes a decrease in demand.

   (B) The quotation is incorrect: an increase in price causes an increase in demand, not a decrease in demand.

   (C) The quotation is incorrect: an increase in price causes a decrease in the quantity demanded, not a decrease in demand.

   (D) The quotation is incorrect: an increase in price causes an increase in the quantity demanded, not a decrease in demand.

6. "As the price of domestic automobiles has risen, customers have found foreign autos to be a better bargain. Consequently, domestic auto sales have been decreasing, and foreign auto sales have been increasing." Using only the information in this quotation and assuming everything else remains constant, which of the following best describes this statement?

   (A) A shift in the demand curves for both domestic and foreign automobiles

   (B) A movement along the demand curves for both foreign and domestic automobiles

   (C) A movement along the demand curve for domestic autos, and a shift in the demand curve for foreign autos

   (D) A shift in the demand curve for domestic autos, and a movement along the demand curve for foreign autos

Part C: Consumer Surplus

Once we have the demand curve, we can define the concept of *consumer surplus*. Consumer surplus is the value a consumer receives from the purchase of a good in excess of the price paid for the good. Stated differently, consumer surplus is the difference between the amount a person is willing and able to pay for a unit of the good and the actual price paid for that unit. For example, if you are willing to pay $100 for a coat but are able to buy the coat for only $70, you have a consumer surplus of $30.

Refer again to the demand data from Table 1-4.1, and assume the price is $0.30. Some buyers will benefit because they are willing to pay prices higher than $0.30 for this good. Note that each time the price is reduced by $0.05, consumers will buy an additional 50 million units. Table 1-4.4 shows how to calculate the consumer surplus resulting from the price of $0.30.

Table 1-4.4
Finding the Consumer Surplus When the Price Is $0.30

| Price willing to pay	Quantity demanded	Consumer surplus from the increments of 50 million units if P = $0.30
$0.40	50 million units	($0.10)(50 million units) = $5.0 million
$0.35	100 million units	($0.05)(50 million units) = $2.5 million
$0.30	150 million units	($0.00)(50 million units) = $0.0 million

For those consumers willing to buy 50 million units at a price of $0.40, the consumer surplus for each unit is $0.10 (= $0.40 – $0.30), making the consumer surplus for all these units equal to $5.0 million. If the price is reduced from $0.40 to $0.35, there are consumers willing to buy another 50 million units; the consumer surplus for these buyers is $0.05 per unit ($0.35 – $0.30) or a total of $2.5 million for all 50 million units. If the price is lowered another $0.05 to $0.30, an extra 50 million units will be demanded; the consumer surplus for these units is $0.00 since $0.30 is the highest price these consumers are willing to pay. Thus, if the price is $0.30, a total of 150 million units are demanded and the total consumer surplus is $7.5 million.

An approximation of the total consumer surplus from a given number of units of a good can be shown graphically as the area below the demand curve and above the price paid for those units. In Figure 1-4.2, redraw the demand curve (D) from the data in Table 1-4.1. We see that if the price is $0.30, the quantity demanded is 150 million units. Consumer surplus from these 150 million units is the shaded area between the demand curve D and the horizontal price line at $0.30. We can find the area of this triangle using the familiar rule of (½) × base × height.

Figure 1-4.2
Consumer Surplus
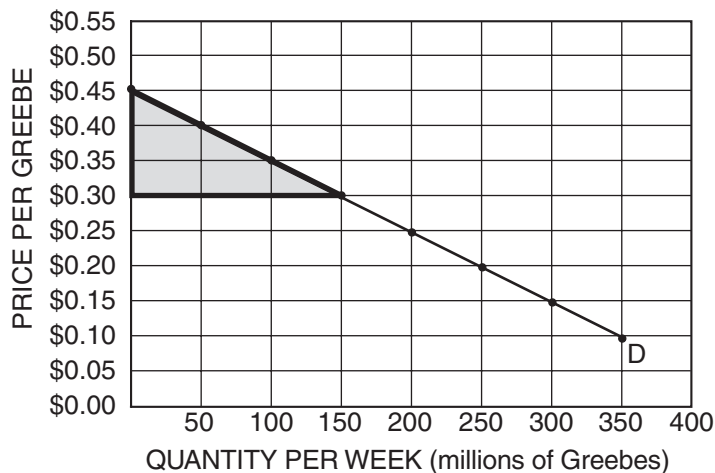
7. What is the value of consumer surplus in this market if the price is $0.30? **$11.25 million or $11,250,000** Show how you calculated the value of the area of the triangle representing consumer surplus.
   Consumer surplus = (0.5)(150 million)($0.45 – $0.30) = $11.25 million.

8. Answer these questions based on the discussion of Figure 1-4.2.

   (A) If the price is increased from $0.30 to $0.35, consumer surplus will (*increase / **decrease***). Why?
   Consumers will buy fewer units because of the higher price, and the consumer surplus of the units they buy will be smaller.

   (B) If the price is decreased from $0.30 to $0.25, consumer surplus will (***increase** / decrease*). Why?
   Consumers will buy more units because of the lower price, and the consumer surplus of the units they buy will be larger.

Part 2

Reasons for Changes in Demand

Part A: Does the Demand Curve Shift?

Read the eight newspaper headlines in Table 1-5.1, and use the table to record the impact of each event on the demand for U.S.-made autos. In the second column, indicate whether the event in the headline will cause consumers to buy more or less U.S.-made autos. Use the third column to indicate whether there is a change in demand (ΔD) or a change in quantity demanded (ΔQd) for U.S.-made autos. In the third column, decide whether the demand curve shifts to the right or left or does not shift. Finally, indicate the letter for the new demand curve. Use Figure 1-5.1 to help you. **Always start at curve B**, and move only one curve at a time.

Table 1-5.1
Impact of Events on Demand for U.S.-Made Autos

Headline	Will consumers buy more or less U.S. autos?	Is there a change in demand (ΔD) or a change in quantity demanded (ΔQd)?	Does the demand curve for U.S. autos shift to the right or left or not shift?	What is the new demand curve for U.S. autos?
1. Consumers' Income Drops	More /**(Less)**	**(ΔD)**/ ΔQd	Right /**(Left)**/ No Shift	**(A)**/ B / C
2. Millions of Immigrants Enter the U.S.	**(More)**/ Less	**(ΔD)**/ ΔQd	**(Right)**/ Left / No Shift	A / B /**(C)**
3. Price of Foreign Autos Drop	More /**(Less)**	**(ΔD)**/ ΔQd	Right /**(Left)**/ No Shift	**(A)**/ B / C
4. Major Cities Add Inexpensive Bus Lines	More /**(Less)**	**(ΔD)**/ ΔQd	Right /**(Left)**/ No Shift	**(A)**/ B / C
5. Price of U.S. Autos Rises	More /**(Less)**	ΔD /**(ΔQd)**	Right / Left /**(No Shift)**	A /**(B)**/ C
6. Price of U.S. Autos Expected to Rise Soon	**(More)**/ Less	**(ΔD)**/ ΔQd	**(Right)**/ Left / No Shift	A / B /**(C)**
7. Families Look Forward to Summer Vacations	**(More)** / Less	**(ΔD)**/ ΔQd	**(Right)**/ Left / No Shift	A / B /**(C)**
8. U.S. Auto Firms Launch Effective Ad Campaigns	**(More)**/ Less	**(ΔD)**/ ΔQd	**(Right)**/ Left / No Shift	A / B /**(C)**

Figure 1-5.1
Demand for U.S.-Made Autos

Part B: Why Does the Demand Curve Shift?

Categorize each change in demand in Part A according to the reason why demand changed. A given demand curve assumes that consumer expectations, consumer tastes, the number of consumers in the market, the income of consumers, and the prices of substitutes and complements are unchanged. In Table 1-5.2, place an X next to the reason that the event described in the headline caused a change in demand. One headline will have no answer because it will result in a change in quantity demanded rather than a change in demand.

Table 1-5.2
Reasons for a Change in Demand for U.S.-Made Autos

Reason	Headline number							
	1	2	3	4	5	6	7	8
9. A change in consumer expectations						X	X	
10. A change in consumer taste								X
11. A change in the number of consumer in the market		X						
12. A change in income	X							
13. A change in the price of a substitute good			X	X				
14. A change in the price of a complementary good								

Part 3

Supply Curves, Movements along Supply Curves, and Shifts in Supply Curves

In this activity, we will assume that the supply curve of Greebes is upward sloping.

Part A: A Change in Supply versus a Change in Quantity Supplied

⚠ *Student Alert:* **The distinction between a "change in supply" and a "change in quantity supplied" is very important!**

Study the data in Table 1-6.1 and plot the supply of Greebes on the graph in Figure 1-6.1. Label the supply curve S and answer the questions that follow.

Table 1-6.1
Supply of Greebes

Price (per Greebe)	Quantity supplied per week (millions of Greebes)
$0.05	0
$0.10	50
$0.15	100
$0.20	150
$0.25	200
$0.30	250
$0.35	300
$0.40	350

Figure 1-6.1
Supply of Greebes
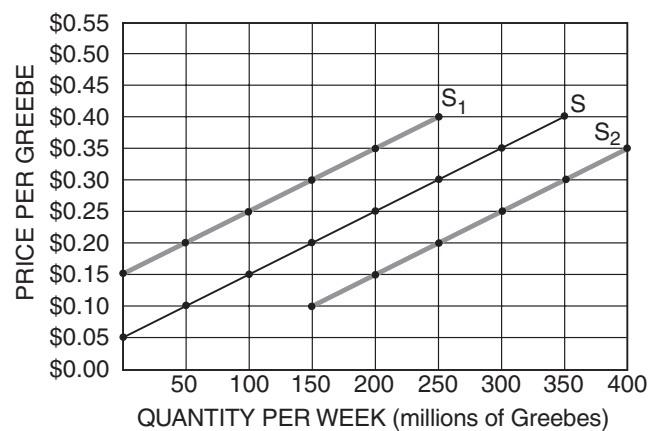
1. The data for supply curve S indicate that at a price of $0.25 per Greebe, suppliers would be willing to offer ___**200**___ million Greebes. All other things held constant, if the price of Greebes increased to $0.30 per Greebe, suppliers would be willing to offer ___**250**___ million Greebes. Such a change would be an increase in (*supply* / ***quantity supplied***). All other things held constant, if the price of Greebes decreased to $0.20 per Greebe, suppliers would be willing to offer ___**150**___ million Greebes. Such a change would be called a decrease in (*supply* / ***quantity supplied***).

Now, let's suppose that there is a change in the price of several of the raw materials used in making Greebes. This change in the *ceteris paribus* conditions underlying the original supply of Greebes will result in a new set of data, such as that shown in Table 1-6.2. Study the data, and plot this supply of Greebes on the graph in Figure 1-6.1. Label the new supply curve S_1 and answer the questions that follow.

Table 1-6.2
New Supply of Greebes

Price (per Greebe)	Quantity supplied per week (millions of Greebes)
$0.15	0
$0.20	50
$0.25	100
$0.30	150
$0.35	200
$0.40	250

2. Comparing the new supply curve (S_1) with the original supply curve (S), we can say that the change in the supply of Greebes results in a shift of the supply curve to the (**left** / *right*). Such a shift indicates that at each of the possible prices shown, suppliers are now willing to offer a (**smaller** / *larger*) quantity; and at each of the possible quantities shown, suppliers are willing to accept a (**higher** / *lower*) minimum price. The cause of this supply curve shift was a(n) (**increase** / *decrease*) in prices of several of the raw materials used in making Greebes.

Now, let's suppose that there is a dramatic change in the price of Silopanna, a resource used in the production of Greebes. This change in the *ceteris paribus* conditions underlying the original supply of Greebes will result in a new set of data shown in Table 1-6.3. Study the data, and plot this supply of Greebes on the graph in Figure 1-6.1. Label the new supply curve S_2 and answer the questions that follow.

Table 1-6.3
New Supply of Greebes

Price (per Greebe)	Quantity supplied per week (millions of Greebes)
$0.10	150
$0.15	200
$0.20	250
$0.25	300
$0.30	350
$0.35	400

3. Comparing the new supply curve (S_2) with the original supply curve (S), we can say that the change in the supply of Greebes results in a shift of the supply curve to the (*left* / ***right***). Such a shift indicates that at each of the possible prices shown, suppliers are now willing to offer a (*smaller* / ***larger***) quantity; and at each of the possible quantities shown, suppliers are willing to accept a (***lower*** / *higher*) minimum price. The cause of this supply curve shift is a(n) (*increase* / ***decrease***) in the price of Silopanna, a resource used in the production of Greebes.

Part B: Do You Get It?

Now, to check your understanding, choose the answer you think is the one best alternative in each of the following multiple-choice questions.

4. All other things held constant, which of the following would *not* cause a change in the supply of beef?

    (A) A decrease in the price of beef (This will cause a decrease in the quantity supplied of beef.)

    (B) A decrease in the price of cattle feed

    (C) An increase in the price of cattle feed

    (D) An increase in the cost of transporting cattle to market

5. "Falling oil prices have caused a sharp decrease in the supply of oil." Speaking precisely, and using terms as they are defined by economists, choose the statement that best describes this quotation.

   (A) The quotation is correct: decrease in price causes a decrease in supply.

   (B) The quotation is incorrect: decrease in price causes an increase in supply, not a decrease in supply.

   (C) The quotation is incorrect: decrease in price causes an increase in the quantity supplied, not a decrease in supply.

   (D) The quotation is incorrect: a decrease in price causes a decrease in the quantity supplied, not a decrease in supply.

6. You overhear a fellow student say, "Economic markets are confusing. If supply increases, then price decreases; but if price decreases, then supply also will decrease. If supply falls, price will rise; but if price rises, supply also will rise." Dispel your friend's obvious confusion (in no more than one short paragraph) below.
   My friend does not understand the difference between a change in supply, which will cause a change in price, and a change in quantity supplied, which is the result of a change in price. If supply increases, then price will decrease. However, a decrease in price will lead to a decrease in quantity supplied, not a decrease in supply. If supply falls, then price will increase. If however, there is an increase in price, it will result in an increase in quantity supplied.

Part C: Producer Surplus

Once we have the supply curve, we can define the concept of *producer surplus*. Producer surplus is the value a producer receives from the sale of a good in excess of the marginal cost of producing the good. Stated differently, producer surplus is the difference between the price a seller receives for a unit of the good and the cost to the seller of producing that unit. For example, if your cost of producing a coat is $50 but you are able to sell the coat for $70, you have a producer surplus of $20.

Refer again to the supply curve data from Table 1-6.1, and assume the price is $0.25. Some sellers will benefit because based on their low marginal costs of production, they are willing to accept prices lower than $0.25 for this good. Note that each time the price is increased by $0.05, sellers will provide an additional 50 million units. Table 1-6.4 shows how to calculate the producer surplus resulting from the price of $0.25.

Table 1-6.4
Finding the Producer Surplus When the Price Is $0.25

| Price willing to accept	Quantity supplied	Producer surplus from the increments of 50 million units if P = $0.25
$0.10	50 million units	($0.15)(50 million units) = $7.5 million
$0.15	100 million units	($0.10)(50 million units) = $5.0 million
$0.20	150 million units	($0.05)(50 million units) = $2.5 million
$0.25	200 million units	($0.00)(50 million units) = $0.0 million

For those producers willing to sell 50 million units at a price of $0.10, the producer surplus for each unit is $0.15 (= $0.25 – $0.10), making the producer surplus for all these units equal to $7.5 million. There are other producers who will put an extra 50 million units on the market if the price is $0.15. The producer surplus for these sellers is $0.10 per unit (= $0.25 – $0.15) or a total of $5.0 million for all 50 million units. If the price is raised another $0.05 to $0.20, an extra 50 million units will be supplied; the producer surplus for these units is $2.5 million, or $0.05 per unit (= $0.25 – $0.20). If the price is $0.25, another 50 million units will be supplied. The producer surplus for these units, however, is $0.00 since $0.25 is the lowest price these producers are willing to accept. Thus, if the price is $0.25, a total of 200 million units are supplied and the total producer surplus is $15.0 million.

An approximation of the total producer surplus from a given number of units of a good can be shown graphically as the area above the supply curve and below the price paid for those units. In Figure 1-6.2, redraw the supply curve (S) from the data in Table 1-6.1. We see that if the price is $0.25, the quantity supplied is 200 million units. Consumer surplus from these 200 million units is the shaded area between the supply curve S and the horizontal price line at $0.25. We can find the area of this triangle using the familiar rule of (½) × base × height.

Figure 1-6.2
Producer Surplus
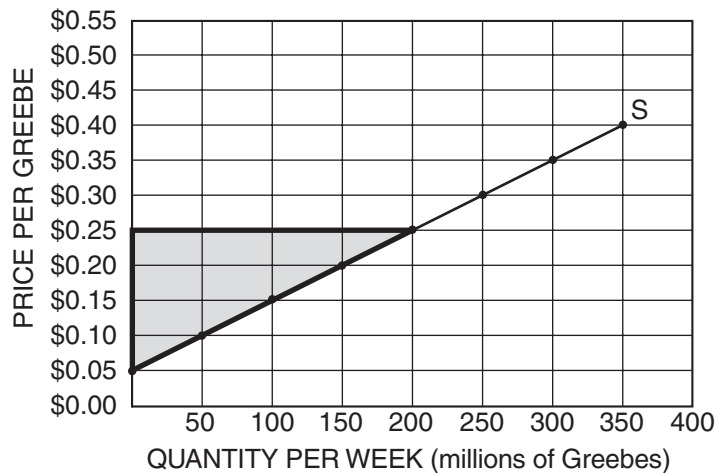
7. What is the value of producer surplus in this market if the price is $0.25? **$20.0 million**
   Show how you calculated the value of the area of the triangle representing producer surplus.
   PS = (0.5)(200 million)($0.25 – $0.05) = $20.0 million

8. Answer these questions based on the discussion of Figure 1-6.2.

(A) If the price is increased from $0.25 to $0.30, producer surplus will (***increase*** / *decrease*). Why?
Producers are putting more units on the market and receiving a higher price.

(B) If the price is decreased from $0.25 to $0.20, producer surplus will (*increase* / ***decrease***). Why?
Producers are putting fewer units on the market and receiving a lower price.

Part 4

Reasons for Changes in Supply

Part A: Does the Supply Curve Shift?

Read the eight newspaper headlines in Table 1-7.1, and use the table to record the impact of each event on the supply of cars from U.S. auto producers. In the second column, indicate whether the event in the headline will cause American auto producers to provide more or less cars. Use the third column to indicate whether there is a change in supply (ΔS) or a change in quantity supplied (ΔQs) of cars. In the third column, decide whether the supply curve shifts to the right or left or does not shift. Finally, indicate the letter for the new supply curve. Use Figure 1-7.1 to help you. **Always start at curve B**, and move only one curve at a time.

Table 1-7.1
Impact of Events on Supply of U.S.-Made Autos

Headline	Should U.S. auto firms produce more or less?	Is there a change in supply (ΔS) or a change in quantity supplied (ΔQs)?	Does the supply curve of cars shift to the right or left or not shift?	What is the new supply curve for cars?
1. Auto Workers' Union Agrees to Wage Cuts	**(More)** / Less	(Δ**S**) / ΔQs	(**Right**) / Left / No Shift	A / B / **(C)**
2. New Robot Technology Increases Efficiency	**(More)** / Less	(Δ**S**) / ΔQs	(**Right**) / Left / No Shift	A / B / **(C)**
3. Price of U.S. Cars Increases	**(More)** / Less	ΔS / (Δ**Qs**)	Right / Left / (**No Shift**)	A / **(B)** / C
4. Nationwide Auto Workers Strike Begins	More / **(Less)**	(Δ**S**) / ΔQs	Right / (**Left**) / No Shift	**(A)** / B / C
5. Cost of Steel Decreases	**(More)** / Less	(Δ**S**) / ΔQs	(**Right**) / Left / No Shift	A / B / **(C)**
6. Major Auto Producer Goes Out of Business	More / **(Less)**	(Δ**S**) / ΔQs	Right / (**Left**) / No Shift	**(A)** / B / C
7. Buyers Reject New Car Models	More / **(Less)**	ΔS / (Δ**Qs**)	Right / Left / (**No Shift**)	A / **(B)** / C
8. Government Gives Car Producers a Subsidy	**(More)** / Less	(Δ**S**) / ΔQs	(**Right**) / Left / No Shift	A / B / **(C)**

Figure 1-7.1
Supply of U.S.-Made Cars

Part B: Why Does the Supply Curve Shift?

Categorize each change in supply in Part A according to the reason why supply changed. In Table 1-7.2, place an X next to the reason that the headline indicated a change in supply. In some cases, more than one headline could be matched to a reason. It is possible a headline does not indicate a shift in supply because it will result in a change in quantity supplied rather than a change in supply.

Table 1-7.2
Impact of Events on Supply of U.S.-Made Autos

Reason	Headline number							
	1	2	3	4	5	6	7	8
9. A change in costs of inputs to production process	X			X	X			
10. A change in technology		X						
11. A change in the number of producers in the market						X		
12. Government policies								X

Part 5

Equilibrium Price and Equilibrium Quantity

Table 1-8.1 below shows the demand for Greebes and the supply of Greebes. Plot these data on the graph in Figure 1-8.1. Label the demand curve D and label the supply curve S. Then answer the questions that follow.

⚠ *Student Alert:* A "change in demand" or a "change in supply" results in a change in price, while a "change in quantity demanded" or a "change in quantity supplied" is the result of a change in price.

Table 1-8.1
Demand for and Supply of Greebes

Price (per Greebe)	Quantity demanded (millions of Greebes)	Quantity supplied (millions of Greebes)
$0.05	400	0
$0.10	350	50
$0.15	300	100
$0.20	250	150
$0.25	200	200
$0.30	150	250
$0.35	100	300
$0.40	50	350
$0.45	0	400

Figure 1-8.1
Demand for and Supply of Greebes
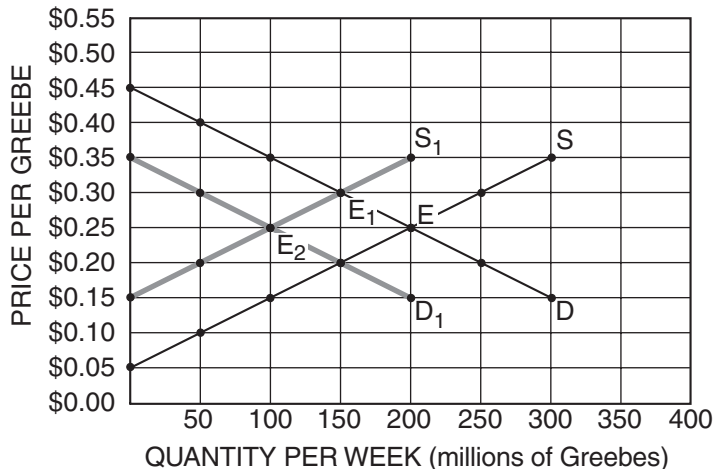
1. Under these conditions, competitive market forces would tend to establish an equilibrium price of ___*$0.25*___ per Greebe and an equilibrium quantity of ___*200*___ million Greebes.

2. If the price currently prevailing in the market is $0.30 per Greebe, buyers would want to buy ___*150*___ million Greebes and sellers would want to sell ___*250*___ million Greebes. Under these conditions, there would be a (*shortage* / ***surplus***) of ___*100*___ million Greebes. Competitive market forces would cause the price to (*increase* / ***decrease***) to a price of ___*$0.25*___ per Greebe. At this new price, buyers would now want to buy ___*200*___ million Greebes, and sellers now want to sell ___*200*___ million Greebes. Because of this change in (***price*** / *underlying conditions*), the (*demand* / ***quantity demanded***) (***increased*** / *decreased*) by ___*50*___ million Greebes, and the (*supply* / ***quantity supplied***) (*increased* / ***decreased***) by ___*50*___ million Greebes.

3. If the price currently prevailing in the market is $0.20 per Greebe, buyers would want to buy ___*250*___ million Greebes, and sellers would want to sell ___*150*___ million Greebes. Under these conditions, there would be a (***shortage*** / *surplus*) of ___*100*___ million Greebes. Competitive market forces would cause the price to (***increase*** / *decrease*) to a price of ___*$0.25*___ per Greebe. At this new price, buyers would now want to buy ___*200*___ million Greebes, and sellers now want to sell ___*200*___ million Greebes. Because of this change in (***price*** / *underlying conditions*), the (*demand* / ***quantity demanded***) (*increased* / ***decreased***) by ___*50*___ million Greebes, and the (*supply* / ***quantity supplied***) (***increased*** / *decreased*) by ___*50*___ million Greebes.

4. At equilibrium, is each of the following true or false? Explain.

   (A) The quantity demanded is equal to the quantity supplied.
   True. The point on the demand and supply curves is the same, so the quantity demanded equals the quantity supplied at the equilibrium price. Quantities refer to points on the graph.

   (B) Demand equals supply.
   False. Demand refers to the entire demand curve and supply refers to the entire supply curve. The two curves are different, therefore supply does not equal demand. At the equilibrium price, the quantity demanded equals the quantity supplied.

5. Now, suppose a mysterious blight causes the supply schedule for Greebes to change as shown in Table 1-8.2:

Table 1-8.2
New Supply of Greebes

Price (per Greebe)	Quantity supplied (millions of Greebes)
$0.15	0
$0.20	50
$0.25	100
$0.30	150
$0.35	200

Plot the new supply schedule on the axes in Figure 1-8.1 and label it S$_1$. Label the new equilibrium E$_1$. Under these conditions, competitive market forces would tend to establish an equilibrium price of __*$0.30*__ per Greebe and an equilibrium quantity of __*150*__ million Greebes.

Compared with the equilibrium price in Question 1, we say that because of this change in (*price* / ***underlying conditions***), the (***supply*** / *quantity supplied*) changed; and both the equilibrium price and the equilibrium quantity changed. The equilibrium price (***increased*** / *decreased*), and the equilibrium quantity (*increased* / ***decreased***).

Compared with the consumer and producer surpluses in Question 4, consumer surplus has (*increased* / ***decreased***), and producer surplus has (*increased* / ***decreased***).

6. Now, with the supply schedule at S$_1$, suppose further that a sharp drop in people's incomes as the result of a prolonged recession causes the demand schedule to change as shown in Table 1-8.3.

Table 1-8.3
New Demand for Greebes

Price (per Greebe)	Quantity demanded (millions of Greebes)
$0.15	200
$0.20	150
$0.25	100
$0.30	50
$0.35	0

Plot the new demand schedule on the axes in Figure 1-8.1 and label it D_1. Label the new equilibrium E_2. Under these conditions, with the supply schedule at S_1, competitive market forces would establish an equilibrium price of __***$0.25***__ per Greebe and an equilibrium quantity of ___***100***___ million Greebes. Compared with the equilibrium price in Question 5, because of this change in (*price* / ***underlying conditions***), the (***demand*** / *quantity demanded*) changed. The equilibrium price (*increased* / ***decreased***), and the equilibrium quantity (*increased* / ***decreased***).

Part 6
Shifts in Supply and Demand

Part A: The Market for Jelly Beans

Fill in the blanks with the letter of the graph that illustrates each situation. You may use a graph more than once.

Figure 1-9.1

The Supply and Demand for Jelly Beans

Graph A	Graph B	Graph C	Graph D
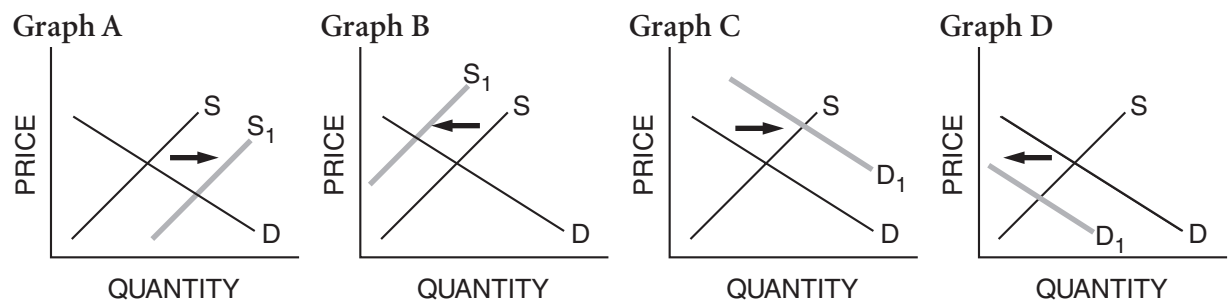
1. The price of sugar, a key ingredient in producing jelly beans, increases. _____**B**_____

2. The price of bubble gum, a close substitute for jelly beans, increases. _____**C**_____

3. A machine is invented that makes jelly beans at a lower cost. _____**A**_____

4. The government places a tax on foreign jelly beans, which have a considerable share of the market. _____**B**_____

5. The price of soda, a complementary good for jelly beans, increases. _____**D**_____

6. Widespread prosperity allows people to buy more jelly beans. _____**C**_____

Part B: Apples, Pears, and Pies

Connecticut ships large amounts of apples to all parts of the United States by rail. Circle the words that show the effects on price and quantity for each situation, and complete the graphs below, showing how a hurricane that destroys apples before they are picked in Connecticut might affect the price and quantity of each commodity. Then provide your reasoning.

7. **Apples in Boston**

    Price: *Rises* / *Unchanged* / *Falls*
    Quantity: *Rises* / *Unchanged* / *Falls*
    Reason: *A hurricane destroyed the apples.*
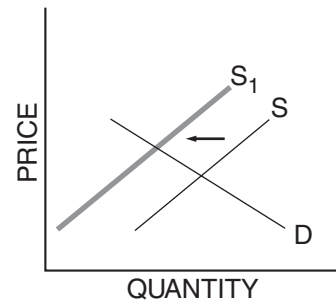
8. **Land devoted to apple orchards in the state of Washington**

    Price: *Rises* / *Unchanged* / *Falls*
    Quantity: *Rises* / *Unchanged* / *Falls*
    Reason: *Washington farmers grow more apples because the price is higher. To do this, they must buy more land.*
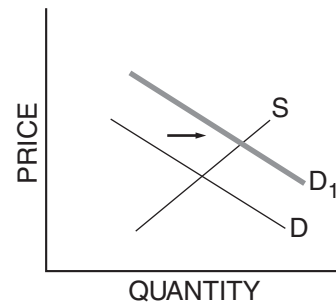
9. **Apples grown in the state of Washington**

    Price: *Rises* / *Unchanged* / *Falls*
    Quantity: *Rises* / *Unchanged* / *Falls*
    Reason: *Consumers substitute Washington apples for Connecticut apples.*
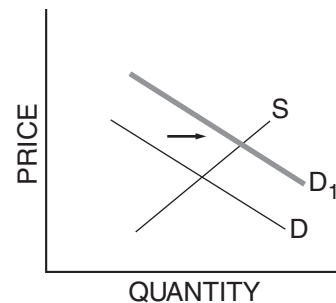
10. **Pears**

Price: *Rises* / *Unchanged* / *Falls*

Quantity: *Rises* / *Unchanged* / *Falls*

Reason: ***Consumers substitute pears for apples.***
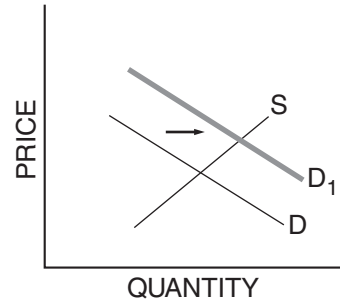
11. **Apple pies**

Price: *Rises* / *Unchanged* / *Falls*

Quantity: *Rises* / *Unchanged* / *Falls*

Reason: ***Apples are used to bake pies. Higher-priced apples increase the cost of producing pies.***
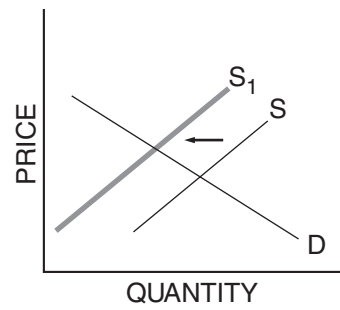
Part 7

How Markets Allocate Resources

Markets use prices as signals to allocate resources to their highest valued uses. Consumers will pay higher prices for goods and services that they value more highly. Producers will devote more resources to the production of goods and services that have higher prices, other things being equal. And other things being equal, workers will provide more hours of labor to jobs that pay higher salaries.

This allocation principle applies both to product markets for items such as cars, houses, and haircuts and to resource markets for items such as labor, land, and equipment. Households play two important roles in an economy—they demand goods and services and supply resources. Businesses also have dual roles—they supply goods and services and demand resources. The interaction of demand and supply in product and resource markets generates prices that serve to allocate items to their highest valued alternatives. Factors that interfere with the workings of a competitive market result in an inefficient allocation of resources, causing a reduction in society's overall well-being.

Figures 2-1.1 and 2-1.2 illustrate how markets can be interrelated. Assume the markets are perfectly competitive and that the supply and demand model is completely applicable. The graphs show the supply and demand in each market *before* the assumed change occurs. Trace through the effects of the assumed change, all other things held constant. Work your way from left to right. Shift no more than one curve in each market. In each market graph, show any shift in the demand or supply curve, labeling each new curve D_1 or S_1. Then circle the correct symbol under each graph (↑ for increase, — for unchanged, and ↓ for decrease).

1. Assume that a new fertilizer dramatically increases the number of potatoes that can be harvested with no additional labor or machinery. Also assume that this fertilizer does not affect wheat farming and that people are satisfied to eat either potatoes or bread made from wheat flour.

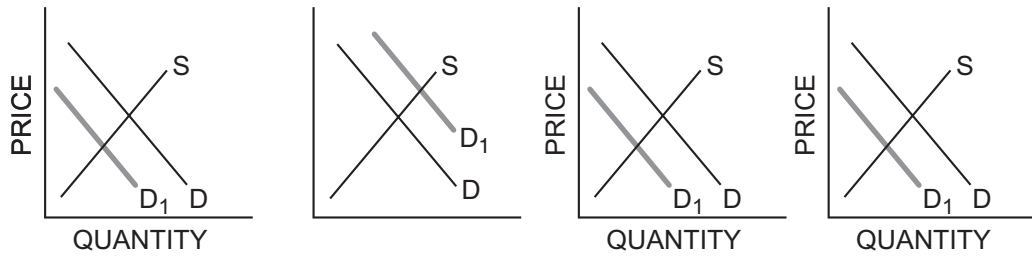Figure 2-1.1
Effects of a New Fertilizer
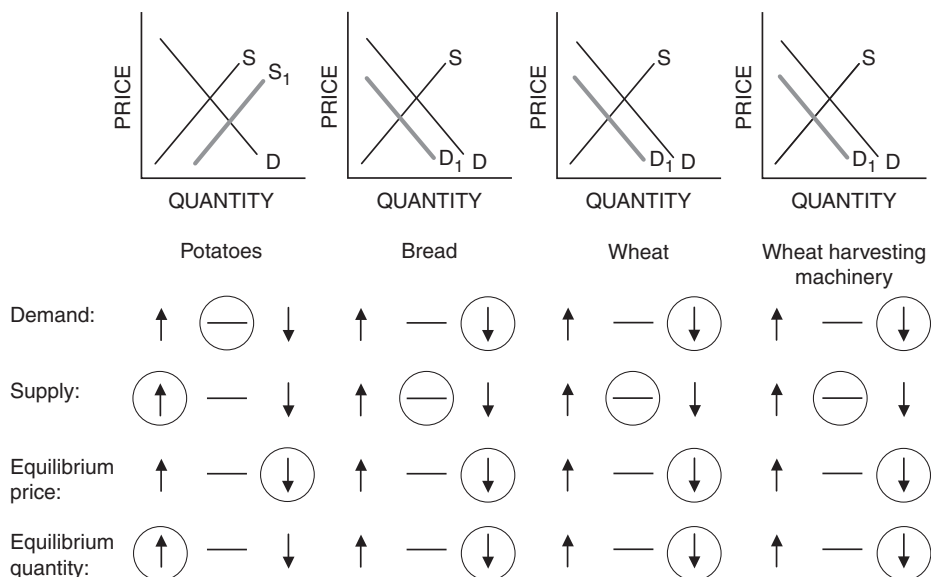
2. Assume new studies show that coffee is worse for people's health than tea and that more people use cream in coffee than in tea.

Figure 2-1.2
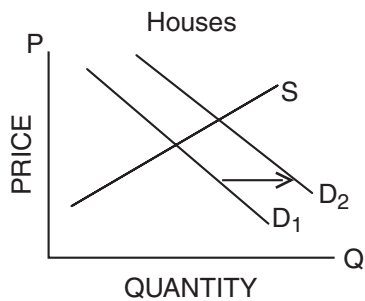**Effects of New Health Studies**

	Coffee	Tea	Cream	Automatic coffee makers
Demand:	↑ — (↓)	(↑) — ↓	↑ — ↓	↑ — ↓
Supply:	↑ — ↓	↑ (—) ↓	↑ — ↓	↑ — ↓
Equilibrium price:	↑ — (↓)	↑ — ↓	↑ — ↓	↑ — ↓
Equilibrium quantity:	↑ — (↓)	(↑) — ↓	↑ — ↓	↑ — ↓

3. Examine Figure 2-1.3, which shows an increase in demand in the housing market in the country of Pajotte.

Figure 2-1.3
Increase in Housing Demand in Pajotte

(A) Which of the following factors would cause an increase in the demand for houses in Pajotte?

(1) An increase in the annual income of many Pajottians

(2) A reduced rate of immigration into Pajotte

(3) Lower interest rates on loans to buy houses

(B) The demand for lumber in Pajotte would (***increase*** / *decrease*), which would result in (***higher*** / *lower*) lumber prices.

(C) Employment of workers who build houses would (***increase*** / *decrease*) and their wages would (***increase*** / *decrease*).

Why Is a Demand Curve Downward Sloping?

To most people, the law of demand is obvious: consumers buy more of a good at a lower price and less at a higher price. Economics goes beyond describing the combined demand of all consumers in a market. To explain why a demand curve is downward sloping, or negatively sloped, economists focus on the demand curve of a single consumer.

The total utility of a quantity of goods and services to a consumer can be represented by the maximum amount of money he or she is willing to give in exchange for that quantity. The marginal utility of a good or service to a consumer (measured in monetary terms) is the maximum amount of money he or she is willing to pay for one more unit of the good or service. With these definitions, we can now state a simple idea about consumer tastes: the more of a good a consumer has, the less will be the marginal utility of an additional unit.

Part A: Total Utility and Marginal Utility

Table 2-2.1 presents data on Dolores's evaluation of different quantities of polo shirts and different quantities of steak.

1. Use the data to compute the marginal utility of each polo shirt and each steak. The total utility numbers in the figure represent the total satisfaction in dollars Dolores receives from a given quantity of shirts or steaks. The marginal utility numbers represent the amount of dollars Dolores is willing to pay for an additional shirt or steak.

Table 2-2.1
**Marginal Utility of Polo Shirts and Steaks**

Number of polo shirts	Total utility	Marginal utility	Number of steaks	Total utility	Marginal utility
0	$0		0	$0	
1	$60	$60	1	$20	$20
2	$100	$40	2	$36	$16
3	$130	*$30*	3	$51	*$15*
4	$150	*$20*	4	$65	*$14*
5	$165	*$15*	5	$78	*$13*
6	$175	*$10*	6	$90	*$12*

2. Using Figure 2-2.1, plot Dolores's total utility and marginal utility for polo shirts and steaks. Each graph has two points to get you started.

Figure 2-2.1

Total and Marginal Utility of Polo Shirts and Steaks
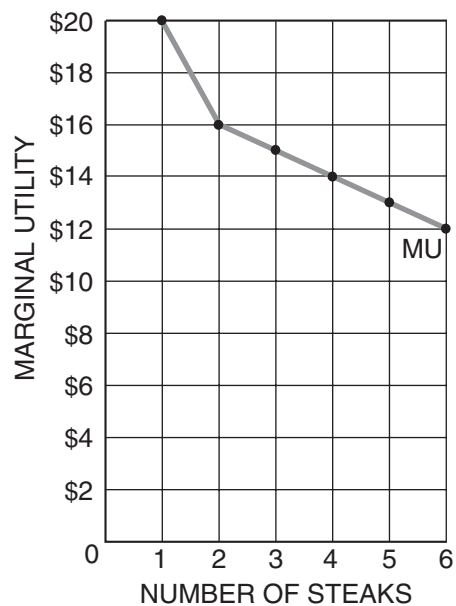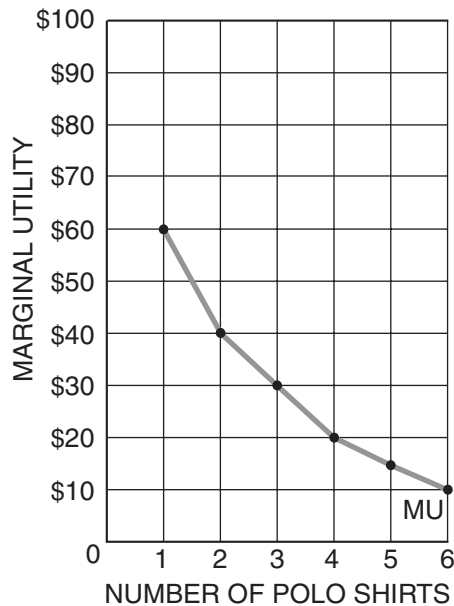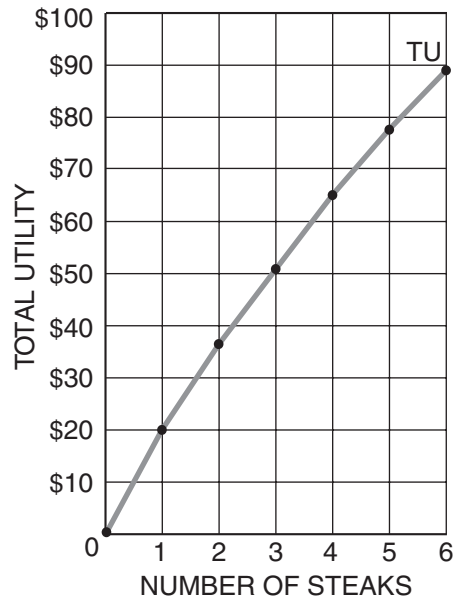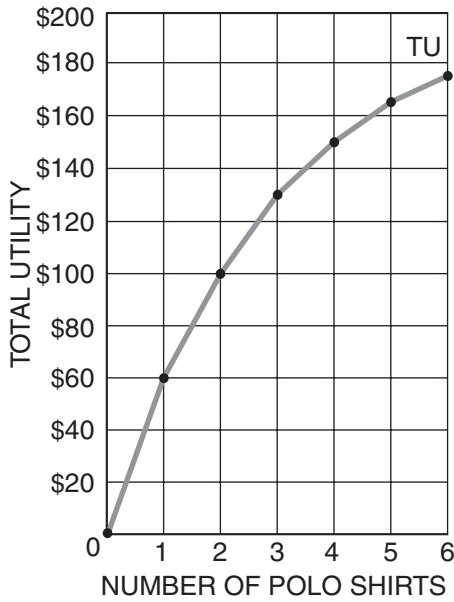
3. Looking at the table and graphs, you can conclude for both goods that as she consumes more units:

(A) total utility is always (***increasing*** / *decreasing*).

(B) marginal utility always (*increases* / ***decreases***).

Because your graphs show that Dolores receives less and less marginal utility, you have demonstrated the law of *diminishing marginal utility*.

Part B: The Marginal Utility per Dollar

❗ *Student Alert:* **In spending your income wisely, it is the marginal utility per dollar (MU per $1) that matters, and not the marginal utility (MU) by itself.**

If Dolores has a given budget and must choose between polo shirts and steaks, she will make her choice so that the marginal utility per dollar spent of each good is the same. Using the data in Table 2-2.1 and assuming that the price of both goods is $30, let's see what happens if Dolores spends her entire budget of $150 dollars and buys five polo shirts and zero steaks. Her marginal utility from the fifth polo shirt is $15, and her marginal utility from the first steak is $20. So if she buys only four polo shirts and one steak, her total utility drops by $15 on the polo shirt, but it increases by $20 on the steak. Dolores is better off because her total utility has increased by $5 and her total budget is unchanged.

Suppose Dolores spends her $150 and buys four polo shirts and one steak. Her marginal utility from the fourth polo shirt is $20, and her marginal utility from the first steak is also $20. She will not want to switch. To buy the next steak gives her an increase in total utility of $16, but she would have to give up a polo shirt, which would reduce her utility by $20. Conversely, to buy an additional polo shirt would increase her total utility by $15, but she would lose $20 from giving up the steak. Dolores should not change her purchases. Note that this example assumes both the shirt and steak have the same price.

If the prices (P) of the two goods differ, then Dolores will adjust her consumption until the MU of the two goods, *per dollar spent,* are equal. Or, stated in another way,

$$\frac{MU_x}{P_x} = \frac{MU_y}{P_y}.$$

4. Use the information in Table 2-2.2 to analyze Callie's choice between gasoline and food.

Callie has an income of $55, the price of a unit of gasoline is $5, and the price of a unit of food is $10. Complete the table.

Table 2-2.2

Callie Buys Gasoline and Food

Gasoline (G)	MU_G	MU_G/P_G	Food (F)	MU_F	MU_F/P_F
1 unit	+$60	*+12.0*	1 unit	+$120	*+12.0*
2 units	+$30	*+6.0*	2 units	+$80	+8.0
3 units	+$15	+3.0	3 units	+$60	*+6.0*
4 units	+$5	*+1.0*	4 units	+$30	+3.0
5 units	+$3	+0.6	5 units	+$10	*+1.0*
6 units	+$1	*+0.2*	6 units	+$5	+0.5

(A) What is the meaning of the value "+3" when Callie consumes the fourth unit of food?
   It means she receives $3 in additional utility for each dollar spent on that fourth unit.

(B) How much income would Callie have to spend to purchase the combination of 1 G and 5 F?
   $55 = (1G)($5) + (5F)($10).

(C) Will the combination of 1 G and 5 F maximize Callie's total utility? Why?
   No, because the MU per $1 from gas (+12) is greater than the MU per $1 from food (+1).

(D) If the combination of 1 G and 5 F will not maximize her total utility from her income of $55, Callie should

   (1) buy more units of G and fewer units of F.

   (2) buy more units of F and fewer units of G.

(E) Callie will maximize her total utility from her budget of $55 if she buys __*3*__ units of G and __*4*__ units of F. This combination will give her a total utility of $__*395*__.
   The MU per $1 is the same for the third unit of G and the fourth unit of F.
   TU = sum of the MUs = $60 + $30 + $15 + $120 + $80 + $60 +$30 = $395.

Part C: Consumer Surplus

Assume you go into a store to buy a bottle of water. The bottle of water costs you $1. You would have been willing to pay $2. The difference between what you paid and what you would have been willing to pay is *consumer surplus.*

We can calculate Dolores's consumer surplus from buying steak by looking at her demand curve. Refer back to Table 2-2.1 and look at her marginal utility values for steak. If she has two steaks, Dolores is willing to pay $15 for one more steak; if she has three steaks, she is willing to pay $14 for a fourth steak. Dolores will buy steak until the point where the price is equal to the marginal utility of the last steak. Dolores will pay the same price for each of the steaks she buys. Thus, if the price of steak is $14, she will buy four steaks; the marginal utility of the fourth steak is $14. Dolores would have been willing to pay more for the first three steaks. She has gotten a bargain buying four steaks at $14 apiece for a total expenditure of $56. She would have been willing to pay $20 for the first steak, $16 for the second, $15 for the third, and $14 for the fourth, for a total outlay of $65. The consumer surplus is the difference between what she was willing to pay ($65) and what she actually paid ($56). Her total consumer surplus from buying four steaks at a price of $14 is $9.

Consider the information in Table 2-2.3 on Joel's total utility for CD purchases, and then answer the questions that follow.

Table 2-2.3
Total Utility of CDs

Number of CDs	Total utility
1	$25
2	$45
3	$63
4	$78
5	$90
6	$100
7	$106
8	$110

5. What marginal utility is associated with the purchase of the third CD?

   (A) $18   (B) $21   (C) $45   (D) $63

   His TU increases from $45 to $63 when he buys the third CD.

6. What is Joel's consumer surplus if he purchases three CDs at $11 apiece?

    (A) $30   (B) $33   (C) $63   (D) $96

    His consumer surplus is the difference between what he was willing to pay for the three CDs and what he actually did pay. What he was willing to pay is found by adding the MUs for the three CDs: $25 + $20 + $18 = $63. This is his TU from three CDs. He paid a total of $33 (3 × $11) so his consumer surplus is $30.

7. What would happen to Joel's consumer surplus if he purchased an additional CD at $11?

    (A) Consumer surplus declines by $11.

    (B) Consumer surplus increases by $11.

    (C) Consumer surplus increases by $15.

    (D) Consumer surplus increases by $4.

    Since his MU from the fourth CD is $15, his consumer surplus from that extra CD is $15 – $11 = +$4.

8. How many CDs should Joel buy when they cost $11 apiece?

    (A) 0   (B) 3   *(C) 5*   (D) 7

    The MU from the fifth CD ($12) is greater than the price of $11, but the MU from the sixth CD ($10) is less than $11. He will not be willing to buy the sixth CD.

9. What is Joel's consumer surplus at the optimal number of CD purchases at the price of $11?

    (A) $35   (B) $55   (C) $79   (D) $100

    His TU from five CDs is $90 and he paid only $55 for them.

10. If CDs go on sale and their price drops to $8, how many CDs do you expect Joel to buy?

    (A) 5   *(B) 6*   (C) 7   (D) 8

    At a price of $8, the sixth CD is worth buying because its MU ($10) now is greater than the price. Since the MU of the seventh CD is only $6, he would not be willing to pay $8 for it.

11. Why is consumer surplus important? How does it help explain the law of demand?
    Consumer surplus is an indication that consumers are able to buy the product at a price which is lower than the price they are willing to pay. Consumers will buy more of a product when its price drops below the marginal utility of additional units. Because the lower price creates consumer surplus for these additional units, consumers will purchase more of the product.

Part D: Income and Substitution Effects

Another way of explaining the downward sloping demand curve is through the *income* and *substitution effects*.

> **Income effect:** When the price of a good falls, consumers experience an increase in purchasing power from a given income level. When the price of a good increases, consumers experience a decrease in purchasing power.

> **Substitution effect:** When the price of a good falls, consumers will substitute toward that good and away from other goods.

Here's an example. Suppose you go to your favorite burger place. The price of a burger has increased, but the price of the chicken sandwich stays the same. Over the course of a week, you generally buy both burgers and chicken sandwiches.

12. How will the increase in the price of a burger affect your purchase of burgers? Explain.
    You will buy fewer burgers because they are relatively more expensive than chicken sandwiches.

13. Describe how the substitution effect changes your purchases of hamburgers and chicken sandwiches.
    Because the price of burgers increased, chicken sandwiches are relatively less expensive. Therefore, you substitute chicken sandwiches for burgers and buy more chicken sandwiches and fewer burgers.

14. Describe how the income effect changes your purchases.
    The increase in the price of burgers is the same as if you had a decrease in real income or purchasing power. Therefore, you would buy fewer burgers.