

# Answer Key

## Chapter 1: Welcome to Economics!

### Self-Check Questions

1. Scarcity means human wants for goods and services exceed the available supply. Supply is limited because resources are limited. Demand, however, is virtually unlimited. Whatever the supply, it seems to be human nature to want more.
3. She is very productive at her consulting job but not very productive at growing vegetables. Time spent consulting would produce far more income than what she could save growing her vegetables using the same amount of time. So on purely economic grounds, it makes more sense for her to maximize her income by applying her labor to what she does best (i.e., specialization of labor).
5. There are many physical systems that would work, such as the study of planets (micro) in the solar system (macro) or solar systems (micro) in the galaxy (macro).
7. There are many such problems. Consider the AIDS epidemic. Why are so few AIDS patients in Africa and Southeast Asia treated with the same drugs that are effective in the United States and Europe? It is because neither those patients nor the countries in which they live have the resources to purchase the same drugs.
9. The United States is a large country economically speaking, so it has less need to trade internationally than the other countries mentioned. (This is the same reason that France and Italy have lower ratios than Belgium or Sweden.) One additional reason

is that each of the other countries is a member of the European Union, where trade between members occurs without barriers to trade, like tariffs and quotas.

### Review Questions

11. Economics factors into every major policy decision, economics encourages good citizenship, and economics makes for a well-rounded education.
13. Individuals, households, and businesses are all economic agents.
15. As a method of thinking that helps people draw correct conclusions
17. Firms are primarily sellers in the goods and services market, offering their wares to consumers. They are primarily buyers in the labor market, hiring employees to produce for them.
19. Globalization is an increase in connections and economic activity across international lines. Globalization allows small economies to take better advantage of the division of labor.

### Critical Thinking Questions

21. With no trade, each individual must produce all the goods and services they want to consume. Therefore, by definition, they cannot specialize and obtain the benefits of specialization. With trade, on the other hand, an individual can specialize in what they do best, maximize production and income, and trade for whatever else they want to consume. In short, specialization results in a net gain rather than a loss.

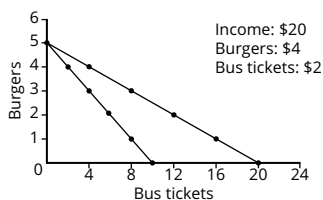
23. A balanced federal budget and the balance of trade do not have direct effects on the well-being of individuals. While we can argue about what their long-term effects are, the standard of living (as measured by economic growth, for example) is directly responsible for how well-off people are within an economy, so that is what economists care about.
25. Economic models and the accompanying theories typically employ simplifying assumptions that, by definition, make the models less than perfectly realistic. If the models are good ones, they are still useful for understanding how a system works, in the same way that a physicist might assume an absence of friction to simplify his understanding of how a ball rolls across a surface. By making models simple, we can understand the basic mechanisms of how things like supply and demand work without having to worry too much about all the real-world complications.
27. Markets have historically been very good at creating wealth and innovation, but the governments of most modern countries have decided that certain market outcomes, such as extreme wealth inequality, are undesirable, and therefore intervene for the sake of what they view as fair or humane treatment of their citizens.

## Chapter 2: Choice in a World of Scarcity

### Self-Check Questions

1. The opportunity cost of bus tickets is the number of burgers that must be given up to obtain one more bus ticket. Originally, when the price of bus tickets was \$1 per trip, this opportunity cost was  $\frac{\$1}{\$4}$  or .25 burgers.

The reason for this is that at the original prices, one burger (\$4) costs the same as four bus tickets (\$1), so the opportunity cost of a burger is four bus tickets, and the opportunity cost of a bus ticket is .25 (the inverse of the opportunity cost of a burger). With the new, higher price of bus tickets, the opportunity cost rises to  $\frac{\$2}{\$4}$  or .50 burgers. You can see this graphically since the slope of the new budget constraint is flatter than the original one. If Alphonso spends his entire budget on burgers, the higher price of bus tickets has no impact, so the horizontal intercept of the budget constraint is the same. If he spends his entire budget on bus tickets, he can now afford only half as many, so the vertical intercept is half as much. In short, the budget constraint rotates clockwise around the horizontal intercept, flattening as it goes. Since the slope of the budget constraint reflects the opportunity cost of whatever good is on the vertical axis (in this case, bus tickets) the opportunity cost of bus tickets increases.



3. No. Allocative efficiency requires productive efficiency because it pertains to choices along the production possibilities frontier.

5. When individuals compare cost per unit in the grocery store or characteristics of one product versus another, they are behaving approximately like the model describes.
7. Assuming that the study is not taking an explicit position about whether soft drink consumption is good or bad, but just reporting the science, it would be considered positive.

### Review Questions

9. A point inside the budget constraint indicates that the individual could have more of one good without having to give up any of the other. This is inefficient. A point outside the budget constraint is one that the individual cannot afford, as much as they might like to. The budget constraint line represents the set of all allocations of resources that are both efficient and possible.
11. The production possibilities frontier is the set of every combination of goods that is both possible and efficient to produce.
13. A choice above the *PPF* is not possible because the *PPF* already illustrates the maximum amount of production. Producing at a point inside the *PPF* is inefficient because more production could be achieved at no additional cost.
15. Productive efficiency means that it is impossible to produce more of one good without producing less of some other good. Allocative efficiency means that the combination of goods being produced represents the mix of goods most desired by society.

17. No. Economic models use simplifying assumptions to help us understand complex systems. These are useful but are not intended as a literal representation of actual behavior.

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### Critical Thinking Questions

19. The opportunity cost is defined as the ratio of the prices of the two goods. Since the prices of both goods doubles, the ratio stays the same, and the opportunity cost for Alphonso remains  $\frac{1}{4}$  of a burger to buy one bus ticket. Once his income doubles as well, his budget constraint is unchanged because in both cases he can still choose five burgers, twenty bus tickets, or any combination in-between.
21. Allocative inefficiency is wasteful because it means that a nation is producing goods that are not the most highly demanded. Not only does this result in goods piling up on store shelves, but it means that people have to pay higher prices for the relatively scarce goods they actually want.
23. In order to make a normative statement, there must be an underlying assumption about what the goal of the policy is or what is right. A normative statement like "If your only goal is for fewer people to smoke, you should raise cigarette taxes" may be within an economist's realm of expertise, but typically, these sorts of statements contain a moral component that lies outside the domain of economics.

### Problems

25.  $\frac{\$24}{\$12} = 2$  pies
27. The opportunity cost of a pie is the absolute value of the slope of the budget line, which is  $\frac{6}{2}$  or 3 magazines.

## Chapter 3: Demand and Supply

### Self-Check Questions

1. Since \$3.60 per gallon is above the equilibrium price, the quantity demanded would fall, and the quantity supplied would rise. (These results are due to the laws of demand and supply, respectively.) The outcome of lower  $Q_d$  and higher  $Q_s$  would be a surplus in the gasoline market.

3. a. An improvement in technology that reduces the cost of production will cause an increase in supply at any price. Alternatively, you can think of this as a reduction in price necessary for firms to supply any quantity. Either way, this can be shown as a rightward shift of the supply curve.

- b. An improvement in product quality is treated as an increase in tastes or preferences, meaning consumers will demand more paint at any price level, so demand in the present will increase or shift to the right. If this seems counterintuitive, note that demand in the future for the longer-lasting paint will fall since consumers are essentially shifting demand from the future to the present.

- c. An increase in need causes an increase in demand: a rightward shift of the demand curve.

- d. Factory damage means that firms are unable to supply as much in the present. Technically, this is an increase in the cost of production. Either way you look at it, the supply curve shifts to the left.

5. Step 1: Draw the graph with the initial supply and demand curves. Label the initial equilibrium price and quantity.

Step 2: Did the economic event affect supply or demand? Jet fuel is a cost of producing air travel, so an increase in price affects supply.

Step 3: An increase in the price of jet fuel caused an increase in the cost of air travel. We show this as a leftward shift of supply.

Step 4: A leftward shift of supply causes a movement up the demand curve, raising the equilibrium price of air travel and lowering the equilibrium quantity.

7. A price ceiling (which is below the equilibrium price) will cause the quantity demanded to rise and the quantity supplied to fall. This is why a price ceiling creates a shortage.

9. A price floor is a legal minimum price, but the market will choose the equilibrium price as long as the latter is above the former. In other words, a price floor below equilibrium will have no effect.

11. Social surplus is the sum of consumer surplus and producer surplus. A price floor reduces social surplus because with a price floor, the losses to consumers are greater than the benefits to producers. For example, when a government purchases excess supply from farmers in an effort to impact demand, the farmers benefit from the price floor, while taxpayers and consumers of food end up paying the costs.

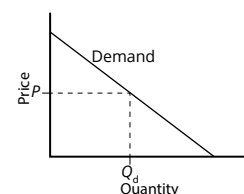
### Review Questions

13. A downward-sloping demand curve means that buyers will demand less of a good the higher the price becomes.
15. An upward-sloping supply curve means that sellers are willing to supply more goods at higher prices.

17. At equilibrium, quantity demanded and quantity supplied are equal to one another. In a shortage, quantity demanded exceeds quantity supplied. In a surplus, quantity supplied exceeds quantity demanded.

19. If the price is above the equilibrium level, there will be excess supply, known as a surplus. If the price is below the equilibrium level, there will be excess demand, known as a shortage. This happens because the number of people who want to buy the good is not equal to the number of people who want to sell it at the given price.

21. Demand describes consumers' willingness to buy a good at any price. Demand is shown by the position of a demand curve: in other words, how far away from the origin it is. Quantity demanded refers to how much will be purchased at a single, specific price (at one point on the demand curve).

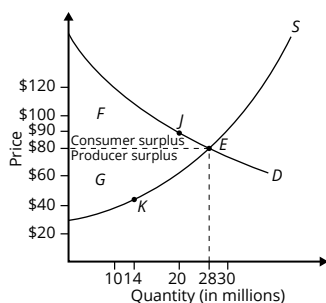


23. Economists try to isolate one variable to study at a time, holding all other factors constant. This can be challenging in the real world, but it is useful in economic models.

25. Supply shocks, such as natural disasters, can shift the supply curve. Changes in technology or the price of inputs can also have an effect.

27. A change in the price received by sellers will cause a movement along the supply curve. A change in the price demanded by buyers will cause a movement along the demand curve.

29. A price ceiling set below the equilibrium price will result in a greater quantity demanded than the quantity supplied, otherwise known as a shortage.
31. A price floor set above the equilibrium level results in a greater quantity supplied than the quantity demanded, otherwise known as a surplus.
33. The producer surplus is the extra benefit producers receive from selling a good or service, measured by the price the producer actually received minus the price the producer would have been willing to accept. The producer surplus is illustrated in the following demand and supply diagram in the area labeled *G*, which is the area between the market price and the segment of the supply curve below the equilibrium.



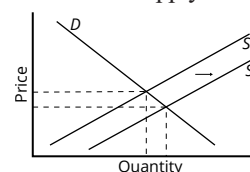
35. Economic efficiency of the market equilibrium is demonstrated when the total surplus is larger at equilibrium quantity and price than it would be at any other quantity. At the efficient level of output, it is impossible to produce greater consumer surplus without reducing producer surplus, and it is impossible to produce greater producer surplus without reducing consumer surplus, which would be evident of economic efficiency.

### Critical Thinking Questions

37. There would be a shortage of gasoline. At such a low price, consumers would be very eager to buy, but producers would see limited profit opportunities. The quantity demanded would therefore exceed the quantity supplied by the market.
39. The equilibrium price merely equalizes the number of willing sellers and buyers. There would still be people willing to sell even if the price were to fall.
41. Assuming that milk is primarily consumed by children, an aging population will probably see a reduction in demand as baby boomers stop having children.
43. A reduction in the soda tax means that sellers receive a higher price for each soda sold. This will increase the supply of sodas.
45. Draw the graph of the initial supply and demand curves. Does the change affect demand or supply? Since tariffs affect the price consumers pay, the effect will be on demand. The reduction in the price of iPads causes a leftward shift in demand for the substitute good, the MacBook. The leftward shift in demand for MacBooks would cause a reduction in price and quantity sold.
47. The minimum wage is a price floor that prevents the price of labor from falling below a certain level. Like all binding price floors, this creates a surplus of labor, also known as unemployment. Those who do not offer enough productive value to earn the minimum wage will lose out on job opportunities they might otherwise have had. On the other hand, those who do manage to keep their jobs will benefit from higher wages. In this way, minimum wages make some workers better off but actually harm those who have the least education or skills and cannot compete for jobs at the higher wage level.
49. A reduction in property taxes would make it cheaper for landlords to own houses and rent them out, resulting in an increase in supply.
51. Voluntary transactions improve social welfare because they allow both the buyers and sellers to willingly engage in the market.

### Problems

53. The quantity demanded will be higher than at the equilibrium price, and the quantity supplied will be lower, resulting in a shortage of 300 million gallons.
55. c. A rise in supply. For prices to fall while the quantity sold rises, supply must have increased. This is shown graphically by a rightward shift of the supply curve.



57. a. The new equilibrium price would be \$12.00, and the new equilibrium quantity would be 18.

| Price   | $Q_d$ | $Q_s$ |
|---------|-------|-------|
| \$11.00 | 20    | 16    |
| \$12.00 | 18    | 18    |
| \$13.00 | 16    | 20    |
| \$14.00 | 15    | 21    |
| \$15.00 | 14    | 22    |

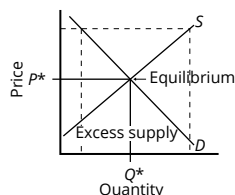
- b. The new equilibrium price would be \$13.00, and the new equilibrium quantity would be 22.

| Price   | $Q_d$ | $Q_s$ |
|---------|-------|-------|
| \$11.00 | 26    | 17.6  |
| \$12.00 | 24    | 19.8  |
| \$13.00 | 22    | 22    |
| \$14.00 | 21    | 23.1  |
| \$15.00 | 20    | 24.2  |

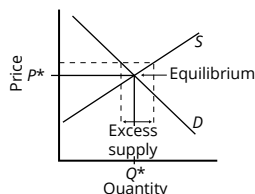
## Chapter 4: Labor and Financial Markets

### Self-Check Questions

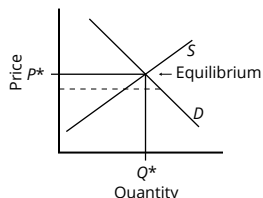
- Changes in the wage rate (the price of labor) cause a movement along the demand curve. A change in anything else that affects demand for labor (e.g., changes in output, changes in the production process which use more or less labor, government regulation) causes a shift of the demand curve.
- Since a living wage is a suggested minimum wage, it acts like a price floor (assuming, of course, that it is followed). If the living wage is binding, it will cause an excess supply of labor at that wage rate.
- Changes in the interest rate (i.e., the price of financial capital) cause a movement along the supply curve. A change in anything else that affects the supply of financial capital (a non-price variable), such as income or future needs, would shift the supply curve.
- b. A fall in demand, c. A rise in supply. At a lower demand, lenders will not be able to charge as much, and with more available lenders, competition for borrowers will drive rates down.
- a. substantially above the equilibrium price. A price floor prevents a price from falling below a certain level but has no effect on prices above that level. It will have its biggest effect in creating excess supply if it is substantially above the equilibrium price. This is illustrated in the following graph.



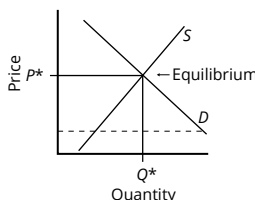
It will have a lesser effect if it is slightly above the equilibrium price. This is illustrated in the following graph.



It will have no effect if it is set either slightly or substantially below the equilibrium price since an equilibrium price above a price floor will not be affected by that price floor. The following graphs illustrate these situations.

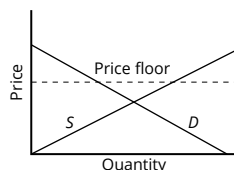


(a) Price floor slightly below equilibrium price



(b) Price floor substantially below equilibrium price

- d. neither. A shift in demand or supply means that at every price, either a greater or a lower quantity is demanded or supplied. A price floor does not shift a demand curve or a supply curve. However, if the price floor is set above the equilibrium, it will cause the quantity supplied on the supply curve to be greater than the quantity demanded on the demand curve, leading to excess supply.



### Review Questions

- In labor markets, price is typically called a "wage."
- Recessions and expansions in the economy can cause a shift in the demand for labor, as can changes in the price of capital (a substitute) and new production technologies.
- Equilibrium is where the quantity of loanable funds demanded equals the quantity supplied.
- Usury laws make lending less profitable, so they would hinder resolution of a shortage.

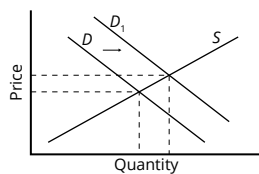
### Critical Thinking Questions

- Demand for the raw materials involved in production, such as steel or lumber, can be examples of derived demand.
- For a minimum wage to be nonbinding, it must be set below the equilibrium wage. For the living wage price floor to be binding, it must be set above the equilibrium wage.
- Borrowers would gain, as the amount of debt that could accrue was limited; lenders would lose, and their loans would become less profitable.
- a. The price floor would result in more natural gas being supplied than the quantity demanded.  
b. There would be a surplus of natural gas, with firms producing more than consumers would be willing to buy at the mandated price.

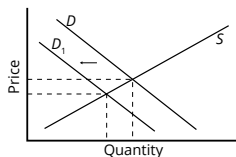
- c. Policies that directly affect supply and demand are more efficient than price floors. For example, the government could shift investment away from public transportation and ethanol towards technologies that rely more heavily on natural gas to stimulate demand, or the government could stimulate supply by offering subsidies to producers.

### Problems

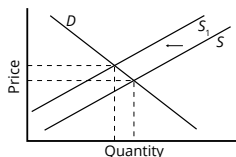
29. a. Since coal is a substitute for oil, an increase in the price of coal will shift the demand curve right, increasing wages and increasing the quantity of oil drillers employed.



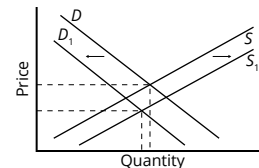
- b. Oil-drilling equipment is a substitute for labor, so the demand curve for oil drillers shifts left, reducing wages and reducing employment.



- c. The availability of new factory jobs shifts the supply curve for oil workers left, increasing wages and reducing the quantity of mining jobs.



- d. Mandated expenditures on safety reduce the demand for labor, shifting the demand curve left, reducing wages, and reducing quantity. However, since drilling is safer, this may also cause an increase in the supply of workers as well, shifting supply to the right. The combination of both effects will reduce wages, but the effect on employment is indeterminate.



31. The equilibrium interest rate occurs where the quantity of borrowing equals the quantity of lending, here \$140 million. The equilibrium interest rate is therefore 7%.

With \$10 million less supplied at every interest rate, we see that  $145 - 10 = 135$ . Thus, the new equilibrium interest rate is 8%. The interest rate has risen because there is now less money to go around for the same number of potential borrowers.

33. The drought is a supply shock that will reduce the supply of cocoa, whereas the health study will increase demand. Both of these shifts will result in higher prices, but they have opposite effects on the quantity produced and sold. Without knowing the magnitudes of the effects, we cannot say for sure what happens to the equilibrium quantity.

## Chapter 5: Elasticity

### Self-Check Questions

1. From Point B to Point C, prices rise from \$70 to \$80, and quantity demanded decreases from 2,800 to 2,600. So:

$$\begin{aligned} \text{\% change in quantity} &= \frac{2,600 - 2,800}{(2,600 + 2,800) \div 2} \times 100 \\ &= \frac{-200}{2,700} \times 100 = -7.41 \\ \text{\% change in price} &= \frac{\$80 - \$70}{(\$80 + \$70) \div 2} \times 100 \\ &= \frac{10}{75} \times 100 = 13.33 \\ \text{elasticity of demand} &= \frac{-7.41\%}{13.33\%} = -0.56 \end{aligned}$$

The demand curve is inelastic in this area since the elasticity value is less than one.

Answer from Point D to Point E:

$$\begin{aligned} \text{\% change in quantity} &= \frac{2,200 - 2,400}{(2,200 + 2,400) \div 2} \times 100 \\ &= \frac{-200}{2,300} \times 100 = -8.7 \\ \text{\% change in price} &= \frac{\$100 - \$90}{(\$100 + \$90) \div 2} \times 100 \\ &= \frac{10}{95} \times 100 = 10.53 \\ \text{elasticity of demand} &= \frac{-8.7\%}{10.53\%} = -0.83 \end{aligned}$$

The demand curve is inelastic in this area since the elasticity value is less than one.

Answer from Point G to Point H:

$$\begin{aligned} \text{\% change in quantity} &= \frac{1,600 - 1,800}{(1,600 + 1,800) \div 2} \times 100 \\ &= \frac{-200}{1,700} \times 100 = -11.76 \\ \text{\% change in price} &= \frac{\$130 - \$120}{(\$130 + \$120) \div 2} \times 100 \\ &= \frac{10}{75} \times 100 = 13.33 \\ \text{elasticity of demand} &= \frac{-11.76\%}{13.33\%} \\ &= -0.88 \end{aligned}$$

The demand curve is inelastic in this area; however, it is approaching unit elasticity as the elasticity value gets closer to one.

3. The demand curve with constant unit elasticity is concave because at high prices, a one percent decrease in price results in more than a one percent increase in quantity. As we move down the demand curve, price drops, and the one percent decrease causes less than a one percent increase in quantity.
5. Carmakers can pass this cost along to consumers if the demand for these cars is inelastic. If the demand for these cars is elastic, the manufacturer must pay for the equipment.
7. It would mean the percentage change in quantity supplied as a result of a given percentage change in the price of gasoline.
9. The formula for cross-price elasticity is  $\frac{\% \text{ change in } Q_d \text{ for apples}}{\% \text{ change in } P \text{ of oranges}}$ . Multiplying both sides by  $\% \text{ change in } P \text{ of oranges}$  yields:  
 $\% \text{ change in } Q_d \text{ for apples} = \text{cross-price elasticity} \times \% \text{ change in } P \text{ of oranges}$   
 $= 0.4 \times (-3\%) = -1.2\%$ ,  
or a 1.2% decrease in demand for apples.

### Review Questions

11. The price elasticity of demand is the extent to which quantity demanded responds to a change in price.
13. A vertical line, since quantity will not change at all in response to a change in price
15. Quantity
17. Quantity

19. We should expect demand to be more elastic than supply in the short run since it takes time to vary production to supply more or less of a good. However, in the long run, supply is likely to be more elastic, as producers have a potentially unlimited ability to vary supply with prices.

21. The percent change in quantity demanded over the percent change in income:  $E = \frac{\% \Delta Q}{\% \Delta I}$
23. The percent change in the quantity of labor supplied over the percent change in the wage rate:  $E = \frac{\% \Delta Q}{\% \Delta W}$

### Critical Thinking Questions

25. Due to the length of time it takes to travel across the Atlantic and the discomfort of traveling economy class, we would expect the sorts of people who purchase first class tickets to be largely unwilling to downgrade their preference for comfort, which yields an inelastic demand. Additionally, many transatlantic tickets are paid for by large companies on behalf of their employees, where price is less of a concern than for individuals traveling economy class.
27. Many internet companies fall into this model, where the addition of one more user to a website has almost zero cost. Any site that operates on a subscription service could potentially do this, at least in the short run.
29. The city should charge a toll at the unit elastic portion of the demand curve. Charging more than this will see a larger decrease in drivers that will reduce revenue, and charging less than this will not increase traffic enough to make up for the lost revenues.

31. Goods with high income elasticity could be classified as luxuries. We buy more of them as our incomes rise but are willing to give them up if our incomes fall. Goods with low income elasticities could be classified as necessities, where we don't vary our consumption much, no matter how much money we make.

### Problems

$$33. \quad P = 48 - 3(5) = 33;$$

$$P = 48 - 3(6) = 30;$$

$$E = \frac{\% \Delta Q}{\% \Delta P} = \frac{\left( \frac{6-5}{5} \right)}{\frac{30-33}{33}} = |-2.2|$$

$$35. \quad 4(3) = Q = 12;$$

$$4(4) = Q = 16;$$

$$E = \frac{\% \Delta Q}{\% \Delta P} = \frac{\left( \frac{16-12}{12} \right)}{\left( \frac{4-3}{3} \right)} = |1|$$

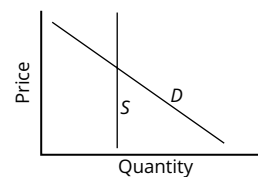
At the higher price, the elasticity should be the same.

$$4(7) = Q = 28;$$

$$4(8) = Q = 32;$$

$$E = \frac{\% \Delta Q}{\% \Delta P} = \frac{\left( \frac{32-28}{28} \right)}{\left( \frac{8-7}{7} \right)} = |1|$$

37. The supply of da Vinci paintings will be represented by a vertical line since no amount of price fluctuation can change them. Price is, therefore, wholly determined by the position of the demand curve.



39. Given that the patient will die without the aid of a dialysis machine, their demand will be almost perfectly inelastic, as they will be willing to pay any amount of money to survive. The demand curve is, therefore, a near-vertical line, and price is determined by the position of the supply curve.

## Chapter 6: Consumer Choices

### Self-Check Questions

1. The rows of the table in the problem do not represent the actual choices available on the budget set (the combinations of round trips and phone minutes that Jeremy can afford with his budget). One of the choices listed in the problem, 6 round trips, is not even available on the budget set. If Jeremy has only \$20 to spend, a round trip costs \$4, and phone calls cost \$0.10 per minute, he could spend his entire budget on 5 round trips but no phone calls, 200 minutes of phone calls but no round trips,

or any combination in-between.

It is easy to see all of his budget options with a little algebra. The equation for a budget line is

$$\text{budget} = P_{RT} \times Q_{RT} + P_{PC} \times Q_{PC}$$

where  $P$  and  $Q$  are price and quantity of round trips ( $RT$ ) and phone calls ( $PC$ ) (per minute). In Jeremy's case, this is the equation for the budget line:

$$\begin{aligned} \$20 &= \$4 \times Q_{RT} + \$0.10 \times Q_{PC} \\ \frac{\$20}{\$0.10} &= \frac{\$4Q_{RT} + \$0.10Q_{PC}}{\$0.10} \\ 200 &= 40Q_{RT} + Q_{PC} \\ Q_{PC} &= 200 - 40Q_{RT} \end{aligned}$$

If we choose 0–5 round trips (Column 1), the table shows how many phone minutes can be afforded with the budget (Column 3).

The total utility figures are given in the table.

Adding up total utility for round trips and phone minutes at different points on the budget line gives total utility at each point on the budget line. The highest possible utility is at the combination of 1 trip and 160 minutes of phone time, with a total utility of 1,120.

| Round Trips | Total Utility for Trips | Phone Minutes | Total Utility for Minutes | Total Utility |
|-------------|-------------------------|---------------|---------------------------|---------------|
| 0           | 0                       | 200           | 1,100                     | 1,100         |
| 1           | 80                      | 160           | 1,040                     | 1,120         |
| 2           | 150                     | 120           | 900                       | 1,050         |
| 3           | 210                     | 80            | 680                       | 890           |
| 4           | 260                     | 40            | 380                       | 640           |
| 5           | 300                     | 0             | 0                         | 300           |

3. This is the opposite of the example explained in the text. A decrease in price has a substitution effect and an income effect. The substitution effect says that because the product is cheaper relative to other things the consumer purchases, they will tend to buy more of the product (and less of the other things). The income effect says that after the price declines, the consumer could purchase the same goods as before and still have money left over to purchase more. For both reasons, a decrease in price causes an increase in quantity demanded.

### Review Questions

5. Utility is a subjective value determined by one's own preferences.
7. Marginal utility tends to fall with additional consumption because we value the first unit more than the second, and so on. This is diminishing marginal returns.
9. People make decisions on the margin, so as long as marginal utility from consumption remains positive, they will continue to consume. When the utility gained from additional consumption drops to zero, utility is maximized, and no more consumption occurs.

11. In general, this is true because in order for consumers to change their consumption of substitutes and complements to the good in question, they must first change their consumption of the primary good. For example, if the price of apples rises, consumers can only substitute towards oranges by first reducing their consumption of apples.

## Critical Thinking Questions

13. You might have evaluated how much utility you expected to gain from that purchase and compared it to other things you could do with the same amount of money. The fact that you made the purchase instead of spending your money elsewhere indicates that you acted to maximize utility.

15. The other good might have an income elasticity of zero. The fact that your consumption increases in response to a rising income may instead be due to the substitution away from the inferior good.

## Problems

17. This is unlikely to be true. In general, demand elasticity increases as prices drop and quantities increase, so we would expect the second 10% decrease in price to be met with a larger than 8% increase in quantity.

## Chapter 7: Indifference Curves

## Self-Check Questions

- When income increases, consumers can afford more goods, so the budget constraint shifts to the right, parallel to the original budget constraint. When income decreases, the budget constraint shifts to the left.
- The common pattern that each marginal unit of a good consumed provides less of an addition to utility than the previous unit
- Indifference curves are downward-sloping, and they are convex to the origin. They are steeper on the left and flatter on the right. This tells us that there is a tradeoff between different points. To get more of one good, you must give up some of the other good. Also, the shape communicates the diminishing marginal utility that exists when consuming more of a good.

## Review Questions

- This shows that there is a tradeoff between goods. If you give up some of one good, you must receive more of another in order to remain indifferent.
- Each person has an infinite number of indifference curves.
- The income effect states that when one good becomes more expensive, consumers will buy less of other goods because their incomes are relatively lower.
- Changes in price and income both have income effects as well as substitution effects.

## Critical Thinking Questions

- The income effect involves a change in relative income but not necessarily actual income. When goods become more expensive, it will seem like income is lower, even if it is actually not.
- In an intertemporal choice, each indifference curve shows the combinations of present and future consumption that provide a certain level of utility.

19. People always want to be on the highest indifference curve possible. However, they are limited by their budget constraints. The point where an indifference curve is tangent to the budget constraint is the highest possible indifference curve that an individual can be on without exceeding their budget.

## Problems

21. The marginal rate of substitution is the ratio of the number of cookies that must be sacrificed per brownie gained if Chelsea is to remain at the same level of satisfaction. For Option A, Chelsea consumes 15 brownies and 14 cookies. For Option B, she consumes 17 brownies and 10 cookies. In moving from Option A to Option B, she gains 2 brownies, but she gives up 4 cookies. Therefore, her marginal rate of substitution is  $\frac{4}{2} = 2$ .

**Chapter 8: Production, Costs, and Industry Structure**

## Self-Check Questions

1. Accounting profit = total revenues minus explicit costs
- $$= \$1,000,000 - (\$600,000 + \$150,000 + \$200,000)$$
- $$= \$50,000$$

5. marginal product
- $$= \frac{\text{change in total product}}{\text{change in variable input}}$$
- $$= \frac{\text{change in total product}}{275 \text{ square feet} - 200 \text{ square feet}}$$
- $$= \frac{\text{change in total product}}{75 \text{ square feet}}$$
- marginal product
- $$= \frac{75 \text{ square feet}}{1 \text{ worker}} = 75$$

7.

|                      | Total Cost | Machine Cost     | Labor Cost        |
|----------------------|------------|------------------|-------------------|
| Cost of Technology 1 | \$510      | 2 × \$55 = \$110 | 10 × \$40 = \$400 |
| Cost of Technology 2 | \$500      | 4 × \$55 = \$220 | 7 × \$40 = \$280  |
| Cost of Technology 3 | \$505      | 7 × \$55 = \$385 | 3 × \$40 = \$120  |

The firm should choose Production Technology 2 since it has the lowest total cost. Because the cost of machines increased (relative to the prior question), you would expect a shift toward less capital and more labor.

3.

| Total Cost | Average Variable Cost | Average Total Cost | Marginal Cost |
|------------|-----------------------|--------------------|---------------|
| \$30       | -                     | -                  | -             |
| \$40       | \$10                  | \$40               | \$10          |
| \$55       | \$12.50               | \$27.50            | \$15          |
| \$75       | \$15                  | \$25               | \$20          |
| \$100      | \$17.50               | \$25               | \$25          |
| \$130      | \$20                  | \$26               | \$30          |
| \$165      | \$22.50               | \$27.50            | \$35          |

## Review Questions

9. An explicit cost is one that you consciously pay, whereas an implicit cost is a forgone opportunity to do something else with your resources.
11. Accounting profit is the difference between revenues and explicit costs, whereas economic profit is the difference between revenues and total costs, explicit and implicit.
13. A fixed input is a factor of production that can't be easily increased or decreased in a short period of time. Conversely, a variable input is a factor of production a firm can easily increase or decrease in a short period of time.
15. In economics, it is generally accepted that the total cost curve is typically U-shaped, and a marginal cost curve is typically upward-sloping. The total product curve is generally S-shaped. A marginal product curve tends to be downward-sloping.
17. A fixed cost does not vary with output, such as the cost of a building or land, whereas a variable cost increases with output, such as labor or supplies.
19. Fixed costs are represented by a horizontal line, variable costs slope upward, marginal costs tend to slope upward, average total costs are U-shaped, and average variable costs are U-shaped as well and lie below average total costs.
21. Many fixed costs are also sunk costs. For example, when making the decision of whether to keep the restaurant open another hour, the owner should not factor in the rent on the building, which will be the same regardless of whether they close early.
23. Marginal costs, average costs, and average variable costs are measured on a per-unit basis.
25. If, for example, the price of labor rises, firms will substitute to a production technology that uses more capital instead of labor.
27. Economies of scale occur when average costs decrease with increases in output. Constant returns to scale show no such decrease, and diseconomies of scale show increase in average costs as output rises.
29. The minimum of the long-run average cost curve represents an efficient level of output. Producing less than this misses out on cost savings, whereas producing more is overly expensive, so most markets will be located near the minimum value on the curve.

## Critical Thinking Questions

31. Since fixed costs do not increase with output, the average fixed cost curve is continually downward-sloping. Spreading the overhead means increasing output so that the fixed cost per unit is very small.

33. The average cost curve depends directly on the marginal cost curve since rising marginal costs must necessarily increase average costs.
35. Businesses that plan to be around for a long time may indeed operate in the long run. One famous example is the makers of Guinness Stout, who signed a 9,000 year lease for their brewery in 1759, at the rate of 45 pounds a year, a very forward-thinking decision.
37. Improvements in technology reduce the costs of production, but they can also change the structure of an industry or the size of a firm. For this reason,

it is often not possible to draw both curves on the same graph. If other firms had access to the same technology, the effects for them would be similar. However, if the technology were proprietary, other firms might be forced to drop out of the market due to their competitor's lower prices.

### Problems

39. Since the bank is able to command an 8% rate of return on its loans, presumably the firm should be able to do the same. To invest at only a 6% rate of return would result in an economic loss due to the forgone opportunity to earn 8%.

41. For 60 haircuts, the average total cost is  $\frac{(160 + 240)}{60} = \$6.67$ .

The average variable cost is  $\frac{240}{60} = \$4$ .

The marginal cost is  $\frac{(400 - 300)}{20} = \$5$ .

For 72 haircuts, the average total cost is  $\frac{(160 + 320)}{72} = \$6.94$ .

The average variable cost is  $\frac{320}{72} = \$4.44$ , and the marginal

cost is  $\frac{(500 - 400)}{12} = \$8.33$ .

## Chapter 9: Perfect Competition

### Self-Check Questions

1. No, you would not raise the price. Your product is exactly the same as the product of the many other firms in the market. If your price is greater than your competitors, your customers would switch to them and stop buying from you. You would lose all your sales.
3. Holding total cost constant, profits at every output level would increase.
5. If marginal costs exceed marginal revenue, the firm will reduce its profits for every additional unit of output it produces. Profit would be greatest if it reduces output to where  $MR = MC$ .
7. With a technological improvement that causes a reduction in costs of production, an adjustment process will take place in the market. The existing firms will experience higher profits, which will attract other firms into the market. This entry process will stop whenever profits are driven back to zero.

9. Perfect competition is considered "perfect" because both allocative and productive efficiency are met at the same time in long-run equilibrium. If a market structure results in long-run equilibrium that does not minimize average total costs and/or does not charge a price equal to marginal cost, either allocative or productive (or both) conditions are not met, and the market cannot be labeled "perfect."

### Review Questions

11. Small, in this instance, means that the firm has no ability to influence the price of its product and must take the market price as given.
13. A price-taker firm cannot influence the price in the market but must accept it as a given.
15. If a perfectly competitive firm tries to increase prices, all of its customers will simply switch to another seller.
17. The marginal revenue curve is flat for a perfectly competitive firm because it cannot influence

prices by changing the level of output.

19. If the average cost curve is below the marginal revenue curve, or the price, at the selected level of output, the firm will make profits.
21. No. The firm should shut down only if its revenues are not able to cover its variable costs. If it is able to cover its variable costs, and perhaps some of its fixed costs, it should stay open in the short run.
23. Average variable cost and marginal revenue
25. Exit occurs when a firm can no longer make a profit by continuing to produce.
27. It will charge a price equal to the minimum of its average cost of production because perfect competition drives the price down to the zero-profit level.
29. Yes. Allocative efficiency requires firms to produce the level of output where  $P = MC$ . This is the same level of output where perfectly competitive firms will maximize profits.

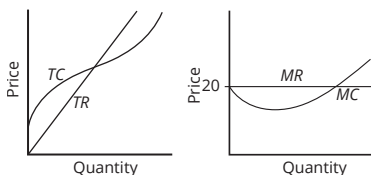
## Critical Thinking Questions

31. No market in the real world perfectly satisfies all the conditions of perfect competition, but some, such as for agricultural products, come close.
33. Because rising marginal and average costs and diseconomies of scale eventually make expanding production unprofitable.
35. As long as someone is earning profits, there is an opportunity for a perfectly competitive firm to lower prices and steal all their customers. The only way to prevent this from happening is to lower prices to the zero-profit level.
37. It implies that producing more cigarettes would require reductions in production elsewhere and that the market is producing what consumers most want to buy. It does not imply anything about whether cigarette consumption is desirable for society, however.

## Problems

39. The profit-maximizing level of output is 4 aquariums, with a profit of \$10. Producing more or less than this amount results in lower profits.

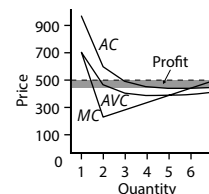
|   | Fixed Cost | Variable Cost | Total Cost | Marginal Cost | Total Revenue | Marginal Revenue | Profit |
|---|------------|---------------|------------|---------------|---------------|------------------|--------|
| 1 | 20         | 20            | 40         | -             | 20            | -                | -20    |
| 2 | 20         | 25            | 45         | 5             | 40            | 20               | -5     |
| 3 | 20         | 35            | 55         | 10            | 60            | 20               | 5      |
| 4 | 20         | 50            | 70         | 15            | 80            | 20               | 10     |
| 5 | 20         | 80            | 100        | 30            | 100           | 20               | 0      |



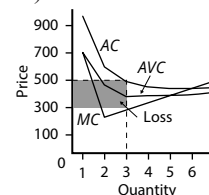
41. a.

|  | Output | Total Cost | Marginal Cost | Average Cost | Variable Cost | AVC |
|--|--------|------------|---------------|--------------|---------------|-----|
|  | 1      | 950        | 700           | 950          | 700           | 700 |
|  | 2      | 1,200      | 250           | 600          | 950           | 475 |
|  | 3      | 1,500      | 300           | 500          | 1,250         | 417 |
|  | 4      | 1,850      | 350           | 463          | 1,600         | 400 |
|  | 5      | 2,250      | 400           | 450          | 2,000         | 400 |
|  | 6      | 2,700      | 450           | 450          | 2,450         | 408 |
|  | 7      | 3,200      | 500           | 457          | 2,950         | 421 |

- b. The zero-profit point occurs when the price equals the minimum of average cost. The shutdown point occurs where the price equals the minimum of average variable costs.
- c. The firm can make a profit of \$300 by producing until marginal cost is equal to price (at an output of 7).



- d. The best the firm can do is take a loss of \$600 by producing until marginal cost equals price (at an output of 3).



## Chapter 10: Monopoly

### Self-Check Questions

1.
  - a. A government-enforced barrier to entry
  - b. No barrier to entry
  - c. No barrier to entry
  - d. A non-government barrier to entry
  - e. A non-government barrier to entry
3. Because of economies of scale, each firm would produce at a higher average cost than before. (They would each have to build their own power lines.) As a result, they would each have to raise prices to cover their higher costs. The policy would fail.
5. If price falls below  $AVC$ , the firm will not be able to earn enough revenues even to cover its variable costs. In such a case, it will suffer a smaller loss if it shuts down and produces no output. By contrast, if it stays in operation and produces the level of output where  $MR = MC$ , it will lose all of its fixed costs plus some variable costs. If it shuts down, it only loses its fixed costs.

### Review Questions

7. In a monopoly, there is only one seller, who can set prices as they choose. In perfect competition, firms are price takers.
9. A natural monopoly occurs when one firm can produce a product more efficiently than all others, so no other sellers can match its prices or compete in the marketplace.
11. Predatory pricing occurs when a firm dramatically lowers prices and takes a loss in order to drive competitors out of business. Once this happens, the monopolist is free to raise prices again.

13. Copyright, patent, trade secrets, and trademark law protect intellectual property.
15. The demand curve of a perfectly competitive firm is horizontal, meaning that it can sell as much as it wants at the market price. A monopolist faces a downward-sloping demand curve and can affect the quantity demanded by the price it charges.
17. No, a monopolist can control the price of its good by changing the level of output. It is a price maker, not a price taker.
19. The marginal revenue curve is downward-sloping because expanded output leads to falling prices.
21. The profit-maximizing level of output will be where marginal revenue intersects marginal cost.
23. No, because the monopolist maximizes profits by producing less than the socially optimal level of output in order to keep prices high.

### Critical Thinking Questions

25. Improvements in production technology and increased free trade with other countries weakened the barriers to entry into the aluminum market.
27. No, because the increased competition from other countries would reduce these companies' ability to restrict output and raise prices.
29. Consider whether the monopolist has the ability to engage in predatory pricing: dropping prices dramatically and tolerating the loss until you are forced to exit the market.

### Problems

31. If the new firm supplied 4,000 units of output, its average cost would be about \$13 per unit. Together, the two firms would supply 10,000 units of output. Eyeballing the demand curve gives a market price of about \$6 per unit. The incumbent firm's output would have an average cost of \$11 per unit, so it would now be losing about \$5 per unit. But the new firm would be losing even more: \$6–\$13 is a loss of \$7 per unit. Given this scenario, it is unlikely that the new firm would be able to outlast the incumbent. The barrier to entry created by the economies of scale would be effective.
33. The monopolist chooses  $Q_0$  where  $MR = MC$ . For a slightly higher level of output, the demand curve is higher than the marginal cost curve. This means that the price or marginal benefit to society of producing that output exceeds the marginal cost to society of producing it. If that additional output were produced, society would be better off. By not producing more than  $Q_0$ , society forgoes that additional net benefit. This is the definition of allocative inefficiency.

## Chapter 11: Monopolistic Competition and Oligopoly

### Self-Check Questions

- Using the three-step method, an increase in demand will manifest itself as a rightward shift of the demand curve and a rightward shift in marginal revenue. The shift in marginal revenue will cause a movement up the marginal cost curve to the new intersection of  $MR$  and  $MC$  at a higher level of output. The new price can be read by drawing a line up from the new output level to the new demand curve and then over to the vertical axis. The new price should be higher. The increase in quantity will cause a movement along the average cost curve to a possibly higher level of average cost. The price, though, will increase more, causing an increase in total profits.
- If the firms form a cartel, they will act like a monopoly, choosing the quantity of output where  $MR = MC$ . Drawing a line from the monopoly quantity up to the demand curve shows the monopoly price. Assuming that fixed costs are zero, we can infer that when the marginal cost curve is horizontal, average cost is the same as marginal cost. Thus, the cartel will earn positive economic profits equal to the area of the rectangle above average cost, out to the monopoly quantity and under the monopoly price.
  - The firms will expand output and cut prices as long as there are profits remaining. The long-run equilibrium will occur at the point where average cost equals demand. As a result, the oligopoly will earn zero economic profits due to cutthroat competition.

- $P_c > P_{cc}$ .  $Q_c < Q_{cc}$ . Profit for the cartel is positive and large. Profit for cutthroat competition is zero.

### Review Questions

- A firm selling a differentiated product is essentially a monopolist for that product, so it is able to exercise some market power.
- The firm will produce at a level of output where marginal revenue equals marginal cost and charge the highest price it can to sell that quantity based on perceived demand.
- They earn profits in the short run and will continue to do so in the long run since entry cannot completely erase the differentiation in their product.
- Firms will generally act more like competitors because although their products are somewhat different, there are still plenty of substitutes for consumers to choose if prices get too high.
- There is an incentive for members of a cartel to cheat in order to gain more profits for themselves, so such arrangements tend to be unstable.

### Critical Thinking Questions

- Ordinarily, long-run equilibrium would occur as new firms enter the market until no one has market power and profits are zero, but this cannot happen when products are differentiated, as there will always be some degree of market power.
- The demand curve would be more sharply kinked the more similar the products were since consumers can easily switch to another company in the case of a price increase.

### Problems

19.

|  | Price   | Quantity | Total Cost | Marginal Cost | Average Cost | Total Revenue | Marginal Revenue |
|--|---------|----------|------------|---------------|--------------|---------------|------------------|
|  | \$25.00 | 0        | \$130      | -             | -            | -             | -                |
|  | \$24.00 | 10       | \$275      | \$14.50       | \$27.50      | \$240         | \$24.00          |
|  | \$23.00 | 20       | \$435      | \$16.00       | \$21.75      | \$460         | \$22.00          |
|  | \$22.50 | 30       | \$610      | \$17.50       | \$20.33      | \$675         | \$21.50          |
|  | \$22.00 | 40       | \$800      | \$19.00       | \$20.00      | \$880         | \$20.50          |
|  | \$21.60 | 50       | \$1,005    | \$20.50       | \$20.10      | \$1,080       | \$20.00          |
|  | \$21.20 | 60       | \$1,225    | \$22.00       | \$20.42      | \$1,272       | \$19.20          |

The profit-maximizing level of output is 40 units.

$\$22.00 \times 40 = \$880 - \$800 = \$80$  of profit.

- If Jane trusts Bill to stay silent, she should confess. If Jane thinks Bill will confess, she should confess. Both criminals have a dominant strategy to confess.

## Chapter 12: Monopoly and Antitrust Policy

### Self-Check Questions

1. Yes, it is true. If the new firm formed by two smaller ones enters the top four, it can affect these indices.
3. The bus companies would have preferred the broader definition because in that market they would have had a much smaller share, and the merger would not be challenged by the Justice Department.
5. Because outright collusion to raise profits is illegal, and existing regulations include gray areas, which firms may be able to exploit.
7. Yes, it is a natural monopoly because average costs decline over the range that satisfies the market demand. For example, at the point where the demand curve and the average cost curve meet, there are increasing returns to scale.
9. More consumer choice. Cheaper phone calls, especially long distance. Better-quality phone service in many cases. Cheaper, faster, and better-quality data transmission. Spin-off technologies like free internet-based calling and video calling.

### Review Questions

11. A corporate merger is when two firms combine to create one. An acquisition is when one firm absorbs another into its current form.
13. The four-firm concentration ratio is measured by adding the market shares of the four largest firms in a market. If this measure is very high, it means that only a few firms are doing most of the business in the market, and there is not much serious competition.

15. Market definitions can be difficult because most goods satisfy a variety of needs. Is Coca-Cola in the cola market, the soft drink market, the beverage market, or some other market? It is difficult to say.
17. Exclusive dealing is when a firm agrees to buy or sell to only one other party. This shuts out other firms' ability to compete for that firm's business and thus reduces competition. Exclusive dealing might be acceptable when used to encourage competition between dealers.
19. Predatory pricing is when firms reduce prices to drive competitors out of business so they can remain the only firm in a market. While this is anti-competitive, it can be difficult to tell the difference between predatory pricing and legitimate price competition.
21. In this situation, multiple firms would be less efficient than a single firm, and prices would rise.
23. A way of setting prices for utility firms that would change over time to incentivize the firm to reduce costs on its own.
25. Regulatory capture is what happens when industries play a large role in designing their own regulations. Since industry leaders know more about their work than government regulators, they are often able to make persuasive arguments for the kinds of regulations they need or ones that would be impossible to follow.

### Critical Thinking Questions

27. No, they only measure market share, which is related to, but not the same as, competition.

29. Some airlines have been accused of doing this to maintain their dominance at particular airports.
31. As automobiles became less expensive, demand for public transportation declined to the point where cities could not support multiple bus companies.
33. Airline regulation was invented to stabilize the industry and protect airlines from fluctuating fuel prices and other disruptions. With deregulation, we could potentially have seen more airlines going out of business, resulting in fewer options for travelers.

### Problems

35. The four-firm concentration ratio is 61%. This is a concentrated market since the number is over 50%.
37. It would supply 5 units, where marginal revenue equals marginal cost, and charge a price of 6.
39. Allocative efficiency requires that price equals marginal cost, so the firm would produce 7 units at a price of 4. Since average cost at this output is 4.6, the firm would require a subsidy of  $0.6 \times 7 = 4.2$ .

**Chapter 13: Environmental Protection and Negative Externalities**

## Self-Check Questions

1. a. Positive externality  
b. Negative externality  
c. Positive externality  
d. Negative externality  
e. Negative externality
3. a. Price will rise  
b. Price will rise  
c. Price stays the same  
d. Price will rise
5. The first policy is command-and-control because it is a requirement that applies to all producers.
7. Even though state or local governments impose these taxes, a company has the flexibility to adopt technologies that will help it avoid the tax.

9.

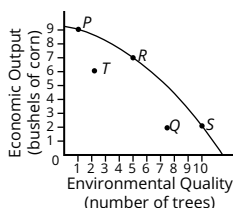
|                    | Incentives to Go Beyond                                                                     | Flexibility about Where and How Pollution Will Be Reduced                                                   | Political Process Creates Loopholes and Exceptions                                       |
|--------------------|---------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| Pollution Charges  | If you keep reducing pollution, you reduce your charge.                                     | Reducing pollution by any method is fine.                                                                   | If the charge applies to all emissions of pollution, there are no loopholes.             |
| Marketable Permits | If you reduce your pollution, you can sell your extra pollution permits.                    | Reductions of pollution will happen at firms where it is cheapest to do so, by the least expensive methods. | If all polluters are required to have permits, there are no loopholes.                   |
| Property Rights    | The party that has to pay for the pollution has incentive to do so in a cost-effective way. | Reducing pollution by any method is fine.                                                                   | If the property rights are clearly defined, it is not legally possible to avoid cleanup. |

11. a.

| Land Restored (in acres) | Total Cost | Marginal Cost | Total Benefit | Marginal Benefit |
|--------------------------|------------|---------------|---------------|------------------|
| 0                        | \$0        | -             | \$0           | -                |
| 200                      | \$20       | \$0.10        | \$140         | \$0.70           |
| 300                      | \$80       | \$0.60        | \$240         | \$1.00           |
| 400                      | \$160      | \$0.80        | \$320         | \$0.80           |
| 500                      | \$280      | \$1.20        | \$380         | \$0.60           |

- b. The optimal amount of restored land is 400 acres. Beyond this quantity, the marginal costs are greater than the marginal benefits.

13. a.



- b. Of the choices provided, *P*, *R*, and *S* demonstrate productive efficiency. These are the choices on the production possibility frontier.
- c. Allocative efficiency is determined by preferences—in this case, by the preferences of society as expressed through government and other social institutions. Because you do not have information about these preferences, you really cannot say much about allocative efficiency.
- d. In the choice between *T* and *R*, *R* should clearly be preferred because it has both more corn and more trees. This answer illustrates why productive efficiency is beneficial. Compared with choices inside the *PPF*, it means more of one or both goods.
- e. In the choice between *T* and *S*, it is not possible to say which choice is better. True, *S* is

on the *PPF* and *T* is not, but that only addresses the issue of productive efficiency. If a society has a strong preference for economic output and places a lower value on trees, allocative efficiency may lead to a choice of *T* over *S*. Of course, the reverse could also be true, leading to a choice of *S*. Without information on society's preferences to judge allocative efficiency, this question cannot be answered.

- f. Compared with command-and-control policies, market-oriented policies allow more output with the same environmental protection, more environmental protection with the same level of output, or more of both environmental protection and output. Thus, a choice like *Q*, inside the *PPF*, is more likely to represent a command-and-control policy than a choice like *S*, on the *PPF*.

## Review Questions

15. A person who spends money to make their house and yard look nice creates a positive externality by increasing the value of the neighbors' property. Pollution is the classic example of a negative externality, where a producer imposes a cost on others who do not benefit from the goods.
17. The supply curve will only take into account private costs because the producer does not have to bear the social costs.
19. These regulations create no incentive for companies to reduce pollution below a minimum standard, they make no distinction between firms that can easily reduce pollution and those that cannot, and they are subject to political lobbying and loopholes.
21. A marketable permit grants permission to pollute at a certain rate. If a firm can reduce pollution, it can then sell these permits to others to raise additional revenue.
23. The marginal costs should rise as protection expands because of diminishing marginal returns. It is fairly inexpensive to protect the first unit of the environment, but the marginal cost of protecting the last unit would be extraordinarily high.
25. High-income countries often agree to help low-income countries cover the cost of their pollution through tourism and sharing technology.
27. Each combination represents an efficient level of environmental protection and economic production, such that you could not get more of one without losing some of the other.

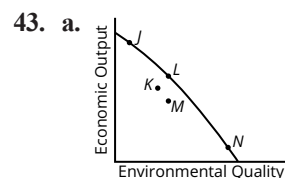
## Critical Thinking Questions

29. You would need to find the cost of reducing the equivalent amount of carbon emissions in other areas to correct for external costs.
31. The notion of large national parks where no humans can enter has some emotional appeal, but consider the practical incentives. Laws against poaching elephants or destroying habitats need to be enforced. Without the positive support of local communities, both in protecting habitats and opposing poachers, such command-and-control environmental policies tend to be empty statements of hopeful intent. Whatever the law says, very poor local people will try to make a living, even if it means killing elephants, cutting down trees, or diverting water from the elephants' habitat. However, if local citizens have a financial interest in the wildlife habitat—because it attracts tourists who stimulate the local economy—they will have an incentive to protect the habitat, save the elephants, and avoid supporting (or even turn in) poachers. A ring of such communities around a national park, where local people effectively have a sort of property right to benefit from their proximity to the park, may be a great help in saving elephants.
33. No, because someone will always own the permits and thus be permitted to pollute.
35. It is not because the costs of not polluting at all would be far higher than the benefits. We would have to abandon virtually all modern technology in order to achieve such a goal, which would have devastating economic consequences, whereas a small amount of pollution necessary for modern life is a comparatively small cost.

37. Yes, extreme levels of pollution can impose many costs, including health hazards for the citizens. Resources devoted toward correcting these costs cannot be used in more productive activities.
39. In that problem, the environmental cost did not come from pollution but from cutting down trees to make room for corn, so clean technology would not affect the production possibility curve. Instead, the country should promote technologies that increase the yield of corn so that more crops can be produced without cutting down so many trees.

## Problems

41. The producer splits the price of the externality with the consumer. While the consumer pays \$50 more, the producer receives \$50 less.



- b. Choices *J*, *L*, and *N* are productively efficient because the country cannot produce more of one good without giving up some of the other.
- c. Allocative efficiency is determined by preferences—in this case, by the preferences of society as expressed through government and other social institutions. Because you do not have information about these preferences, you really cannot say much about allocative efficiency.
- d. *L* is clearly better because it contains both more economic production and environmental protection than *K*.

- e. There is no clear way to say which is better between these two choices. True,  $N$  is on the  $PPF$  and  $K$  is not, but that only addresses the issue of productive efficiency. If a society has a strong preference for economic output and places a lower value on environmental quality, allocative efficiency may lead to a choice of  $K$  over  $N$ . Of course, the reverse could also be true, leading to a choice of  $N$ . Without information on society's preferences to judge allocative efficiency, this question cannot be answered.
- f.  $M$  would represent a command-and-control policy because it unnecessarily reduces the amount of production, whereas  $L$  sees more production at no additional cost to the environment.

## Chapter 14: Positive Externalities and Public Goods

### Self-Check Questions

1. No. A market demand curve reflects only the private benefits of those who are consuming the product. Positive externalities are benefits that spill over to third parties, so they create social benefits and are not captured by a market (or private benefit) demand curve.
3. a. \$102 million
- b. If the interest rate is 9%, the cost of financial capital, and the firm can capture the 5% return to society, the firm would invest as if its effective rate of return is 4%, so it will invest \$183 million.
5. Government programs that either pay for neighborhood cleanup directly or provide reduced tax payments for those who clean up or fix up their own property could be enacted. It is also easy to imagine how a city might allow its businesses to form a group that would pay for and manage neighborhood cleanup.
7. a. Once citizens are protected from crime, it is difficult to exclude someone from this protection, so it is nonexcludable.
- b. Some satellite radio services, such as SiriusXM, are sold by subscription fee, so it is excludable.
- c. Once a road is built, it is difficult to exclude people although toll roads can exclude nonpayers.
- d. Primary education can be provided by private companies, so it is excludable.
- e. Companies sell cell phone service and exclude those who do not pay.

### Review Questions

9. New technologies, once discovered, can be used by other firms who did not pay the cost of development (although patent laws reduce this somewhat).
11. Since private investors do not reap the social benefits of their investments, they might invest at a rate below the socially optimal level.
13. Public goods are nonrival and nonexcludable.
15. The free rider problem is when people refuse to pay for a public good because they cannot be excluded from its use. If many people behave this way, the good might not be produced in the first place.

### Critical Thinking Questions

17. No. Patent law tries to internalize some of the social benefits, but eventually, new technologies are available for others to use and build upon.

19. They promote membership as something special, with gifts for those who donate. In addition to receiving some federal funding, they offer special perks to those who donate large sums of money to the organization.
21. The post office is one example, where consumers pay a direct fee to use the service. Another example would be the Smithsonian Museums in Washington, D.C., where consumers could easily be charged an entrance fee.

### Problems

23. a. If the opportunity cost of capital is 6%, HighFlyer will invest \$400. Phrased differently, HighFlyer's private demand for investment is \$400.
- b. The socially optimal amount of investment will be \$500 since a private rate of return of 4% + 2% more yields a social return of 6%, which is equal to the opportunity cost of capital. Intuitively, the socially optimal amount (\$500) should be more than the privately optimal amount (\$400) when there are positive externalities.
25. a. The best outcome for each girl individually is for the other one to do all the cleaning, but the best outcome for them jointly is to share the cleaning. The worst outcome would be for neither girl to clean, so the room remains dirty.

- b. Both girls reason that if the other one forgoes cleaning, her best option is to not clean as well. Similarly, if the other one cleans, her best option is not to. Not cleaning is the dominant strategy, so the room will likely remain dirty. Of course, this assumes that the girls cannot collude, cannot clean the room only partially, and have no way to tell if the other is helping.

## Chapter 15: Labor Markets and Income

### Self-Check Questions

1. a. For a firm operating in a perfectly competitive output market, the value of the marginal product is the marginal product of labor multiplied by the firm's output price.

| Labor | Marginal Product of Labor | Price of the Product | Value of the Marginal Product |
|-------|---------------------------|----------------------|-------------------------------|
| 1     | 10                        | \$4                  | $10 \times \$4 = \$40$        |
| 2     | 8                         | \$4                  | $8 \times \$4 = \$32$         |
| 3     | 7                         | \$4                  | $7 \times \$4 = \$28$         |
| 4     | 5                         | \$4                  | $5 \times \$4 = \$20$         |
| 5     | 3                         | \$4                  | $3 \times \$4 = \$12$         |
| 6     | 1                         | \$4                  | $1 \times \$4 = \$4$          |

- b. In a perfectly competitive labor market where the going market wage is \$12, a profit-maximizing firm will hire workers up to the point where the market wage equals the value of the marginal product. In this case, the market wage equals the value of the marginal product when the labor is 5 because at that level, the value of the marginal product is \$12.

3. a. With no union, the equilibrium wage rate would be \$18 per hour, and there would be 8,000 bus drivers.
- b. If the union has enough negotiating power to raise the wage \$4 per hour higher than under the original equilibrium, the new wage would be \$22 per hour. At this wage, 4,000 workers would be demanded while 10,000 would be supplied, leading to an excess supply of 6,000 workers.
5. In a few other countries (France, Spain), the percentage of workers belonging to a union is similar to that in the United States, but union membership rates are generally lower in the United States. When the share of workers whose wages are determined by union negotiations is considered, the United States ranks by far the lowest (because in countries like France and Spain, union negotiations often determine pay even for non-union employees).
7. From a social point of view, the benefits of unions and the costs seem to counterbalance. There's no evidence that in countries with a higher percentage of unionized workers, the economies grow more or less slowly.
9. a. Firms have a profit incentive to sell to everyone, regardless of race, ethnicity, religion, or gender.
- b. A business that needs to hire workers to expand may also find that if it draws only from its accustomed pool of workers—say, White men—it lacks the workers it needs to expand production. Such a business would have an incentive to hire more women and minorities.
- c. A discriminatory business that is underpaying its workers may find those workers leaving for jobs with another employer who offers better pay. This market pressure could cause the discriminatory business to change its practices.
11. If a large share of immigrants have relatively low skills, reducing the number of immigrants would shift the supply curve of low-skill labor back to the left, which would tend to raise the equilibrium wage for low-skill labor.

### Review Questions

13. The going market wage and the firm's marginal revenue product determine the demand for labor for a firm with market power in the output market. Firms with market power in their output market choose the number of workers based on the point where the going market wage equals the firm's marginal revenue product. The demand for labor for a firm that has market power in the output market is less than the demand for labor for a perfectly competitive firm because the marginal revenue is less than the price.

15. A labor union is an organization of workers who collectively bargain with employers over wages and working conditions.
17. The Fair Labor Standards Act of 1938, the Civil Rights Act of 1964, the Occupational Health and Safety Act of 1970, and the Americans with Disabilities Act of 1990 are a few of the prominent U.S. workplace protection laws.
19. Union membership has been declining in recent years.
21. Union membership rates have been trending downward in recent years, partially due to the popularity of right-to-work laws and less government support for unions than exist in other countries.
23. The marginal cost of labor is the cost to the firm of hiring one more worker.
25. A bilateral monopoly is a labor market with a union on the supply side and a monopsony on the demand side. A monopsony is a labor market where there is only one employer.
27. The earnings gap between men and women has generally decreased in recent years.
29. No. There are many reasons such a gap could exist, including differences in skills or education and the different types of jobs that attract different demographics.
31. Affirmative action or tax incentives for hiring Black workers or women could have this effect.
33. Minimum wage laws prevent wages of low-skilled workers from falling below a certain level. Additionally, immigrants and natives often do not compete for the same types of jobs. For example, a large population of low-skilled immigrants may increase the demand for native speakers of English, which benefits low-skilled natives.
35. An increase in low-skilled immigrants shifts the supply of low-skilled workers to the right, decreasing wages and increasing the equilibrium quantity of low-skilled workers. If the minimum wage prevents wages from dropping, unemployment will result.

### Critical Thinking Questions

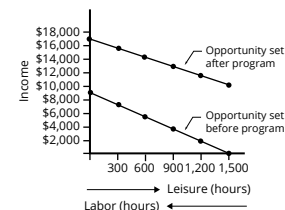
37. As more states pass right-to-work laws and technology continues to improve, union membership will likely continue to decline.
39. Some people are willing to put prejudice over profit, and some customer bases will support a business that discriminates over one that does not based on their own prejudices.
41. The marginal cost of labor for a firm that operates in a competitive labor market is equal to the wage rate. The marginal cost of labor for a monopsony, a labor market where there is only one employer (i.e., the monopsony is the sole demander for labor), would be greater than the wage. In order for a monopsony to increase employment, it must raise the wage it pays, not just for new workers but for all the existing workers it could have hired at the previous lower wage.
43. Economists are not in general agreement on this question, so the student will have to give their own opinion.

## Chapter 16: Poverty and Economic Inequality

### Self-Check Questions

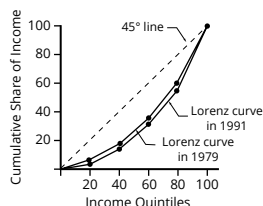
1. a. Poverty falls, inequality rises  
b. Poverty rises, inequality falls
3. Here is the new table, showing a policy where only \$0.30 in government support is pulled back for every \$1 of income earned.

| Number of Work Hours | Earnings from Work | Government Benefits | Total Income |
|----------------------|--------------------|---------------------|--------------|
| 1,500                | \$9,000            | \$7,300             | \$16,300     |
| 1,200                | \$7,200            | \$7,840             | \$15,040     |
| 900                  | \$5,400            | \$8,380             | \$13,780     |
| 600                  | \$3,600            | \$8,920             | \$12,520     |
| 300                  | \$1,800            | \$9,460             | \$11,260     |
| 0                    | \$0                | \$10,000            | \$10,000     |



5. TANF attempts to loosen the poverty trap by providing incentives to work in other ways. Specifically, it requires that people work (or complete their education) as a condition of receiving TANF benefits, and it places a time limit on benefits.

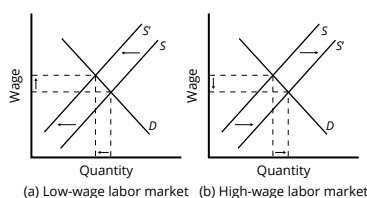
7. Just from glancing at the quintile information, it's fairly obvious that income inequality increased in the United Kingdom over this time. The top quintile is getting a lot more, and the lowest quintile is getting a bit less. But converting this information into a Lorenz curve is a little trickier because the Lorenz curve graphs the cumulative distribution, not the amount received by individual quintiles. Thus, as explained in the text, you have to add up the individual quintile data to convert the data to this form.



| Share of Income Received | 1979   | 1991   |
|--------------------------|--------|--------|
| Bottom 20%               | 7.0%   | 6.6%   |
| Bottom 40%               | 18.5%  | 18.1%  |
| Bottom 60%               | 35.5%  | 34.4%  |
| Bottom 80%               | 60.3%  | 57.1%  |
| All 100%                 | 100.0% | 100.0% |

9. In the market for low-wage labor, a skills program will shift supply to the left, which will tend to drive up wages for the remaining low-skill workers. In the market for high-wage labor, a skills program will shift supply to the right (because after the training program, there are now more high-skilled workers at every wage), which will tend to drive down wages for high-skill workers. The combination of these two programs will result in a lesser degree of inequality. The

following figures illustrate these two labor markets.



11. For this hypothesis, a well-funded social safety net might make people feel that even if their company goes bankrupt or they need to change jobs or industries, they will have some degree of protection. As a result, people may be more willing to allow markets to work without interference and not lobby as hard for rules that would prevent layoffs, set price controls, or block foreign trade. In this case, safety net programs that increase equality could also allow the market to work more freely in a way that could increase output. In this case, at least some portion of the *PPF* between equality and economic output would slope up.

13. Many view the redistribution of income to achieve greater equality as taking away from the rich to pay the poor, or as a “zero sum” game. By taking taxes from one group of people and redistributing them to another, the tax system is robbing some of the American Dream.

### Review Questions

15. The poverty line is the income threshold below which it is not possible to afford the basic necessities of life.
17. The poverty trap occurs when welfare payments are more generous than the payment a person would receive at an entry-level or part-time job. In such a case, it is more financially rewarding not to work than to find and take a job.

19. The near-poor are those who earn incomes just above the poverty line.
21. TANF provides temporary financial assistance for people who work, EITC provides a tax credit that increases with hours worked before phasing out, SNAP provides debit cards that can be used to buy food, and Medicaid provides medical care to the poor.
23. The cumulative share of the population is on the horizontal axis, and the cumulative share of income is on the vertical axis.
25. Income inequality has increased since the 1970s.
27. Changing family demographics, with more single-parents and households with two high-earners, as well as shifts in the distribution of wages
29. A push for economic equality usually requires restricting the amount of income some people can earn (for example, high tax rates on people with high incomes), which reduces their incentives to work. On the other hand, allowing them to earn as much as possible will increase inequality but also increase incentives to work.

### Critical Thinking Questions

31. In 2022, the poverty line for a family of four was \$27,750, so they would not be able to make ends meet.
33. Welfare payments should decline at a lower rate per hour than the hourly wage of a low-paying job in order to incentivize more hours worked.
35. These programs are countercyclical, meaning they pay out more during times of recession and less during times of expansion. Maximum payments occur at the trough, and minimum payments occur at the peak of the business cycle.

37. The student will have to provide their own opinion.
39. The student will have to provide their own opinion.

41. The student will have to provide their own opinion.

43. Some economists have argued that high levels of income inequality harm a nation's economic growth in the long run, but this is not a universally accepted opinion.

#### Problems

45.  $\frac{100}{900} \times 100 = 11\%$

47. Total income is \$400,000. A useful first step is to rank the households by income, from lowest to highest. Then, since there are ten households total, the bottom quintile will be the bottom two households, the second quintile will be the third and fourth households, and so on, up to the top quintile.

| Income           | Quintile Incomes                          | % of Total Income |
|------------------|-------------------------------------------|-------------------|
| 15,000<br>20,000 | Total bottom quintile income:<br>\$35,000 | 8.75%             |
| 30,000<br>30,000 | Total second quintile income:<br>\$60,000 | 8.75%             |
| 35,000<br>40,000 | Total third quintile income:<br>\$75,000  | 18.75%            |
| 45,000<br>50,000 | Total fourth quintile income:<br>\$95,000 | 23.75%            |
| 55,000<br>80,000 | Total top quintile income:<br>\$135,000   | 33.75%            |

Comparing this distribution to the U.S. income distribution for 2019, the top quintile in the example has a smaller share of total income than in the U.S. distribution, and the bottom quintile has a larger share.

This pattern usually means that the income distribution in the example is more equal than the U.S. income distribution.

## Chapter 17: Information, Risk, and Insurance

### Self-Check Questions

- Imperfect information is relatively low; after all, you can see the apples.
  - Imperfect information is relatively low. The neighborhood restaurant probably has a certain local reputation.
  - Imperfect information is relatively high. How can you tell whether the computer is really in good working order? Why are they selling it?
  - Imperfect information is relatively high. What do those flowers really look like?

- It is almost impossible to distinguish whether a health outcome, such as life expectancy, was the result of personal preferences that might affect health and longevity—such as diet, exercise, certain risky behavior, and consumption of certain items like tobacco—or the result of expenditures on health care (for example, annual check-ups).

### Review Questions

- A “lemon” is a good that is of very low quality but whose quality cannot be verified until after purchase.

- The worker may offer to work for a trial period for little or no wages so that the employer can verify their value before signing a long-term contract.
- An insurance premium is a monthly rate policyholders pay in order to maintain insurance coverage.
- An actuarially fair policy is one in which the average benefits paid out equal the average cost to the policyholder.
- When people are insured, they engage in more risky behavior, leading to higher costs for the insurer and, thus, higher premiums for the policyholder.

15. Since the policyholder still incurs a cost for their risky behavior, they will be less inclined to engage in it.
17. Typically, those most inclined to buy insurance are the ones most likely to make expensive claims, which drives up the cost of insurance for healthy people who may then decide to do without.

### Critical Thinking Questions

19. You might test all applicants in sample classrooms to see how they perform before making a decision on whom to hire.
21. Players who wear more padding feel less vulnerable to injury, so they are willing to engage in more dangerous behavior. For example, without boxing gloves, it is too painful to risk hitting an opponent in the face due to

the hardness of the skull. With boxing gloves, this is not an issue, so there are more head injuries in boxing today.

### Problems

23. Demand should increase due to improved expectations about quality. Supply should also increase due to the higher prices that the product can command, so the quantity of emeralds sold should increase as well.

## Chapter 18: Financial Markets

### Self-Check Questions

1. a. The management of small companies might rather do an IPO right away, but until they get the company up and running, no sensible person would pay very much for the stock.
- b. A small company may be earning few or zero profits, and its owners want to reinvest their earnings in the future growth of the company. If this company issues bonds or borrows money, it is obligated to make interest payments, which can eat up the company's cash. However, if the company issues stock, it is not obligated to make payments to anyone (although it may choose to pay dividends).
- c. Venture capitalists are private investors who can keep close tabs on the management and strategy of the company, which reduces the problems of imperfect information about whether the firm is being well-run. Venture capitalists often own a substantial portion of the firm and have much better information than a typical shareholder.

3. a. Remember, equity is the market value of the house minus what is still owed to the bank. Thus, the value of the house is \$200,000, Fred owes \$180,000 to the bank, and his equity is \$20,000.
- b. The value of Freda's house is \$250,000. It doesn't matter what price she bought it for. She owes zero to the bank, so her equity is the whole \$250,000.
- c. The value of Frank's house is \$160,000. He owes \$60,000 to the bank (the original \$80,000 minus the \$20,000 he has paid off the loan). His equity is \$100,000.
5. When people believe that a high-risk investment must have a low return, they are getting confused between what risk and return mean. Yes, a high-risk investment might have a low return, but it might also have a high return. Risk refers to the fact that a wide range of outcomes is possible. However, a high-risk investment must, on average, expect a relatively high return, or else no one would be willing to take the risk. Thus, it is quite possible—even likely—for an investment to have high risk and high return. Indeed, the reason

that an investment has a high expected return is that it also has a high risk.

7.  $\text{principal} + (\text{principal} \times \text{rate} \times \text{time})$   
 $\text{interest} = \text{principal} \times \text{rate} \times \text{time}$   
 $\$500 = \$10,000 \times \text{rate} \times 5 \text{ years}$   
 $\$500 = \$50,000 \times \text{rate}$   
 $\frac{\$500}{\$50,000} = \text{rate}$   
 $\text{rate} = 1\%$

### Review Questions

9. Startup firms often approach investors known as venture capitalists to provide them with the money they need in exchange for a share in the company.
11. Because well-established firms have a proven record of being able to generate revenue and are, thus, less risky for banks to lend to
13. A share of stock represents partial ownership in a company.
15. A dividend is a payment made by firms to stockholders as a way of signaling healthy profits and encouraging further investment.
17. A public company offers up shares of stock for public sale, whereas in a private company, ownership is retained by a select few.

19. Banks transfer money from lenders (who make deposits) to borrowers (who take out loans), serving as the middlemen for such transactions.
21. If the company issuing the bond goes bankrupt before the bond matures, investors may lose out on the money owed them.
23. A mutual fund invests in a wide variety of stocks and bonds, offering investors a diversified portfolio in a single investment.
25. A house is an asset whose value will change over time and can be sold at a later date, so a house is a type of financial investment even though it also satisfies the consumption need of shelter.
27. Become well-educated and start saving money early in life

### Critical Thinking Questions

29. You might prefer to borrow the money in order to retain ownership of the company, provided you were sufficiently established to secure a large loan from the bank.
31. A thirty-year-old might invest more heavily in long-term assets like bonds, whereas a sixty-five-year-old does not have the luxury of waiting for these to mature. Also, older investors tend to be retired and living on a fixed income, so they cannot afford to take risks that might impact their standard of living in real time.
33. Less access to capital makes it harder to start or expand businesses, so both economic growth and employment will suffer in such a situation.

35. Bank failures often cost depositors large sums of savings, reducing the amount of money they have to spend and negatively affecting aggregate demand.

### Problems

37. a. Since interest rates have fallen, you should be willing to buy the bond only if you can get it for less than the \$10,000 face value.  
b. Since you can earn 9% interest by investing your money elsewhere, you should not be willing to pay more than  $\frac{\$10,000}{1.09} = \$9,174.31$  for the bond.
39.  $\frac{\$10,000}{1.1^{10}} = \$3,855.43$

## Chapter 19: Public Economy

### Self-Check Questions

1. All other things being equal, voter turnout should increase as the cost of casting an informed vote decreases.
3. The costs of organization and the small benefit to the individual
5. True. This is exactly what occurs in a voting cycle. That is, the majority can prefer Policy A to Policy B, Policy B to Policy C, and Policy C to Policy A. Then, the majority will never reach a conclusive outcome.
7. The four Coca-Cola candidates compete with each other for Coca-Cola voters, whereas everyone who prefers Pepsi had only one candidate to vote for. Thus, the will of the majority is not satisfied.

### Review Questions

9. Since the benefits to the group are concentrated among a few, members of the group have a strong incentive to lobby on their own behalf. Since the costs are spread out over a large population, there is little incentive for individuals to expend much effort opposing the special interest policy.
11. In order to gather the votes needed to pass their own pork-barrel projects, legislators are often willing to vote for others outside their district in a form of reciprocal exchange.

13. Government raises revenue through taxation, which citizens must pay or else face legal consequences. Businesses must sell goods and services to voluntary consumers. Therefore, a business has to consider how its decisions will affect customer satisfaction, whereas a government knows it can always raise more revenue through the tax system.

### Critical Thinking Questions

15. Anything that reduces the cost of voting, such as greater access to absentee ballots or electronic voting, will make people more likely to vote.
17. If lobbying can protect the company's profits from harmful regulation, or else convince lawmakers to pass regulations that benefit the company, it is often wise to employ lobbyists.

19. Amazon has the resources to easily weather such a regulation, but a new startup may not. By supporting laws like this, incumbents protect themselves from potential competition from new firms.
21. Costs are often hidden because we don't see how things might have been otherwise. For example, a regulation that protects a special interest group from competition may result in prices remaining high when they might otherwise have dropped. The consumers themselves would not be aware of the alternative possibility and would not notice the cost that they bear.
23. The problem with an FPTP system is that the candidate who gets the most votes may not best represent the desires of the people. For example, suppose Candidate A gets 45% of the vote, Candidate B gets 30%, and Candidate C gets 25%. Candidate A will be elected even if Candidates B and C had very similar campaign platforms to one another, representing a total of 55% of the population. This is known as the third party "spoiler effect" and has been thought to affect many important elections.
25. There are some things even lobbyists can't accomplish. Antitrust laws and the rapid expansion of telephone markets made overt protectionism politically difficult.

#### Problems

27. The total costs would be  $\$5 \text{ million} \times 2 = \$10 \text{ million}$ , while the total benefits would be  $\$200 \times 1 \text{ million} = \$200 \text{ million}$ . Still, since the tobacco companies are likely to spend millions lobbying against the ban, it is not probable that it will pass.

## Chapter 20: International Trade

### Self-Check Questions

1. False—anything that leads to different levels of productivity between two economies can be a source of comparative advantage. For example, the education of workers, the knowledge base of engineers and scientists in a country, the part of a split-up value chain where they have their specialized learning, economies of scale, and other factors can all determine comparative advantage.
3. In answering questions like these, it is often helpful to begin by organizing the information in a table. Notice that, in this case, the productivity of the countries is expressed in terms of how many workers it takes to produce a unit of a product.

| Country | 1 Sweater | 1 Bottle of Wine |
|---------|-----------|------------------|
| France  | 1 worker  | 1 worker         |
| Tunisia | 2 workers | 3 workers        |

In this example, France has an absolute advantage in the production of both sweaters and wine. You can tell because it takes France less labor to produce a unit of the good.

5. There are several possible advantages of intra-industry trade. Both nations can take advantage of extreme specialization and learning in certain kinds of cars with certain traits, like gas-efficient cars, luxury cars, sport-utility vehicles, higher- and lower-quality cars, and so on. Moreover, nations can take advantage of economies of scale so that large companies will compete against each other across international borders, providing the benefits of competition and variety to customers. This same argument applies to trade between U.S. states, where people often buy products made by people in other states, even though a similar product is made within the boundaries of their own state. All states—and all countries—can benefit from this kind of competition and trade.

7. A nation might restrict trade on imported products to protect an industry that is important for national security. For example, Nation X and Nation Y may be geopolitical rivals, each with ambitions of increased political and economic strength. Even if Nation Y has a comparative advantage in the production of missile defense systems, it is unlikely that Nation Y would export those goods to Nation X. It is also the case that, for some nations, the production of a particular good is a key component of national identity. In Japan, the production of rice is culturally very important. It may be difficult for Japan to import rice from a nation like Vietnam, even if Vietnam has a comparative advantage in rice production.

### Review Questions

9. Comparative advantage leads to gains from trade when countries specialize and produce mainly what they do best.

11. Yes. Comparative advantage is defined by what you have to give up to produce a good. If the opportunity cost of production is low, a country will still have a comparative advantage even when at an absolute disadvantage.

13. Trade that takes place within a specific industry

15. Splitting up the value chain involves different countries undertaking different stages of production for a good.

### Critical Thinking Questions

17. To a certain extent, yes. Greater natural resources or access to the sea can lead to absolute advantage for certain goods.
19. Tunisia has the lower opportunity cost for producing sweaters because it only has to give up  $\frac{2}{3}$

of a bottle of wine for each sweater, whereas France has to give up 1 bottle of wine for each sweater. France has the lower opportunity cost of producing wine because it only has to give up 1 sweater per bottle of wine, whereas Tunisia has to give up  $1\frac{1}{2}$  sweaters. The opportunity cost of a good is what you have to give up to get it.

21. When both the United States and Mexico shift production of shoes and refrigerators toward their comparative advantage, the combined production of both goods rise, as illustrated in the following table.

| Country       | Shoe Production | Refrigerator Production |
|---------------|-----------------|-------------------------|
| United States | 3,500           | 26,000                  |
| Mexico        | 6,000           | 2,500                   |
| Total         | 9,500           | 28,500                  |

In this scenario, the U.S economy, after specialization, will only benefit if it exports fewer than 6,000 refrigerators and imports at least 1,500 pairs of shoes. If the United States exports more than 6,000 refrigerators and imports fewer than 1,500 pairs of shoes, it would not gain from trading with Mexico. Additionally, the Mexican economy, after specialization, will only benefit if it imports at least 2,500 refrigerators and exports no more than 2,000 pairs of shoes. Like the United States, Mexico will not experience gains from this particular trade relationship unless these conditions are met.

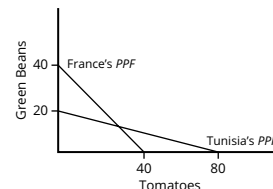
23. The theory of comparative advantage suggests that trade should happen between economies with large differences in opportunity costs of production. Gains from trade emerge as a result of comparative advantage. Intra-industry trade is the trade of goods within the same industry between countries. While it may appear that intra-industry trade contradicts the theory of comparative advantage, they can be harmonious because the division of labor that occurs with intra-industry trade leads to learning, innovation, and unique skills that accompany specialization. Splitting up the value chain is a recent trend in international trade. When countries produce a good in stages, intra-industry trade between similar countries leads to economic gains, which is the goal of comparative advantage.

25. Intra-industry trade is the trade of goods within the same industry from one country to another. Intra-industry trade may seem surprising from the point of view of comparative advantage because the theory of comparative advantage suggests that trade should happen between economies with large differences in opportunity costs of production. Typically, intra-industry trade involves countries with similar economies.

27. Even though low-income countries benefit more from trade than high-income countries, a low-income country may put up barriers to trade, such as tariffs on imports, in order to protect certain vested economic, social, and cultural interests. Because of this, tariffs are traditionally considered a political tool.

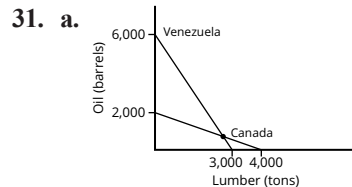
### Problems

29. a. The PPF for France will range from 40 green beans to 40 tomatoes. The PPF for Tunisia will range from 20 green beans to 80 tomatoes.



- b. Tunisia has the absolute advantage in tomatoes, and France has the absolute advantage in green beans.
- c. France has a comparative advantage in green beans, and Tunisia has a comparative advantage in tomatoes.

- d. Even giving up 1 tomato would allow France to gain from trade since it could exchange the additional green bean for 4 tomatoes from Tunisia. France should not give up any green beans but instead produce them exclusively since it can trade each green bean for 4 tomatoes.



Canada can produce between 2,000 barrels of oil and 4,000 tons of lumber. Venezuela can produce between 6,000 barrels of oil and 3,000 tons of lumber.

- b. They should get at least 500 barrels of oil for their 1,000 tons of lumber. Asking for more than this will result in gains from trade.
- c. This price is also beneficial for Venezuela, for if they wanted to produce 1,000 tons of lumber themselves, it would cost 2,000 barrels of oil.

- d. If Canada asks for more than 2,000 barrels of oil for their lumber, it would be cheaper for Venezuela to produce it themselves.

33. Taiwan will not be able to compete in the market with South Korea, whose economies of scale allow the production of more phones at a lower price. South Korea has no reason to pay a higher price for Taiwanese phones, and Taiwan cannot sell at South Korea's prices without taking a loss.

## Chapter 21: Globalization and Protectionism

### Self-Check Questions

1. This is the opposite case of the Work It Out in Lesson 21.1. A reduced tariff is like a decrease in the cost of production, which is shown by a rightward shift of the supply curve.
3. Trade barriers raise the prices of goods in protected industries. If those products are inputs in other industries, it raises their production costs and prices, so sales fall in those other industries. Lower sales lead to lower employment. Additionally, if the protected industries are consumer goods, their customers pay higher prices, which reduces demand for other consumer products and, thus, employment in those industries.
5. By raising incomes, trade tends to raise working conditions also, even though those conditions may not (yet) be equivalent to those in high-income countries.
7. Since trade barriers raise prices, real incomes fall. The average worker would also earn less.

9. If imports can be sold at extremely low prices, domestic firms would have to match those prices to be competitive. By definition, matching prices would imply selling under cost and, therefore, losing money. Firms cannot sustain losses forever. When they leave the industry, importers can take over, raising prices to monopoly levels to cover their short-term losses and earn long-term profits.
11. Low-income countries can compete for jobs by reducing their environmental standards to attract business to their countries. This could lead to a competitive reduction in regulations, which would lead to greater environmental damage. While pollution management is a cost for businesses, it is tiny relative to other costs, like labor and adequate infrastructure. It is also costly for firms to locate far away from their customers, which many low-income countries are.
13. Restricting imports today does not solve the problem. If anything, it makes it worse since it implies using up domestic sources of the

products faster than if they are imported. Also, the national security argument can be used to support protection of nearly any product, not just things critical to our national security. For example, there are many products, like mohair, that were protected decades ago that we have substitutes for today.

15. A free trade association offers free trade between its members, but each country can determine its own trade policy outside the association. A common market requires a common external trade policy in addition to free trade within the group. An economic union is a common market with coordinated fiscal and monetary policy.
17. Reductions in tariffs, quotas, and other trade barriers; improved transportation; and communication media have made people more aware of what is available in the rest of the world.

19. Consumers get better or less expensive products. Businesses with the better or cheaper products increase their profits. Employees of those businesses earn more income. On balance, the gains outweigh the losses to a nation.

### Review Questions

21. Tariffs, or taxes on imported goods; import quotas, which limit the number of goods that can be imported; and nontariff barriers, which cover all rules, regulations, and contracts involving imports
23. It increases the number of jobs because the gains from trade create wealth and spur on further production.
25. Trade tends to increase the average wage as workers are able to be more productive.
27. Protecting infant industries is done to give them time to develop, become efficient, and be profitable. The fear is that a new industry may be crushed by competition before it has a chance to develop a valuable new product or technology. However, once these protections are in place, industries will not relinquish them without a fight, and repeal is difficult.
29. This happens when countries compete to attract business by weakening environmental standards until all such standards have been eliminated in the bidding war.
31. If there is a war or other international conflict, countries may be unable to acquire goods through trade, so it is important that they have the capacity to produce them domestically.
33. Trade barriers have generally been reduced in recent decades.
35. Consumers gain from trade, but domestic producers can lose.
37. Sometimes, governments subsidize domestic industries that lose from trade or help workers retrain for more competitive professions.

### Critical Thinking Questions

39. The rest of the tariff is paid by the importer, in the same way that a tax is split between a consumer and producer.
41. Labor standards and working conditions reflect the income in a country. Strong labor standards are a luxury that low-income nations can't afford. If they were to mandate higher labor standards, wages would have to be reduced or prices of products raised. Given their low incomes, workers prefer wages to labor standards. Additionally, in order to remain competitive and export their goods, low-income countries don't have the luxury of enacting stricter standards.
43. It is difficult for governments to identify good candidates for infant industry protection, especially since all industries have incentives to lobby for such protection. The best examples are those that require a limited period of time to develop and become internationally competitive, after which the protection will be removed. Computers are not good candidates because the technology changes so quickly that governments will end up protecting old technologies while the industry has moved on to something better.
45. Americans would likely resent the interference of other countries.
47. If products are really unsafe, putting tariffs on them will not eliminate consumption entirely, whereas the unsafe consumer products argument might be successful.
49. Like everything else, there are diminishing marginal returns in negotiation. If all the best, most obvious policies have already been implemented, it will be more difficult to resolve the remaining issues.
51. The advent of cellular phones damaged many of the old companies that provided landline service or sold pagers and answering machines, but the cell phone was a decided improvement over the previous technology.
53. a. Trade will ultimately increase wages for workers as a group, even if some workers lose out in the short run.
- b. Competitive pressure helps industries stay strong. Blocking competition by hindering trade will ultimately weaken industries, not strengthen them.
- c. Since trade is more efficient, the same output can be achieved at a lower cost to the environment.
- d. Strong trading partners are less likely to enter into wars with each other since it would be to both countries' economic disadvantage. Similarly, a trading partner is more likely to assist in a war with a third party in order to preserve the gains from trade.

### Problems

55. a. To compute equilibriums, we set quantity demanded equal to quantity supplied and solve. For Thailand:
- $$60 - P = -5 + \frac{1}{4}P; P = 52.$$
- $Q = 8$ . For Japan:
- $$80 - P = -10 + \frac{1}{2}P; P = 60.$$
- $Q = 20$ .

- b. At the new price, Thailand will produce

$$-5 + \frac{1}{4}(56.36) = 9.09$$

cameras and demand

$$60 - 56.36 = 3.64 \text{ cameras.}$$

Japan will produce

$$-10 + \frac{1}{2}(56.36) = 18.18$$

cameras and demand

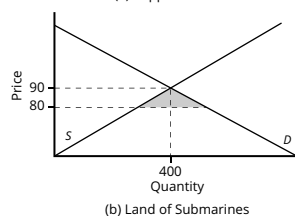
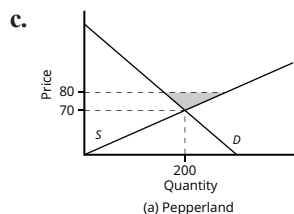
$$80 - 56.36 = 23.64 \text{ cameras.}$$

So, Japan will import at least 6 cameras ( $23.64 - 18.18$ )

from Thailand (since fractions of cameras cannot be consumed). Thailand will export those cameras.

57. a. The equilibrium occurs where quantity demanded equals quantity supplied. The equilibrium price in Pepperland is \$70, and the equilibrium quantity is 200. The equilibrium price in the Land of Submarines is \$90, and the equilibrium quantity is 400.

- b. The equilibrium price would be \$80, where the total quantity demanded across both countries equals the total quantity supplied.



- d. Pepperland exports 50 units of steel to the Land of Submarines.
- e. The quota will injure consumers in the Land of Submarines by driving the price up, but it will benefit producers. The reverse is true for Pepperland.

- f. The equilibrium level of imports is 50, so a quota of 70 would be nonbinding and have no effect.