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The Economic Problem: Scarcity and Choice

Chapter objectives:

1. Identify the three basic economic questions.
2. Distinguish between absolute advantage and comparative advantage. Relate comparative advantage to the theory that individuals can gain from specialization and exchange.
3. Explain why a production possibility frontier has a negative slope and why the slope depicts the concept of opportunity cost.
4. Interpret what is depicted by a production possibility frontier.
5. Explain why increasing opportunity costs occur and how this is shown in the production possibility frontier diagram.
6. Identify ways in which economic growth may occur.
7. Identify and distinguish how economic systems differ in their solutions to the three basic questions. State the "mistakes" to which an unregulated market system is prone.

BRAIN TEASER: You graduate from college and are offered three jobs (Job A, Job B, and Job C). Assume that they are identical in all respects (duties, benefits, promotion prospects, and so on) except that the salaries differ, as shown below:

Job A	$150,000
Job B	$120,000
Job C	$100,000

First, which of the three jobs would you choose? (No, you can't have all three!) Because you have made a choice, you have incurred an opportunity cost. What is the opportunity cost of your job choice? Comparing benefits and costs, have you made a rational choice? Why or why not?

Suppose, for a moment, that you select Job B. What is the cost of that choice? Comparing benefits and costs, have you made a rational choice? Why or why not?

Now suppose that you select Job C. What is the cost of that choice? Again, is Job C a rational choice? Why or why not?

SOLUTION: The answer to this and subsequent brain teasers will be found after our discussion of the learning objectives and before the Practice Tests.

ECONOMICS IN PRACTICE: This chapter's textbook example of economics in action in the real world centers on opportunity costs, in particular, the value we place on time. Refer to page 28 in the textbook. First, think about the costs of preparing a meal. To be sure, the price of the ingredients is one factor, but time is another. The textbook makes the point that we are often willing to trade dollars (and perhaps taste) for convenience. Can you think of two or three other examples of the same sort of trade-off in your own life? What do you consider in your decision-making process?

ANSWER: Answers will vary, of course, but fast food is an obvious example. How much more convenient it is to go through the drive-through that spend time shopping and cooking. If you use paper plates on a picnic, you're making the same sort of calculation. A trip to a (typically high-price) convenience store is another example. Many students who sign up for online classes cite "convenience" as the main reason for preferring this form of learning experience. Finally, how much more convenient is it to "google" a subject rather than visit your campus library's book stacks?

OBJECTIVE 1:
Identify the three basic economic questions.

Economics studies the production and consumption choices that are made by society and the outcomes that occur. Solutions must be found to three "basic questions": What goods should be produced? How should the goods be produced? and Who gets what is produced? Every economy must transform its scarce natural, capital, and human resources into usable production. In a complex society the opportunity to cooperate and specialize offers great scope for increased production—but decisions must be made regarding the extent of cooperation, who specializes in what, and how goods are distributed. Even Robinson Crusoe and Friday on their island must come up with answers to these questions. Wants are limitless, but resources are scarce. We are compelled to make choices. (page 26)

Opportunity Cost: Economics has to do with making choices when constraints (scarcity) are present. Constrained choice occurs, for example, when you go to the grocery store with only a $20 bill in your pocket—you have to make choices based on this limitation. Unconstrained choice would be if you were allowed to take as many groceries home as you wanted, free of charge. Sadly, though, we know there's "no such thing as a free lunch."

Practical examples of the consequences and costs of choice include: present vs. future benefits (for example, do you study hard now so that, at exam time, reviewing is easier, or do you take it easy now and sweat it before the exam?), and capital vs. consumer production (for example, should we produce taxicabs or sports cars?).

LEARNING TIP: Everyone has been confronted with some version of the following scene: A favorite grandmother lets you choose one item from two or more items (ice cream sundaes, for example) on a menu. From your viewpoint, is your chosen ice cream sundae free? Or is there an opportunity cost? If you have a range of sundaes from which to choose, what is the cost? The dollar amount of the chosen sundae? All the other sundaes you could have had? The opportunity cost is the value you place on the next most-favorite sundae.

LEARNING TIP: To calculate opportunity cost, use the "give up to get" approach. If you can determine what (next-best) choice was forgone to get your preferred selection, you have determined opportunity cost. This is most clearly seen as a movement along a production possibility frontier.

Practice

1. Which of the following statements about the operation of an economy is false? Each economy has a mechanism to determine
   (a) what is produced.
   (b) how to satisfy all of the desires of its citizens.
   (c) how much is produced.
   (d) how goods and services are distributed among its citizens.

   ANSWER: (b) Because resources are limited, the economy cannot satisfy all the desires of its citizens.

OBJECTIVE 2:
Distinguish between absolute advantage and comparative advantage. Relate comparative advantage to the theory that individuals can gain from specialization and exchange.

A producer has an *absolute advantage* in the production of Good A if, compared with another producer, she can produce Good A more efficiently. A producer has a *comparative advantage* in the production of Good A if, compared with another producer, she can produce Good A at a lower opportunity cost.

The *theory of comparative advantage* provides the rationale for free trade. In a two-country, two-good world, Ricardo showed that trading partners can benefit from specialization in the production of the good in which they have a comparative advantage. (page 27)

Specialization and trade based on comparative advantage lets each participant achieve a higher consumption level than otherwise would be possible. As shown in the graphical representation, each participant can live outside the constraints of his own production opportunities. (page 30)

LEARNING TIP: If you're like most individuals, you'll need several numerical examples to strengthen your grasp of comparative advantage. The following questions take you through all the steps included in the text. Problem 5 in the textbook is recommended.

Comparative advantage hinges on the concept of opportunity cost. The producer (person, firm, or country) with the lowest opportunity cost holds the comparative advantage in that product. Don't be misled—it is irrelevant to comparative advantage whether or not the producer can produce *more* of the good. The issue revolves around the relative opportunity costs. The increased production could be traded. In terms of a *production possibility* diagram, trade will be advantageous if the diagrams have differing slopes because differing slopes indicate differing opportunity costs.

PRACTICE: Think back to when you used to trade baseball cards or Pokemon cards in the schoolyard. Why did you trade? Did you and your trading partner necessarily benefit equally? Should that matter?
ANSWER: If you voluntarily entered into trade, presumably you did so because you thought it would be beneficial for you. Perhaps you traded a duplicate card for one you didn't have. Presumably your partner approached the deal in the same way. Just because you got a good deal didn't mean that s/he got a bad deal—both traders could gain, although there's no requirement that the traders will gain equally.

Practice

Use the following information to answer the next seven questions. George and Laura live on an island in the Caribbean. Their diet is fishes and biscuits. George can bake 20 biscuits or spear 10 fishes each day, while Laura can bake 48 biscuits or spear 12 fishes each day. For each person, costs remain constant.

2. Which of the following statements is false?
   (a) For George, the opportunity cost of 1 fish is 2 biscuits forgone.

(b) For Laura, the opportunity cost of 1 fish is 4 biscuits forgone.
(c) The opportunity cost of 1 fish is greater for Laura than for George.
(d) An increase in George's production of fish requires a decrease in Laura's production of biscuits.

ANSWER: (d) An increase in George's production of fish requires a decrease in *George's* production of biscuits. In fact, both George and Laura might choose independently to increase fish production.

3. Which of the following statements is true?
(a) For George, the opportunity cost of 1 biscuit is 2 fish forgone.
(b) For Laura, the opportunity cost of 1 biscuit is 4 fish forgone.
(c) The opportunity cost of 1 biscuit is greater for Laura than for George.
(d) The opportunity cost of 1 biscuit is greater for George than for Laura.

ANSWER: (d) For George, the opportunity cost of a biscuit is 1/2 of a fish forgone, and for Laura, the opportunity cost of a biscuit is 1/4 of a fish forgone.

4. For _____ , the opportunity cost of 1 fish is _____ biscuits forgone, which is less than the opportunity cost of 1 fish for _____ .
(a) George, 1/2, Laura
(b) George, 2, Laura
(c) Laura, 4, George
(d) Laura, 1/4, George

ANSWER: (b) For George, each fish "costs" 2 biscuits forgone. For Laura, each fish "costs" 4 biscuits forgone. Fish cost less for George to produce.

5. For _____ , the opportunity cost of 1 biscuit is _____ fish forgone, which is less than the opportunity cost of 1 biscuit for _____ .
(a) George, 1/2, Laura
(b) George, 2, Laura
(c) Laura, 4, George
(d) Laura, 1/4, George

ANSWER: (d) For George, each biscuit "costs" 1/2 of a fish forgone. For Laura, each biscuit "costs" 1/4 of a fish forgone. Biscuits cost less for Laura to produce.

6. According to the preceding information,
(a) George has a comparative advantage in the production of both goods.
(b) George has a comparative advantage in producing fish, and Laura has a comparative advantage in producing biscuits.
(c) George has a comparative advantage in producing biscuits, and Laura has a comparative advantage in producing fish.
(d) Laura has a comparative advantage in the production of both goods.

ANSWER: (b) George has a comparative advantage in the production of fish (1 fish costs 2 biscuits forgone), and Laura has a comparative advantage in the production of biscuits (1 biscuit costs 1/4 of a fish forgone). Note: Neither person can be relatively better at producing both goods!

7. Which of the following statements is false?
(a) If George spent half his time fishing and the other half baking, he could produce 10 biscuits and 5 fishes each day.

(b) If Laura spent half her time fishing and the other half baking, she could produce 24 biscuits and 6 fishes each day.
(c) If George and Laura specialized according to comparative advantage, they could produce 34 biscuits and 11 fishes each day.
(d) If George and Laura specialized according to comparative advantage, they could produce 48 biscuits and 10 fishes each day.

ANSWER: (c) George should produce fish, and he can spear 10 each day. Laura should produce biscuits, and she can bake 48 each day. Option (c) is incorrect because it fails to take account of the effects of comparative advantage.

8. George and Laura specialize according to comparative advantage and trade at a rate of 1 fish for 3 biscuits. George sells Laura 5 fish. Which of the following statements is true?
(a) George gains from trade but Laura does not, because George's opportunity cost for producing fish is greater than 3 biscuits per fish.
(b) George gains from trade but Laura does not, because George's opportunity cost for producing fish is less than 3 biscuits per fish.
(c) Both George and Laura gain from trade, because each attains a consumption level impossible without trade.
(d) Both George and Laura gain from trade, because each is able to use their resources to the maximum.

ANSWER: (c) George's opportunity cost for producing fish is less than 3 biscuits per fish, so he gains from trade. However, Laura also gains, because her opportunity cost of producing biscuits is less than 1/3 of a fish. George ends up with 5 fish and 15 biscuits and Laura ends up with 5 fish and 33 biscuits.

OBJECTIVE 3:
Explain why a production possibility frontier has a negative slope and why the slope depicts the concept of opportunity cost.

A production possibility frontier depicts the boundary between possible and impossible (unattainable) levels of production. Employing resources for one use prevents them from being employed for other uses—there is an *opportunity cost* involved in the choice. The *production possibility frontier* portrays graphically the opportunity cost of transferring resources from one activity to another in a two-good environment. If all resources are fully employed, as more of Good A is produced, fewer resources are available to produce Good B. (page 33)

Why Does the Production Possibility Frontier Slope Downward?: The production possibility frontier is the key piece of economic analysis in this chapter. It's always presented as having only two goods or bundles of goods. It slopes downward because "the more you get of one thing the less you get of the other." The more you study economics, the less time you have for other activities. The opportunity cost of an extra hour of studying economics is the value of an hour of other activities.

Graphing Pointer: Draw a graph with "study time per day" on the horizontal (X) axis and "time for all other activities per day" on the vertical (Y) axis. As you increase "study time" you must reduce "other time." Graphically, the cost of one hour of study time (the lost time for other activities) is the (negative) change in Y divided by the (positive) change in X. The slope of the ppf is the geometric representation of the opportunity cost of transferring resources from one productive activity to another.

Graphing Pointer: When drawing a production possibility frontier, remember that the frontier extends all the way from the vertical axis to the horizontal axis. It is a mistake to leave the frontier unconnected to the axes. If the frontier is not connected, it implies that an infinitely large quantity of either good could be produced, which is exactly opposite to the message that the diagram is intended to give.

Practice

9. Along the production possibility frontier, trade-offs exist because
   (a) buyers will want to buy less when price goes up, but producers will want to sell more.
   (b) even on the frontier itself, not all production levels are efficient.
   (c) at some levels, unemployment or inefficiency exists.
   (d) the economy has only a limited quantity of resources to allocate between competing uses.

   ANSWER: (d) Along the production possibility frontier, resources are fully and efficiently employed. However, because resources are scarce, an increase in the production of Good A requires that resources be taken from the production of Good B. ■

OBJECTIVE 4:
Interpret what is depicted by a production possibility frontier.

The ppf shows all the combinations of two goods that can be produced when all resources are employed efficiently. Points inside the ppf represent unemployment and/or inefficiency whereas points outside are currently unattainable. An outward movement of the ppf represents growth. Growth occurs if more resources become available or if existing resources become more productive (e.g., through better education, more efficient techniques of production, or technological innovations). (page 36)

Production Efficiency and Output Efficiency: The vision of a great volume of production, with all resources employed, is an attractive one. For this reason, it's often difficult to understand that, in serving the needs of consumers, producing the *right* goods is more important than mere quantity. This distinction lies at the heart of most confusion about production efficiency and output efficiency. Consider a remote Inuit economy that is fully employed producing refrigerators. Would it be "better" (more efficient) for the Inuits to have some unemployment but be producing warm clothing? Turning out (unwanted) refrigerators is productively efficient, whereas making warm clothing is efficient (in terms of output). Ideally, you'd want to be on the production possibility frontier (output efficiency) and also producing the most desired mix of output.

LEARNING TIP: Think of the production possibility frontier as a way to depict opportunity cost and constrained choice. In general, you want to be somewhere on the curve because otherwise you're losing production, which is inefficient. Production on the curve means that resources are being used to the maximum (no unemployment). However, the inefficiency of a mismatch between an "efficient" production mix and society's needs is easily explained—just because we're producing "on the line" doesn't mean we're meeting society's needs as effectively as possible. Employing all our resources to produce taxicabs, for example, is unlikely to be desirable!

LEARNING TIP: Suppose that, at one point on the ppf, we can produce 16 cars and 5 pickups, and at another point, we can produce 12 cars and 7 pickups. Note that the opportunity cost is calculated by looking at the *change* in production levels—the 2 extra trucks cost 4 cars.

LEARNING TIP: Reducing unemployment does not shift the ppf. Remember the underlying assumptions! The ppf is drawn *given* a set of resources (whether or not those resources are being used). Unemployment represents a situation where the resources are not fully utilized. If unemployment is reduced, the economy moves closer to the ppf.

Practice

10. Which of the following is **not** an assumption underlying the production possibility frontier?
   (a) Technological knowledge is fixed.
   (b) Resources are fully employed.
   (c) Resources are efficiently employed.
   (d) The quantity of labor resources is variable.

ANSWER: (d) When drawing a ppf, the quantity of all resources is assumed to be fixed.

11. The production possibility frontier represents
    (a) the maximum amount of goods and services that can be produced with a given quantity of resources and technology.
    (b) those combinations of goods and services that will be demanded as price changes.
    (c) the maximum amount of resources that are available as the wage level changes.
    (d) those combinations of goods and services that will be produced as the price level changes.

    ANSWER: (a) The production possibility frontier represents what it is "possible to produce" given the available resources and technology.

12. The Arbezani economy is operating at a point inside its production possibility frontier. This may be because
    (a) the economy has very poor technological know-how.
    (b) Arbez is a very small nation and can't produce much.
    (c) poor management practices have led to an inefficient use of resources.
    (d) Arbez has only a small resource base.

    ANSWER: (c) Very poor technological know-how or a small resource base will result in a production possibility frontier that is close to the origin. Fully and efficiently employed resources would still be on the production possibility frontier.

OBJECTIVE 5:
Explain why increasing opportunity costs occur and how this is shown in the production possibility frontier diagram.

Increasing opportunity costs are present when the production possibility frontier bulges outwards from the origin. Increasing costs occur if resources are not equally well suited to the production of Good A and Good B. (page 35)

LEARNING TIP: Why is the production possibility frontier bowed out? The geometry of the ppf flows from its economics. A bowed-out production possibility frontier indicates that the opportunity cost (marginal rate of transformation) is increasing as resources become more heavily allocated to the production of one good. That bowed-out shape occurs because of the imperfect adaptability of resources to different uses. A farmer wishing to produce dairy products, for example, will select the most-suited resources first, and production will increase sharply. Further increases will be less easy to achieve and more expensive in terms of lost production of other goods as resources more suited to other endeavors are pressed into dairy service. If all resources were identical in their productive abilities, the opportunity cost of reallocation would be constant, and the ppf would be a straight line (a constant slope).

Practice

13. There are increasing costs in the economy of Arbez. To portray this fact in a production possibility diagram, we should
    (a) move the ppf outwards (up and to the right).
    (b) draw the ppf bulging outwards.
    (c) shift the ppf's endpoint on the horizontal axis to the right.
    (d) shift the ppf's endpoint on the vertical axis upwards.

ANSWER: (b) The slope of the ppf represents the behavior of opportunity cost as production level changes. A straight ppf represents constant costs. To show increasing costs, the ppf is bowed outwards from the origin.

OBJECTIVE 6:
Identify ways in which economic growth may occur.

If an economy increases the quantity or quality of its resources, or if technological change or innovation increase productivity, economic growth can occur—the production possibility frontier shifts outward. (page 37)

Investment and Capital: "Investment" and "capital" are two terms with very specific meanings in economics. Beware! Investing doesn't just mean buying something. To an economist, investing means only the creation of capital. What, then, is capital? Capital refers to manufactured resources usable in production. A hammer is capital; a share of GM stock is not. A nail is capital; a dollar bill is not. Buying a hammer is capital investment; buying GM stock is not!

If this capital/noncapital distinction gives you problems, ask yourself if the purchase of the item in question increases the economy's ability to produce. If it does, it's an investment in capital.

Practice

14. France experiences an improvement in productivity due to the introduction of improved technology. In terms of France's production possibility frontier, we would show this change as
    (a) a movement along the frontier.
    (b) a shift from a point inside the frontier to a point on the frontier.
    (c) a shift from a point on the frontier to a point outside the frontier.
    (d) a shift outwards by the entire frontier.

    ANSWER: (d) France's resource base has improved in quality, so it is possible for it to produce more than it could previously.

OBJECTIVE 7:
Identify and distinguish how economic systems differ in their solutions to the three basic questions. State the "mistakes" to which an unregulated market system is prone.

The two "pure" types of economic system are the command economy and the laissez-faire economy. A *command (planned) economy* has a central agency that sets production targets, income, and prices and finds answers for the three basic questions. In a *laissez-faire (market) economy*, the three basic questions are answered through the operation of individual buyers and sellers following their own self-interest in markets.

All economies are driven by a mixture of market forces, government intervention, and regulation. Government intervention is felt to be necessary to correct laissez-faire "mistakes" such as an excessive inequality in the distribution of income and periodic spells of unemployment or inflation. (page 38)

Practice

15. The basic mechanism that coordinates activities in a laissez-faire economy is
    (a) how much customers wish to buy.
    (b) how much producers wish to sell.
    (c) price.
    (d) how much producers are able to sell.

ANSWER: (c) Price regulates market activities, reflecting the desires of both buyers and sellers.

16. Advocates comparing the performance of a pure laissez-faire system with that of a command economy would claim that a pure laissez-faire system would do all of the following EXCEPT
    (a) promote efficiency.
    (b) stimulate innovation.
    (c) achieve an equal income distribution.
    (d) be directed by the decisions of individual buyers and sellers.

    ANSWER: (c) A pure laissez-faire system, which rewards those who contribute most, would have an unequal income distribution.

BRAIN TEASER SOLUTION: Presumably, you would choose Job A. The opportunity cost is the next-best alternative given up (Job B), which is valued at $120,000. You have made a rational choice because the benefits ($150,000) outweigh the costs ($120,000).

If you select Job B, the opportunity cost is the next-best alternative given up (Job A), which is valued at $150,000. This isn't a rational choice, because you receive a benefit of $120,000 at a cost of $150,000.

If you select Job C, once again the opportunity cost is the value of Job A, which you could have chosen instead. Job C isn't a rational choice, because you receive a benefit of $100,000 at a cost of $150,000.

PRACTICE TEST

I. MULTIPLE-CHOICE QUESTIONS

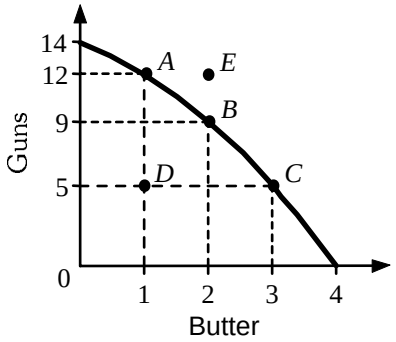
Select the option that provides the single best answer.

_____ 1. Because the nation of Arboc is operating at a point inside its production possibility frontier, it
    (a) has full employment.
    (b) has unemployed or inefficiently employed resources.
    (c) must cut output of one good to increase production of another.
    (d) will be unable to experience economic growth.

_____ 2. Arboc commits more of its resources to capital production than does Arbez. _____ should experience a(n) _____ rapid rate of economic growth.
    (a) Arboc; more
    (b) Arbez; more
    (c) Arboc; less
    (d) Both; equally

_____ 3. Which of the following does not count as a productive resource?
    (a) Capital resources, such as a tractor
    (b) Natural resources, such as a piece of farmland
    (c) Financial resources, such as a $20 bill
    (d) Human resources, such as a hairdresser

Use the following diagram to answer the next four questions.



_____ 4. Point *E* might become attainable if this economy
(a) reduces prices.
(b) reduces wages.
(c) improves the quality of its workforce.
(d) encourages emigration.

_____ 5. A movement from *A* to *B* and then to *C* indicates that
(a) the cost of additional butter is decreasing.
(b) the cost of additional guns is increasing.
(c) the economy is becoming more efficient.
(d) the cost of additional butter is increasing.

_____ 6. To move from *D* to *A* indicates that
(a) the opportunity cost would be zero.
(b) some butter would have to be given up.
(c) there would have to be an increase in the quantity of resources.
(d) the opportunity cost would be 7 guns forgone.

_____ 7. The opportunity cost of producing another unit of butter is
(a) higher at *B* than at *C*.
(b) lower at *D* than at *C*.
(c) higher at *A* than at *B*.
(d) equal at *D* and at *C*.

_____ 8. A production possibility frontier diagram illustrates all of the following concepts EXCEPT
(a) scarcity.
(b) unlimited wants.
(c) constrained choice.
(d) the marginal rate of transformation.

_____ 9. Of the following, the least serious problem for laissez-faire economies is
(a) unemployment.
(b) income inequality.
(c) inflation.
(d) satisfaction of consumer sovereignty.

Use the following production possibility table to answer the next three questions. Suppose that wheat is on the *y*-axis.

Alternative	***A***	***B***	***C***	***D***	***E***	***F***
Wheat	0	1	2	3	4	5
Tobacco	15	14	12	9	5	0

_____ 10. The marginal rate of transformation of a unit of wheat as the economy moves from *C* to *D* is
(a) 1/3 unit of tobacco production forgone.
(b) 3 units of tobacco production forgone.
(c) 9 units of tobacco production forgone.
(d) 12 units of tobacco production forgone.

_____ 11. The marginal rate of transformation of a unit of tobacco as the economy moves from *C* to *B* is
(a) 1/2 unit of wheat production forgone.
(b) 1 unit of wheat production forgone.
(c) 2 units of wheat production forgone.
(d) 12 units of wheat production forgone.

_____ 12. An output of 3 units of wheat and 7 units of tobacco indicates that
(a) this economy has poor technology.
(b) resources are being used inefficiently.
(c) tobacco is preferred to wheat.
(d) it is not possible for this economy to produce at a point on the production possibility frontier.

_____ 13. Which of the following is most likely to shift the production possibility frontier outward?
(a) A sudden expansion in the labor force
(b) An increase in stock prices
(c) A shift of productive resources from capital goods to consumer goods
(d) A general increase in the public's demand for goods

_____ 14. Which of the following is not one of the basic economic questions?
(a) What will be produced?
(b) How will it be priced?
(c) How will it be produced?
(d) Who will get what is produced?

_____ 15. Private markets work best when
(a) they are competitive.
(b) they are regulated by a government agency.
(c) a monopolist is present.
(d) consumer sovereignty is restricted.

_____ 16. Arboc has an increasing-cost production possibility frontier. Its slope must be
(a) positive and increasing.
(b) positive and decreasing.
(c) negative and increasing.

(d) negative and decreasing.

_____ 17. For Jill to have a comparative advantage in the production of pins means that, relative to Jack, with the same resources
(a) Jill is relatively better at producing pins than at producing needles.
(b) Jill is relatively better at producing both pins and needles.
(c) Jill can produce fewer needles than Jack can produce.
(d) Jill can produce more pins than Jack can produce.

_____ 18. Each of the following is a basic concern of any economic system EXCEPT
(a) the allocation of scarce resources among producers.
(b) the mix of different types of output.
(c) the distribution of output among consumers.
(d) the quality of resources allocated among consumers.

The following table shows the maximum output of each good in each country, e.g. maximum Arbezani production of goat milk is 6 units.

	Arboc	**Arbez**
Goat milk	3	6
Bananas	5	2

_____ 19. According to the preceding table,
(a) Arboc has a comparative advantage in producing both goods.
(b) Arboc has a comparative advantage in the production of bananas, and Arbez has a comparative advantage in the production of goat milk.
(c) Arboc has a comparative advantage in the production of goat milk, and Arbez has a comparative advantage in the production of bananas.
(d) Arbez has a comparative advantage in the production of both goods.

_____ 20. The nation of Regit has a bowed-out production possibility frontier with potatoes on the vertical axis and steel on the horizontal axis. A movement down along the ppf will incur _____ opportunity costs in the production of steel; a movement up along the ppf will incur _____ opportunity costs in the production of potatoes.
(a) increasing; increasing
(b) increasing; decreasing
(c) decreasing; increasing
(d) decreasing; decreasing

II. APPLICATION QUESTIONS

1. Farmer Brown has four fields that can produce corn or tobacco. Assume that the marginal rate of transformation between corn and tobacco *within* each field is constant. The maximum yields for each field are given in the following table. Field A, for instance, can produce 40 units of corn and no tobacco or, as another alternative, no corn and 10 units of tobacco.

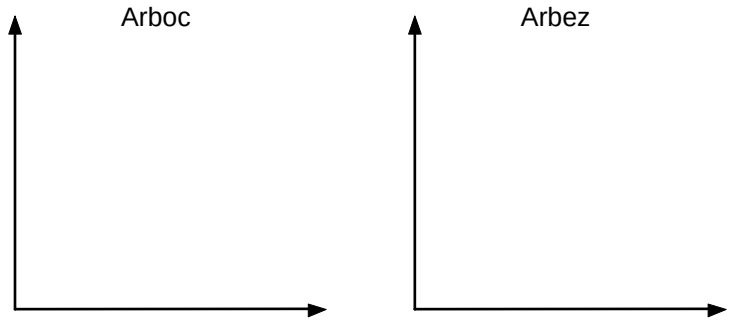
Field	**A**	**B**	**C**	**D**
Corn	40	30	20	10
Tobacco	10	20	30	40

(a) Draw Farmer Brown's production possibility frontier.
(b) To be on the production possibility frontier, what conditions must hold true?
(c) Brown is currently producing only corn: If he wants to produce some tobacco, in what order would he switch his fields from corn to tobacco production?
(d) Explain your answer to (c).

2. Two countries, Arboc and Arbez, produce wine and cheese, and each has constant costs of production. The maximum amounts of the two goods for each country are given in the following table.

Arboc	Arbez	Goods
40	120	Wine
20	30	Cheese

(a) Draw the production possibility frontier for each country.



(b) Calculate the opportunity cost of wine in Arboc and in Arbez.
(c) In which country, then, is wine production cheaper?
(d) Answer questions (b) and (c) for cheese production—remember that the opportunity costs are reciprocals of one another.

Note that Arbez has an advantage in both goods in terms of total production, but a comparative advantage only in wine production.

Now assume that Arboc becomes more efficient and can double its output of both wine and cheese.

(e) Graph the new production possibility frontier on the preceding diagram.
(f) Which good should Arboc now produce?

Suppose, instead, that Arbez has a specific technological advance that permits it to increase cheese production to a maximum of 90.

(g) Now which nation should produce wine?

3. In a national contest, the first prize is a town. The winner receives a furnished house, a general store and gasoline station, a pick-up truck, and 100 acres of land. The store comes fully stocked with everything you might find in a country general store. The town is located 100 miles from a small city. It is the shopping center for about a thousand families who live in the countryside. In addition, the road through the town is fairly well traveled. Suppose you win the contest and decide to try running the town as a business for at least a year.

(a) Describe the resources available to the economy of your town. What is the potential labor force? What are the natural resources?
(b) Describe the capital stock of your town.
(c) List some of the factors that are beyond your control that will affect your income.
(d) List some of the decisions you must make that could affect your income, and explain what their effects might be.

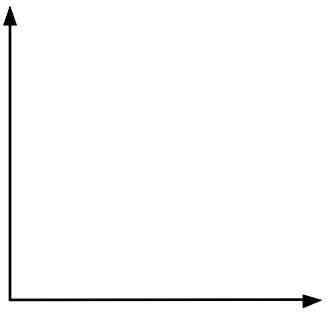
(e) At the end of the year, you must decide whether to stay or go back to college. How will you decide? What factors will you weigh in making your decision? What role do your expectations play?

4. The following data give the production possibilities of an economy that produces two types of goods, guns (horizontal axis) and butter (vertical axis).

Production Possibilities	Guns	Butter
A	0	105
B	10	100
C	20	90
D	30	75
E	40	55
F	50	30
G	60	0

(a) Graph the production possibility frontier.
(b) Explain why Point *D* is efficient, but Point *H* (30 guns and 45 units of butter) is not.
(c) Calculate the per-unit opportunity cost of an increase in the production of guns in each of the following cases.
  (i) From Point *A* to Point *B*?
  (ii) From Point *B* to Point *C*?
  (iii) From Point *E* to Point *F*?
  (iv) From Point *F* to Point *G*?
(d) Calculate the per-unit opportunity cost of an increase in the production of butter in each of the following cases.
  (i) From Point *G* to Point *F*?
  (ii) From Point *D* to Point *C*?
  (iii) From Point *C* to Point *B*?
  (iv) From Point *B* to Point *A*?
(e) Using the production possibility frontier concept, explain what will happen if this nation declares war on one of its neighbors.

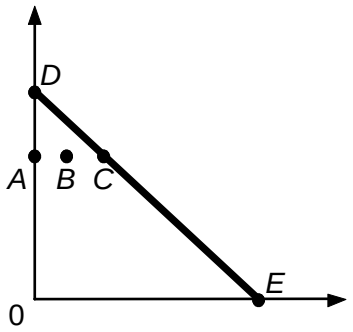
5. Draw a production possibility frontier with farm goods (*X*-axis) and manufacturing goods (*Y*-axis) on the axes. In each of the following cases, explain what will happen to the production possibility frontier.



(a) There is an increase in the unemployment rate.

(b) There is an improvement in farming techniques.
(c) There is a decrease in quantity of physical capital.
(d) The productivity of workers doubles.
(e) The government requires farmers to slaughter a portion of their dairy herds.

6. Consider the following production possibility frontier diagram.

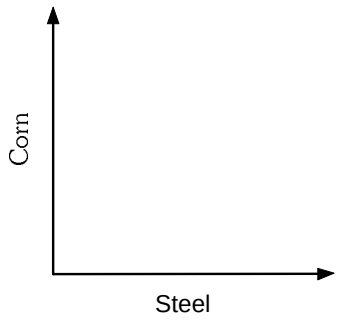


(a) Which point is "best" and which is "worst"?
(b) Now suppose that you're told that the axes measure food (horizontal) and moonshine whisky (vertical). Would your answer be different?
(c) Point *B* may be preferable to Point *D*, although Point *B* in terms of production Point *B* is less efficient. Why might it be preferable?

7. The nation of Arbez can produce two goods—corn and steel. The table shows some points on the Arbezani production possibility frontier.

Alternative	***A***	***B***	***C***	***D***	***E***	***F***
Corn	0	1	2	3	4	5
Steel	20	16	12	8	4	0

(a) Draw the production possibility frontier in the space below.



(b) Moving from Alternative *A* to *B*, *B* to *C*, and so on, calculate the opportunity cost of each additional unit of corn. Going from *F* to *E*, *E* to *D*, and so on, calculate the opportunity cost *per unit* of steel. Confirm that the pairs of values are reciprocals of each other. (This must always be true.)

Production Alternative	Opportunity Cost of 1 Unit of: Corn	Steel
A – *B*		
B – *C*		
C – *D*		
D – *E*		
E – *F*		

(c) Consider each of the following situations.
Situation *X*: Arbez is producing 4 units of corn and no steel. What is the opportunity cost of the next unit of corn? The next unit of steel?
Situation *Y*: Arbez is producing 4 units of corn and 4 units of steel. What is the opportunity cost of the next unit of corn? The next unit of steel?

(d) Why do you find a different set of answers in Situation *X* and Situation *Y*?

(e) Now consider a new situation, Situation *Z*: Arbez is producing 3 units of corn and 5 units of steel. What is the opportunity cost of the next unit of corn? The next unit of steel?

(f) Which situation (*X*, *Y*, or *Z*) is the most productively efficient and which the least productively efficient?

(g) On the Arbezani production possibility frontier, what is the cost of each unit of corn and what is the cost of each unit of steel?

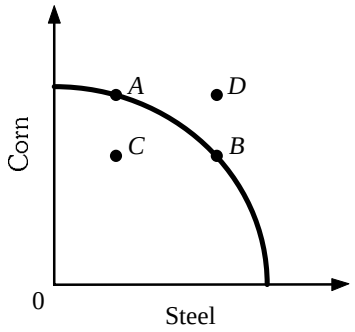
The nation of Arboc also produces corn and steel. The following table shows some points on the Arbocali production possibility frontier.

Alternative	***A***	***B***	***C***	***D***	***E***	***F***
Corn	0	1	2	3	4	5
Steel	10	8	6	4	2	0

(h) On the Arbocali production possibility frontier, what is the cost of each unit of corn and what is the cost of each unit of steel?

(i) Point to ponder: Because steel is relatively cheaper to produce in one country (which?) and corn is relatively cheaper to produce in the other country (which?), might mutually beneficial trade be possible?

8. Refer to the following diagram.



(a) Which point is unattainable?

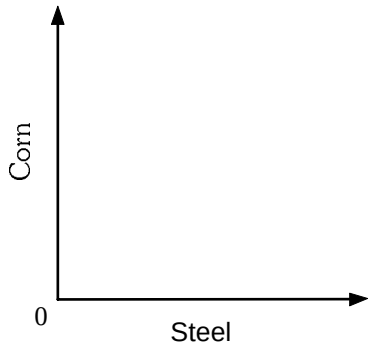
(b) To achieve this currently unattainable production combination, what must happen (two possible answers)?

(c) Which point represents unemployment or inefficiency?

(d) Will a movement from *B* to *A* increase corn production or steel production?

(e) What is the opportunity cost of moving from *C* to *B*?

9. Draw the axes of a production possibility frontier. Use corn (on the vertical axis) and steel (on the horizontal axis) as the two goods.

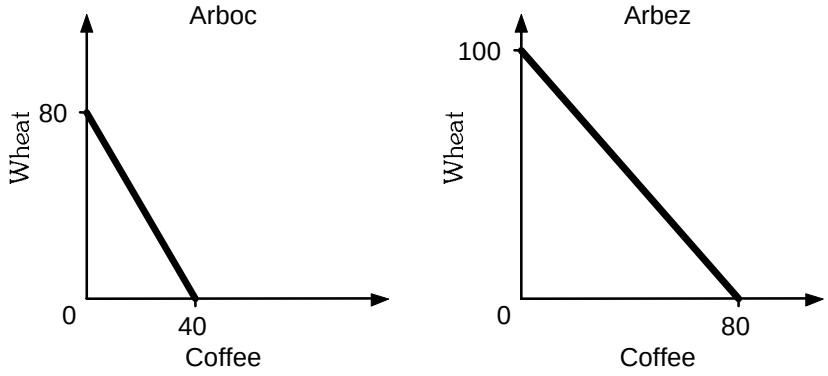


Choose a point, *A*, that represents some corn and some steel production. Suppose that this point is on the ppf—it's a maximum point. Split the diagram up into quarters, with Point *A* in the center.

(a) Is a production mix to the southwest possible?
(b) Would such a mix be efficient in terms of production efficiency?
(c) Would such a mix be efficient in terms of output efficiency?
(d) Is a move to the northeast quadrant possible? What do you know about it? Only the northwest and southeast quadrants are possible locations in which productively efficient output alternatives can occur.
(e) What would happen if the present level of corn production (at Point *A*) was reduced?

If steel production does not change, unemployment occurs. The unemployed resources can be absorbed by the steel industry and more steel can be produced. A parallel case can be made given cutbacks in steel production. Can you see how the production possibility frontier *must* have a negative slope and that it portrays the concept of opportunity cost?

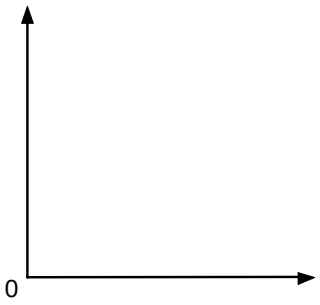
10. Use the diagrams below to answer this question.



(a) What is the opportunity cost of one unit of coffee in Arboc?
(b) What is the opportunity cost of one unit of coffee in Arbez?
(c) Which country has a comparative advantage in the production of coffee?
(d) What is the opportunity cost of one unit of wheat in Arboc?
(e) What is the opportunity cost of one unit of wheat in Arbez?
(f) Which country has a comparative advantage in the production of wheat?

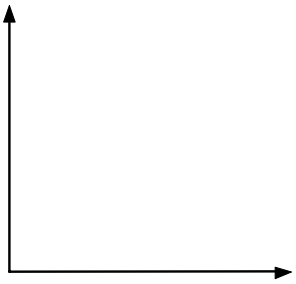
(g) *Ceteris paribus*, ignoring other issues, which good should Arboc produce and which good should Arbez produce?

11. Draw a production possibility curve. Put guns on the vertical axis and butter on the horizontal axis. Suppose that the technology for producing butter improves but the technology for producing guns does not. Describe how your diagram would change. In general, how will this technological advance affect the opportunity cost of producing guns?



12. Kara has a total of 12 hours to work on two projects. She must study for an economics test and "polish" an English composition paper. She believes that, with no studying at all, she would score 30 points on the economics test whereas, if she turned in her English paper with no extra work, it would earn 40 points. Suppose that, for each hour studying economics, she can raise her econ. score by 10 points, and that, for each hour of work on her composition, she can raise her English score by 6 points.

(a) Draw a production possibility frontier graph, showing all the points (combinations of time) that are feasible if Kara has 12 hours to allocate between economics and English. Put "hours of study for economics" on the vertical axis and "hours of study for English" on the horizontal axis.



(b) Show Point *A*, where Kara is studying 6 hours for economics and 6 hours for English.

(c) Show Point *B*, where Kara is studying 12 hours for economics and 0 hours for English.

(d) True or false? It is possible for Kara to score 100 on the economics test and at least 70 on the English paper.

(e) True or false? It is possible for Kara to score 80 on the economics test and at least 80 on the English paper.

(f) Kara decides to spend 4 hours studying for the economics test. What's the highest score she can expect to get on the English paper?

(g) If Kara is satisfied with 70 in both subjects, how many hours would she need to study in total this weekend?

(h) True or false? If Kara scored 70 on the economics test, she could have made at least 90 on the English paper.

(i) The opportunity cost of scoring 6 points higher on the English paper is a score of _____ points LOWER/HIGHER on the economics test.

(j) Draw a line (labelled EE) showing all the points that have exactly 2 hours of study time for the English paper.

13. (a) Consider the three fundamental economic questions in the context of a restaurant you're planning to open. Someone (you!) must decide what will be on the menu. Will it be Chinese, Mexican, or Italian cuisine? This is the "what to produce" question. You must also determine how your meals will be prepared and served. Will it be fast food or cordon bleu? The "for whom" question involved determining who your clientele will be. How do you advertise? Which demographic is important for you?

(b) Now consider the case of Jonah Staw. Jonah, a 29-year old advertising executive earning $140,000 annually quit his job to found Little MissMatched, a company that produces "mismatched" gloves and socks for children. What was his opportunity cost? Now do some research—you can Google Staw's name. How did he answer the three economic questions?

PRACTICE TEST SOLUTIONS

I. Solutions to Multiple-Choice Questions

1. (b) To be on the production possibility frontier, Arboc must have all of its resources fully and efficiently employed. Because it is operating inside the ppf, at least one of these conditions must have been violated.

2. (a) If Arboc produces relatively more capital, then it is expanding its resource base more rapidly and, *ceteris paribus*, it will grow more rapidly.

3. (c) Financial resources may be used to purchase real productive resources, but are not themselves productive. Note that, to an economist, "investment" is the creation of real productive capacity, not merely the purchase of stock in a company.

4. (c) To reach Point *E* the economy must grow, shifting out its production possibility frontier. This could occur if the labor force became more efficient.

5. (d) This is an increasing-cost production possibility frontier. As we increase the production of one good (butter), the cost in terms of the other good increases. In this case, a one-unit increase in butter (*A* to *B*) costs 3 guns; the move from *B* to *C* costs more (4 guns).

6. (a) Opportunity cost is defined (loosely) as the quantity of Good *B* given up to increase production of Good *A*. The quantity of butter remains at 1 unit, and gun production is increased.

7. (b) Refer to the answer to Question 6. Opportunity cost of one unit of butter is 0 at Point *D*. The opportunity cost of one unit of butter at Point *C* is 5 guns.

8. (b) The production possibility frontier depicts what it is possible to produce but nothing about what is wanted.

9. (d) Laissez-faire economies generally respond well to the needs of private consumers.

10. (b) A one-unit increase in wheat results in a three-unit decrease in tobacco production.

11. (a) A two-unit increase in tobacco results in a one-unit decrease in wheat.

12. (b) This point is inside the production possibility frontier. (We could be producing two more units of tobacco with the same amount of wheat production, for example.) This indicates that our resources are unemployed and/or inefficiently employed.

13. (a) The labor-force expansion represents an increase in productive resources. Note that the ppf depicts what can be supplied—demand is not reflected in the diagram.

14. (b) Refer to p. 25 for a discussion of the three basic questions.

15. (a) A general theme in economics is that private competition is highly efficient in providing most goods.

16. (c) With scarce resources, the production possibility frontier will *always* have a negative slope. With an increasing-cost production possibility frontier, the cost of producing one good in terms of the other accelerates as production level increases.

17. (a) Comparative advantage is a relative concept. If, relative to Jack, Jill is better at producing pins, then she has a comparative advantage in this.

18. (d) The first three answers are statements of the three "basic" questions. In any case, resources are allocated among producers, not consumers.

19. (b) The cost of one unit of goat milk in Arboc is 5/3 units of bananas whereas the cost of one unit of goat milk in Arbez is 1/3 unit of bananas. Arbez has the advantage in goat milk. One unit of bananas in Arboc costs 3/5 unit of goat milk whereas one unit of bananas in Arbez costs 3 units of goat milk. Arboc has the advantage in bananas.

20. (a) A bowed-out ppf indicates increasing costs; the costs increase whether the movement is down along the ppf or up along the ppf.

II. Solutions to Application Questions

1. (a) Your ppf should include the following points:

Corn	100	90	70	40	0
Tobacco	0	40	70	90	100

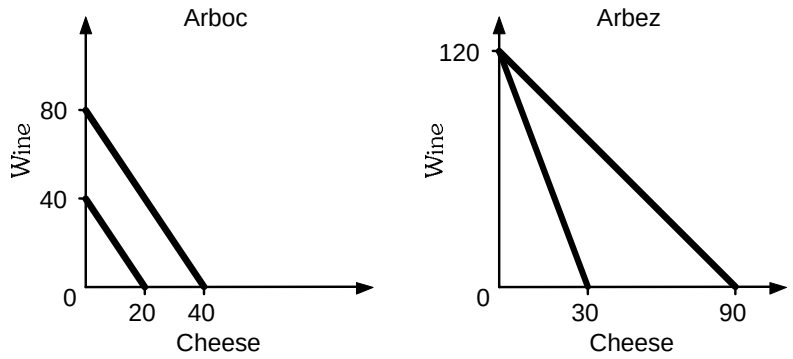
There will be a straight line between each of the points.

(b) Resources are fully employed and employed in the more efficient activity. For example, Field *A* may be producing its maximum output of tobacco, but (because the opportunity cost of tobacco production in that field is high) it should be used to produce tobacco only after the other fields have been switched over to tobacco production. If it is switched before Field *B*, for instance, Brown will be producing inefficiently and inside his ppf.

(c) *D*, *C*, *B*, *A*.

(d) Refer to the explanation for (b).

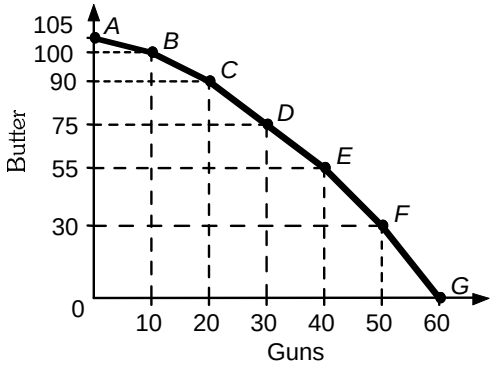
2. (a) Refer to the following diagrams.



(b) 1 wine = 1/2 cheese, 1 wine = 1/4 cheese.
(c) Arbez
(d) 1 cheese = 2 wine (Arboc), 1 cheese = 4 wine (Arbez). Arboc can produce cheese more cheaply than Arbez can.
(e) Refer to the diagrams above.
(f) Arboc should still produce cheese, as the comparative costs have not changed.
(g) Arboc. Recompute the opportunity costs. Note that the relative steepness of the ppfs has changed.

3. (a, b) This question is intended to get you to think about all of the decisions that must be made in an economic system. The owner has land, labor, and capital at his/her disposal. The capital stock includes the store, the gas station, inventories, trucks, the house, and so forth. The road is also capital even though it was produced by the government. We are not told much about the natural resources of the town. These would include the fertility of the land. The potential labor force includes some fraction of those who live nearby.
(c) The people who travel the road, the general economic circumstances of the people who live nearby, the weather, gasoline prices, the potential for competition from other stores, and so forth.
(d) What to sell, whether to advertise, what prices to change, whether to fix up the town, how many people to hire, and so forth.
(e) I will add up all the future income I will earn, net of costs. I must consider all the alternatives and my expectations about them. How much will I earn here? How much will college cost? What am I likely to earn when I have graduated from college? I also need to consider carefully the personal pleasure I will derive from the two situations.

4. (a) Refer to the following diagram.



(b) Point *D* is on the ppf, indicating full employment of resources whereas Point *H* is inside the curve, indicating underproduction and an underutilization of scarce resources.

(c) (i) 1/2 unit of butter
(ii) 1 unit of butter
(iii) 2 1/2 units of butter
(iv) 3 units of butter

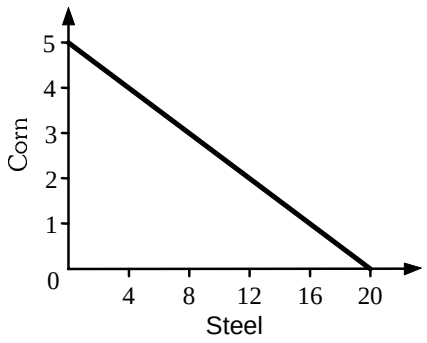
(d) (i) 1/3 of a gun
(ii) 2/3 of a gun
(iii) 1 gun
(iv) 2 guns

(e) The ppf will not shift position! We would expect the balance of production to shift in favor of guns. If unemployment exists, indicated by a bundle of goods inside the ppf, war production will shift the economy towards the ppf.

5. (a) No change in the position of the ppf.
(b) The end of the ppf on the *X*-axis will shift out. The end on the *Y*-axis will not move.
(c) The ppf would shift inwards.
(d) The ppf would shift outwards.
(e) The end of the ppf on the *X*-axis will shift in. The end on the *Y*-axis will not move.

6. (a) You might think *C* and *A* are "best" and "worst," respectively—but the question is a trap! What do we mean by "best"? Perhaps a particular point inside the ppf is better than a particular point on it. There's not enough information to give a complete answer.
(b) Clearly, all points on the production possibility frontier are not created equal, and Point *E* might be the "best" choice of those depicted.
(c) The "best" output mix depends on what best meets society's wants. If you think about it, what society *wants* isn't shown on a ppf diagram—only what can be *produced*.

7. (a) Refer to the following diagram.



(b)

Production Alternative	Opportunity Cost of 1 Unit of: Corn	Steel
A – *B*	4 steel	1/4 corn
B – *C*	4 steel	1/4 corn
C – *D*	4 steel	1/4 corn
D – *E*	4 steel	1/4 corn
E – *F*	4 steel	1/4 corn

(c) Situation *X*: 0 steel; 0 corn
Situation *Y*: 4 steel; 1/4 corn

(d) In Situation *X* there are still some unemployed (inefficiently used) resources. In Situation *Y*, Arbez is already utilizing all of its resources, and a trade-off is necessary. (Plot the points on the diagram to see the difference.)

(e) Situation *Z*: 1 steel; 0 corn

(f) Situation *Y* is the most productively efficient. Either *X* or *Z* is the least productively efficient—we don't have enough information.

(g) Each unit of corn costs 4 units of steel; each unit of steel costs 1/4 unit of corn.

(h) Each unit of corn costs 2 units of steel. Each unit of steel costs 1/2 unit of corn.

(i) Arbez; Arboc. Yes, trade can be mutually beneficial.

8. (a) *D*

(b) The economy must either grow (more resources) or experience a technological improvement.

(c) *C*

(d) Corn

(e) There is no opportunity cost; more steel is produced without any reduction in corn production. Note that there are "free lunches" if the economy is operating at an inefficient point.

9. (a) Yes

(b) No, because it is possible to produce more of each good. Also some resources are unemployed.

(c) No, not relative to Point *A*, where consumers would have more of each good available to them.

(d) It is beyond the maximum level of production, given current resources and technology.

(e) Resources would be released and transferred to steel production.

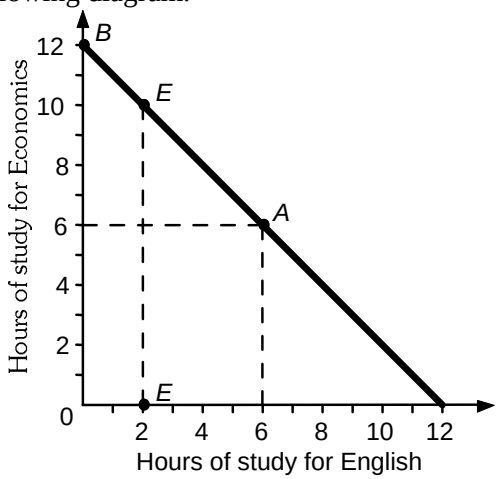
10. (a) 2 units of wheat

(b) 5/4 units of wheat

(c) Arbez
(d) 1/2 unit of coffee
(e) 8/10 unit of coffee
(f) Arboc
(g) Arboc should specialize in wheat production, and Arbez should specialize in coffee production.

11. The production possibility frontier would pivot at its "guns" endpoint and become flatter, which indicates that it is possible to produce a greater maximum quantity of butter than before, while still producing the same maximum quantity of guns. The slope of the ppf represents opportunity cost. Producing only guns means that we surrender a larger quantity of butter than before—the opportunity cost of guns has increased (and the opportunity cost of butter has decreased).

12. (a) Refer to the following diagram.



(b) Refer to the diagram above.
(c) Refer to the diagram above.
(d) True. Economics: $30 + (10 \times 7) = 100$. English: $40 + (6 \times 5) = 70$.
(e) True. Economics: $30 + (10 \times 5) = 80$. English: $40 + (6 \times 7) = 82$. If she gets 80 on the economics test, 82 is the maximum she can get on the English paper.
(f) She has 8 hours for the English paper. English: $40 + (6 \times 8) = 88$.
(g) Economics: $30 + (10 \times 4) = 70$. English: $40 + (6 \times 5) = 70$. This totals 9 hours.
(h) False. Economics: $30 + (10 \times 4) = 70$. English: $40 + (6 \times 8) = 88$.
(i) Ten points lower—an extra hour of work on the English paper will cut Kara's economics score by 10 points.
(j) Refer to the preceding diagram.

13. (a) Clearly, there are no definitive answers for the restaurant—that's why entrepreneurs are an unusual breed.
(b) Staw's opportunity cost of founding his company would include the salary he gave up (and his promotion prospects). He opted to produce deliberately mismatched products, made to his specifications by overseas textiles producers. He set up marketing deals with large retail chains such as Sears.