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Chapter 2

Check Your Understanding

1. When can an economy increase the production of one good without reducing the output of another?
Answer: When there are unemployed resources, and the economy is operating within the production possibilities frontier.

2. In which of the three basic questions facing any society does technology play the greatest role?
Answer: Technology will be most important in the how to produce question.

3. Explain the important difference between a straight line PPF and the PPF that is concave to (bowed away from) the origin.
Answer: A straight line PPF curve has constant opportunity costs, whereas the bowed out (concave to the origin) curve has increasing opportunity costs as the production of one good is increased.

4. How would unemployment be shown on the PPF?
Answer: Any time the economy is operating inside the PPF, some resources will be unemployed, thus any point inside the PPF represents unemployment.

5. List three factors that can contribute to an economy's growth.
Answer: Economies can grow through increases in the quality or quantity of labor, land, capital, and entrepreneurial activity. Increases in resources expand the PPF outward. Improvements in technological progress can increase growth in an economy.

6. How can a country that does not have an absolute advantage in producing goods still benefit from trade?
Answer: All countries can benefit from trade as long as they specialize in the production of the good in which they have a comparative advantage. All countries have a comparative advantage in producing something because comparative advantage deals with relative abilities rather than absolute abilities.

Apply the Concepts

7. China's tremendous growth rate over the past two decades has allowed its economic output to nearly catch up to that of the United States. If China continued to grow much faster than the United States, would this eventually lead to the elimination of scarcity in China?
Answer: No. Scarcity still exists in China. Growth alone does not eliminate scarcity: The PPF shifts outward, but still there are tradeoffs between products, and time is still a limited resource experienced by people and businesses in all countries, rich and poor. Economic growth typically does improve standards of living, and the level (or degree) of scarcity declines.

8. Describe how a country producing more capital goods rather than consumption goods ends up in the future with a PPF that is larger than a country that produces more consumption goods and fewer capital goods.
Answer: Capital goods are those goods used to produce other goods. Producing more capital goods represents an investment in the economy. This investment leads to the ability of the country to produce more goods and services in the future.

9. The United States has an absolute advantage in making many goods, such as short-sleeved cotton golf shirts. Why do Indonesia and Bangladesh make these shirts and export them to the United States?
Answer: Indonesia and Bangladesh, while smaller, have a comparative advantage in the production of shirts, making it profitable for both countries to specialize and ship shirts to the United States.

10. Why is it that America uses heavy street cleaning machines driven by one person to clean the streets,

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while China and India use many people with brooms to do the same job?
Answer: Both China and India have huge labor resources relative to available capital, therefore the job is done with a lot of labor and a little capital. The United States has less labor relative to capital, thus wages are higher, and capital is substituted for labor.

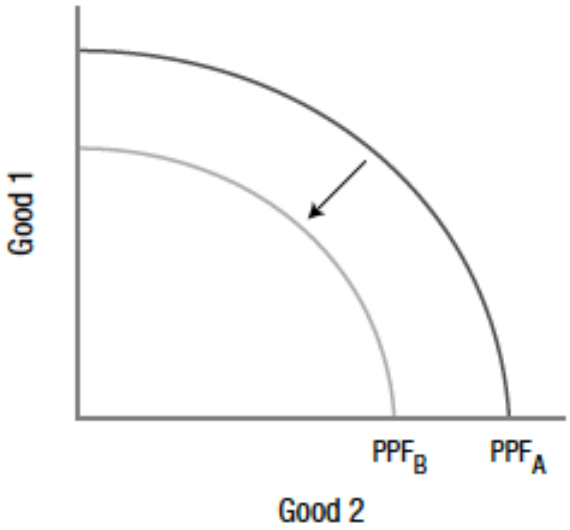
11. If specialization and trade as discussed in this chapter lead to a win-win situation in which both countries gain, why is there often opposition to trade agreements and globalization?
Answer: While trade is typically beneficial to both countries in the aggregate, individuals and groups within each country lose when their product faces competition from a country with a comparative advantage.

12. The issue of climate change has risen to the forefront of economic discussion, especially among industrialized countries such as the United States and those in Europe. Critics, however, argue that greater environmental regulations restrict economic growth. Explain how relatively wealthy countries might react differently to this tradeoff compared to poor countries.
Answer: Most economists believe there is a tradeoff between economic growth and environmental protection, simply due to the fact that it's less expensive to produce goods when one is less concerned about the environment. However, as countries become wealthier, concerns about the environment, particularly climate change, become a commodity in itself, and subsequently, greater demand for environmental protection results. In poorer countries, however, the tradeoff is often too severe, and therefore countries may forgo environmental rules in an effort to maximize their output and economic growth.

In the News

13. According to an April 4, 2015, *New York Times* report, California experienced the most severe drought in over a millennium from 2011 to 2015, when reservoirs and underground aquifers that farmers, households, and businesses depend on dried up. As a result, California's governor ordered a major cut in water usage statewide that made it harder to live and work in the Golden State. If the drought forces some households and businesses to move out of California, what might happen to California's ability to achieve economic growth? Illustrate your answer using a PPF.
Answer: The severe drought in California is a natural disaster that occurred over several years, and has reduced the productive capacity of the state. Without adequate water supplies, industries that depend on water, such as farming, experience smaller crop yields. Landscaping companies cannot keep their client's lawns green and lush. Businesses and households must pay more for water, making living in California more difficult. The loss of productive capacity is represented by the *PPF* shifting inward (from PPF_A to PPF_B), indicating a reduction in the maximum amount of goods that can be produced which will subsequently reduce economic growth.

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14. At the 2015 White House Science Fair, a $240 million private-public initiative was announced for the purpose of boosting STEM (science, technology, engineering, and math) education, as the United States continues to fall behind other industrialized nations in student achievement in these fields. How would spending on STEM initiatives today, which leads to higher costs in the near term, pay off in future benefits to the economy?
Answer: Investments in education result in an increase in long-term productivity through a more productive workforce. This is especially the case for STEM education, which is often viewed as critical for maintaining a labor force that is innovative and productive. Spending on STEM initiatives would require increased spending in the near term, which requires a tradeoff of other useful services that this money could be used for. However, in the long term, boosting STEM education allows the United States to maintain competitiveness with other countries, which have continued to increase their investment in education.

Solving Problems

15. Iceland and Denmark both produce skis and sleds. Iceland can produce 3 skis or 6 sleds using one day of labor, while Denmark can produce 4 skis or 12 sleds using one day of labor. Which country has an absolute advantage in producing skis? Sleds? Which country has a comparative advantage in producing skis? Sleds? Are gains from trade possible between Iceland and Denmark? If yes, which good should each country specialize in producing?
Answer: Denmark has an absolute advantage in the production of both goods. The opportunity cost of producing one ski in Iceland is 2 sleds, and in Denmark it is 3 sleds. Therefore, Iceland has a comparative advantage in ski production. The opportunity cost of producing one sled in Iceland is 0.5 ski, and in Denmark it is 0.33 ski. Therefore, Denmark has a comparative advantage in producing sleds. Yes, there are gains from trade if each country specializes in the good in which it has a comparative advantage and then trades with one another.

16. The table below shows the potential output combinations of oranges and jars of prickly pear jelly (from the flower of the prickly pear cactus) for Florida and Arizona.
a. Compute the opportunity cost for Florida of oranges in terms of jars of prickly pear jelly. Do the same for prickly pear jelly in terms of oranges.
b. Compute the opportunity cost for Arizona of oranges in terms of jars of prickly pear jelly. Do the same for prickly pear jelly in terms of oranges.
c. Would it make sense for Florida to specialize in producing oranges and for Arizona to specialize in producing prickly pear jelly and then trade? Why or why not?

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Florida		Arizona	
Oranges	**Prickly Pear Jelly**	**Oranges**	**Prickly Pear Jelly**
0	10	0	500
50	8	20	400
100	6	40	300
150	4	60	200
200	2	80	100
250	0	100	0

Answer:
a. Florida's opportunity cost of oranges: 2/50 = .04, or .04 jar of prickly pear jelly for each orange. The opportunity cost of a jar of prickly pear jelly: 50/2 = 25, or 25 oranges must be given up for each jar of prickly pear jelly.
b. Arizona's opportunity cost of oranges: 100/20 = 5, or 5 jars of prickly pear jelly for each orange. The opportunity cost of a jar of prickly pear jelly: 20/100 = .2, or .2 orange must be given up for each jar of prickly pear jelly.
c. Total combined output for both states will rise to 250 oranges and 500 jars of prickly pear jelly. This is larger than the sum of any two combinations available to both states. They will be able to share the excess through trade.

Using the Numbers

17. According to By the Numbers, in which period (1965–1990 or 1990–2015) did corn and soybean production increase more in terms of yield per acre?
Answer: Production of corn and soybeans increased slightly more in the 1990 to 2015 period.

18. According to By the Numbers, during the period between 1997 and 2015, in how many years did the U.S. trade balance improve from the previous year and in how many years did the trade balance deteriorate? (Assume the trade balance deteriorated from 1996 [not shown in the figure] to 1997.)
Answer: The U.S. trade balance improved in 4 of the 18 years: 2007, 2009, 2012, 2013. In all other years, the U.S. trade balance deteriorated.

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Production, Economic Growth, and Trade 2

Chapter Overview

The focus of this chapter is on the basic economic choices that must be made and on the framework for making such choices. Growth is presented in the context of a choice between the present and the future, and policies to enhance growth are discussed. International trade is analyzed and connected to growth.

Chapter Outline

Basic Economic Questions and Production
- Basic Economic Questions
  - Economic Systems
- Resources and Production
  - Land
  - Labor
  - Capital
  - Entrepreneurial Ability
- *Around the World:* Ironbridge: The Beginnings of the Industrial Revolution
- Production and Efficiency
- *Checkpoint:* Basic Economic Questions and Production
  - Production Efficiency
  - Allocative Efficiency

Production Possibilities and Economic Growth
- Production Possibilities
  - Full Employment
  - Opportunity Cost
  - Increasing Opportunity Costs
- Economic Growth
  - Expanding Resources
  - Technological Change
- Summarizing the Sources of Economic Growth
- *Issue:* Is the Ocean the Next Frontier? Land Reclamation and Underwater Cities
- *Checkpoint:* Production Possibilities and Economic Growth

Specialization, Comparative Advantage, and Trade
- Absolute and Comparative Advantage
- The Gains from Trade
- *Issue:* Do We Really Specialize in That? Comparative Advantage in the United States and China
- Limits on Trade and Globalization
- *Checkpoint:* Specialization, Comparative Advantage, and Trade

Ideas for Capturing Your Classroom Audience

- Talk about students' possessions: Where was your shirt made? What about your shoes? For a fun illustration of global trade, go to the Web site http://money.cnn.com/2008/04/03/smbusiness/birds_feathers.fsb. Here you will learn more about where Big Bird's feathers come from and the feather trade in general.
- Bring the global economy into your classroom. Visit the Web site of the *CIA Factbook* to discuss the United States and other countries in terms of resources (like population, education, health) and technology. The site includes data on Internet service providers and mobile phone use. The page for the United States (available at https://www.cia.gov/library/publications/the-world-factbook/geos/us.html) also has the menu box from which to access other countries.

Chapter Checkpoints

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Basic Economic Questions and Production

Question: The one element that really seems to differentiate entrepreneurship from the other resources is the fact that entrepreneurs shoulder the risk of failure of the enterprise. Is this important? Explain.

The point is to check that students can: differentiate between entrepreneurship and other types of resources. The question asks whether or not it seems "right" that entrepreneurs shoulder the risk of failure of the enterprise. Students may see this as a normative question. Some may make the observation that entrepreneurs (if successful) are compensated for undertaking the risk.

Production Possibilities and Economic Growth

Question: Taiwan is a small, mountainous island with 23 million inhabitants, little arable land, and few natural resources, while Nigeria is a much larger country with seven times the population, 40 times more arable land, and tremendous deposits of oil. Given Nigeria's sizable resource advantage, why is Nigeria's total annual production only half the size of Taiwan's?

The point is to check that students can: appreciate that the resources an economy has matter as much as how much of them it has. Moreover, students should understand that having a variety of resources provides an economy with more flexibility. Students will likely have some intuition that being too dependent on a few things involves a degree of risk.

Specialization, Comparative Advantage, and Trade

Question: Why do Hollywood stars (and many other rich individuals)—unlike most people—have full-time personal assistants who manage their personal affairs?

The point is to check that students can: apply the concept of opportunity cost to the use of time. Student comments may lead to a discussion about what someone's time is "worth" in terms of social value, but the point of the question is really about available alternatives and their compensation. Students are also likely to point out that people with high incomes can afford to hire others.

Debate the Issues

Issue: Is the Ocean the Next Frontier? Land Reclamation and Underwater Cities

One of the concerns with underwater cities or land reclamation is the actual ownership of the right to live in the ocean. Because international waters begin 12 nautical miles beyond a country's coastline, some have questioned whether creating underwater cities or new islands in the ocean is merely a way to acquire new territory for a country, and subsequently the resources that come from that territory such as fish, natural resources, or a strategic geographic location for military purposes. For more information see the *Wall Street Journal* story by Trefor Moss "China Official Says Island-Building Has Stopped in Disputed Seas," August 5, 2015.

Issue: Do We Really Specialize in That? Comparative Advantage in the United States and China

Learn more about the production of soybeans and other crops on the Web site of the Environmental Protection Agency at http://www.epa.gov/oecaagct/ag101/cropmajor.html.

Another great resource is the Web site of the United Soybean Board at http://www.unitedsoybean.org/.

For a twist on the issue's introduction (for instance, most people associate soy with Asian food products, but the United States is a key producer), see the story from The Economist that discusses how China (estimated to be only 5% Christian) is home to one of the world's largest producers of Bibles. It is found at http://www.economist.com/news/china/21574529-china-has-become-one-largest-producers-bibles-world-beginning-was.

Around the World: Ironbridge: The Beginnings of the Industrial Revolution

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The Industrial Revolution began with the mass production of iron, and the town of Ironbridge, England, claims to be one of the birthplaces of the Industrial Revolution. It was there that Abraham Darby built his bridge in 1781. The bridge was revolutionary in design and is still open today. The iron bridge represents a feat of engineering that led to the development of physical capital as a key factor of production. Combining all of the factors of production has allowed economic growth to flourish over the past two centuries, and this can be traced back to a small Victorian town that bears the name of its most famous landmark. The bridge has been named a UNESCO World Heritage site, and more information can be found at http://whc.unesco.org/en/list/371

Examples Used in the End-of-Chapter Questions

Question 7 references economic growth in China. For current data on China and other countries visit the Web site of the Organization for Economic Cooperation and Development (OECD) at http://www.oecd.org/
Question 12 references climate change. The website of the Organization for Economic Cooperation and Development (OECD) at http://www.oecd.org/ provides information on climate change as a global issue, including information on the 2015 Paris conference.

For Further Analysis

Analyzing the Gains from Trade and the Effect of Growth

This example can be used as an in-class small group exercise or as an individual in-class exercise. It is designed to complement the text's material on comparative advantage and the gains from trade by incorporating Figure 7 and allowing students to work through the data presented in Tables 1–3. A shift in a production possibilities curve is also included.

Learning objectives: review of the definitions of absolute advantage and comparative advantage; application of the analysis of comparative advantage and the gains from trade; analysis of the causes and effects of growth; and reinforcement of critical thinking skills.

Tips from a Colleague

Use the material in the opening pages to reinforce the information on resources and technology and their impacts on specialization and trade. Most students will have heard of Nokia and will identify it with electronics. Did you know they started out as a paper mill? See the Nokia story at http://www.nokia.com/global/about-nokia/about-us/the-nokia-story.

Visit the website of the Chemical Heritage Foundation to find the following quote:

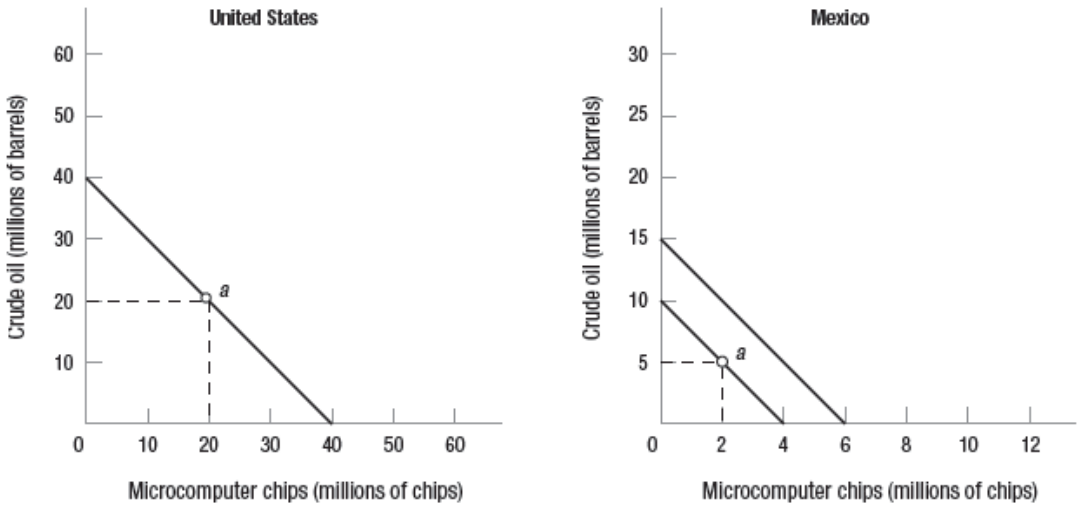
> In 1944 H. C. Meyer, then president of the Foote Mineral Company, wrote an editorial titled "The Alchemy of the Useless." He asked, "How often have we seen the useless become useful, the luxury of today become the necessity of tomorrow?" Lithium, the third element on the periodic table and the lightest metal, is a prime example of an answer to this question. It evolved from a relatively useless curiosity to an indispensable component of everyday items like pharmaceuticals and laptop batteries (http://www.chemheritage.org/discover/media/magazine/articles/30-3-ready-or-not.aspx).

Bolivia has been found to have the world's largest reserves of lithium, and the question of how to reap its benefits provides an interesting illustration of the role of government in economic development.

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HANDOUT 2-1

Date_____ Name_____ Class_____ Professor_____



Analyzing the Gains from Trade and the Effect of Growth

The figure illustrates the production possibilities for the United States and Mexico, each of which can produce crude oil and microcomputer chips. Use the figure to answer the following questions:

1) Which country has the absolute advantage in crude oil? Which country has it in microcomputer chips? Explain.

2) Which country has the comparative advantage in crude oil? Which country has it in microcomputer chips? Explain.

3) Suppose that each country is producing and consuming the combination of the two goods represented by the point labeled *a* on its production possibilities curve. Suppose further that Mexico specializes in the production of oil and then trades 5 million barrels of oil to the United States in exchange for 3.5 million computer chips. Illustrate the new combination of the two goods that can now be consumed by each country. Label the points on the graphs as *b*.

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HANDOUT 2-1 (continued)

4) Explain why each country is better off at *b* than it was at *a*.

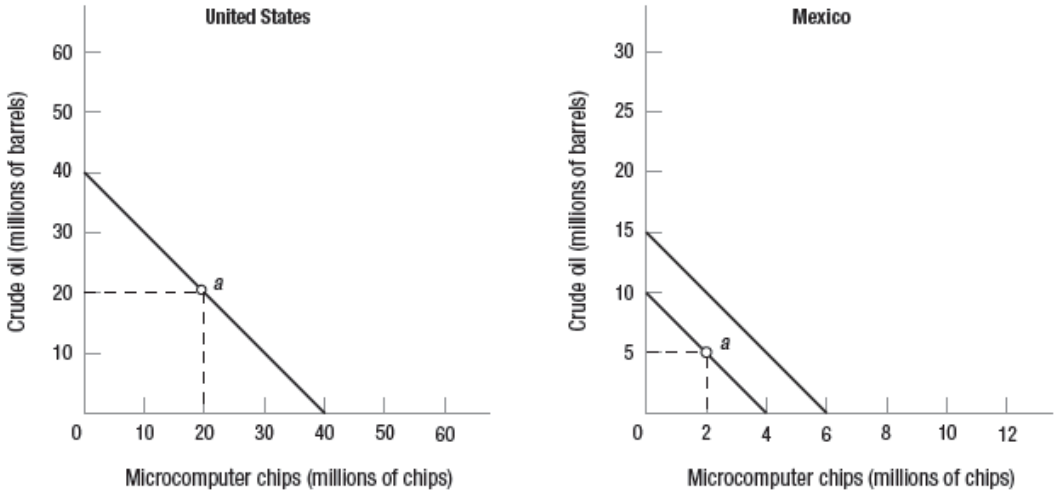
5) Suppose that Mexico experiences growth such that its production possibilities curve now has the endpoints of 15 on the vertical axis and 6 on the horizontal axis. Draw the new production possibilities curve for Mexico.

6) Explain what may have caused this growth.

7) Has Mexico's absolute advantage changed as a result of growth? Has its comparative advantage changed? Explain why or why not.

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ANSWERS TO HANDOUT 2-1



Analyzing the Gains from Trade and the Effect of Growth

The figure illustrates the production possibilities for the United States and Mexico, each of which can produce crude oil and microcomputer chips. Use the figure to answer the following questions:

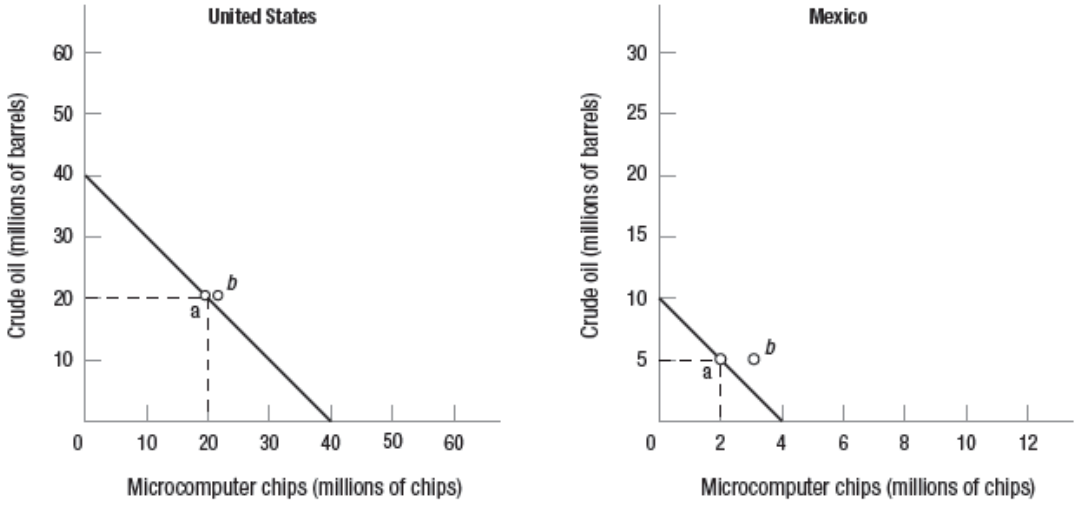
1) Which country has the absolute advantage in crude oil? Which country has it in microcomputer chips? Explain.
   The United States has the absolute advantage in both crude oil and microcomputer chips because it can produce more of each good than Mexico can.

2) Which country has the comparative advantage in crude oil? Which country has it in microcomputer chips? Explain.
   The United States has the comparative advantage in microcomputer chips because producing 1 million more chips means sacrificing 1 million barrels of crude oil. For Mexico to produce 1 million more chips means sacrificing 2.5 million barrels of crude oil. Using the same reasoning, Mexico has the comparative advantage in crude oil because producing 1 million barrels more oil means sacrificing 0.40 million of chips. For the United States to produce 1 million barrels more crude oil means sacrificing 1 million of chips.

3) Suppose that each country is producing and consuming the combination of the two goods represented by the point labeled "a" on its production possibilities curve. Suppose further that Mexico specializes in the production of oil and then trades 5 million barrels of oil to the United States in exchange for 3.5 million computer chips. Illustrate the new combination of the two goods that can now be consumed by each country. Label the points on the graphs as "b."

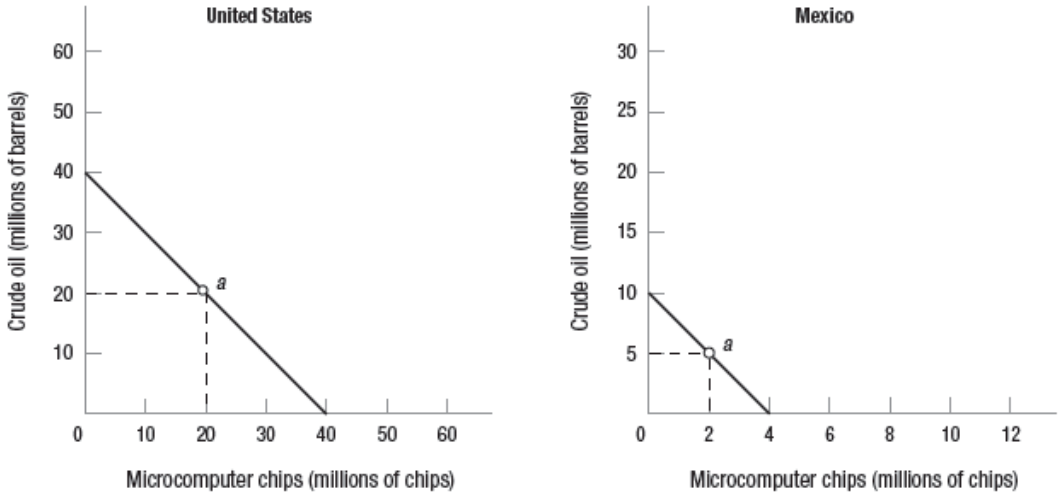
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ANSWERS TO HANDOUT 2-1 (continued)



4) Explain why *each country is better off at b than it was at a.*
Each country is better off at b than it was at a because the combinations of the two goods represent increased amounts of one good without a decreased amount of the other good.

5) Suppose that Mexico experiences growth such that its production possibilities curve now has the endpoints of 15 on the vertical axis and 6 on the horizontal axis. Draw the new production possibilities curve for Mexico.



6) Explain what may have caused this growth.
This growth could be the result of an expansion in resources or improvements in technology. The quantity or quality of labor may have changed in such a way as to allow greater production of both goods.

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ANSWERS TO HANDOUT 2-1 (continued)

7) Has Mexico's absolute advantage changed as a result of growth? Has its comparative advantage changed? Explain why or why not.

No; even with the growth Mexico still does not have the absolute advantage in either chips or crude oil because the United States still can produce more of both. Nor has its comparative advantage changed; even with the increased amounts of both goods that can be produced the opportunity cost of each good has not changed.

[OPTIONAL: Consider a change in resources and/or technology such that Mexico's PPF changes in slope. That would affect the comparative advantage because the opportunity costs would now be different.]

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