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CHAPTER 2
SPECIALIZATION AND EXCHANGE

Chapter Overview

Specialization and trade can make everyone better off. It is not surprising, then, that in an economy driven by individuals seeking to make a profit or to make the biggest difference in their communities, people specialize so as to exploit their comparative advantages. The principle is as true for countries, like Canada and China, as it is for individuals picking their careers. No government intervention is required to coordinate production. The great economic thinker Adam Smith suggested the term *invisible hand* to describe this coordinating mechanism:

> *It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their [self-interest]. . . . he intends only his own gain, and he is in this, as in many other cases, led by an invisible hand to promote an end which was no part of his intention.*
>
> *-(A. Smith, An Inquiry into the Nature and Causes of the Wealth of Nations, 1776.)*

The functioning of the invisible hand depends on a lot of other assumptions, such as free competition, full information, and many others that do not always hold true in the real world. Later in the book we will discuss these assumptions, and when they work and when they do not.

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Most people take for granted the prevalence of specialization and trade in their everyday lives. Few stop to think about the benefits and where they come from. In this chapter we tried to dig down to the bottom of the assumptions people make and expose the logic behind the gains from trade. As we proceed—especially when we return to topics like international trade and government intervention in the markets—students must remember the underlying incentive that drives people to interact with one another in economic exchanges.

Learning Objectives

LO 2.1: Construct a production possibilities graph and describe what causes shifts in production possibilities curves.
LO 2.2: Define absolute and comparative advantage.
LO 2.3: Define specialization and explain why people specialize.
LO 2.4: Explain how the gains from trade follow from comparative advantage.

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Chapter Outline

- OPENING STORY: THE ORIGINS OF A T-SHIRT
- Production Possibilities
  - Drawing the Production Possibilities Frontier **(LO 2.1)**
  - Choosing Among Production Possibilities
  - Shifting the Production Possibilities Frontier
- Absolute and Comparative Advantage
  - Absolute Advantage **(LO 2.2)**
  - Comparative Advantage
    - BOX FEATURE: FROM ANOTHER ANGLE – STORY OF MULTI-TALENTED ATHLETS
- Why Trade?
  - Specialization **(LO 2.3)**
    - BOX FEATURE: ECONOMICS IN ACTION – SPECIALIZATION SAUCE
  - Gains from Trade **(LO 2.4)**
    - BOX FEATURE: ECONOMICS IN ACTION – IS SELF-SUFFICIENCY A VIRTUE?
    - BOX FEATURE: ECONOMICS IN ACTION – TRADE AGREEMENT - CETA
  - Comparative Advantage over Time
    - BOX FEATURE: ECONOMICS IN ACTION – CALL CENTERS

Beyond the Lecture

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Class Discussion: Production Possibilities (LO 2.1)
In order to highlight the concept of the production possibilities curve, have students consider the production possibilities curve for a student deciding how to study for two exams given a fixed timeframe. This helps to highlight the concept of tradeoffs for students, as you can ask them to consider the tradeoff between grades on the two exams. Assume that the students have a fixed number of hours in one evening to study for two large exams the following day.

1. What tradeoffs does a student face when deciding how to spend their time?
2. What factors should the student consider when making the decision regarding how to study?
3. Why might different students make different decisions regarding how to spend the hours studying?

Class Discussion: Absolute and Comparative Advantage (LO 2.2)
Have students view a brief clip from the movie Tommy Boy to highlight comparative advantage, specifically from 52:26 – 55:43 (or a little longer if you prefer). In the clip, Tommy (Chris Farley) and Richard (David Spade) realize their relative strengths: Tommy is a people person and Richard is good with numbers.

1. What are Tommy's skills relative to Richard's?
2. How could they utilize their relative strengths? Do they do this in the movie?
3. How do people try to leverage their comparative advantage in reality?

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Writing Assignment: Specialization (LO 2.3)
Have students read (or listen to the audio book for) *I, Pencil* by Leonard E. Read. Ask students to write a brief essay on why no single individual can personally produce even a seemingly simple product like a pencil.

Class Activity: Gains from Trade (LO 2.4)
A simple trading exercise can highlight the concept of gains from trade for students. Bring a few bags of chips or other snacks to class and distribute them to students (you may choose only a few students for this activity in a large lecture).

1. Ask each student to rate their satisfaction with the snack you've given them on a scale from 1-10, with 1 being highly dissatisfied and ten being highly satisfied. Record their answers somewhere where all students can see.
2. Ask the students if they want to trade, and give them a few minutes to interact and exchange snacks. (Remind them that it must be voluntary—they do not have to trade if they do not wish to.)
3. Ask the students about their satisfaction again, this time with their new snack. Have the students explain any changes in their answer from before.

After trading, students should be at the very least equally as well off in terms of satisfaction as the first time they answered. This exercise can be used to highlight the gains from trade. You can also discuss the fact that the original distribution matters as well. This can tie into a number of discussions, including income distribution and comparative advantage.

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Clicker Questions

There are three main purposes to clicker questions. First, they are a great way to do a quick and instant "on demand" test of student understanding of the material. You can cover material, and instantly get feedback on student comprehension. You can see whether you need to explain certain topics again, or move on to the next subject. Second, they are a great method to break up the class and take a moment away from lecture. It gets the students actively involved. Finally, certain clicker questions can be framed in a "discussion" manner, in which you can invite students to talk about the possible right answer with their peers. You can instruct students to convince their classmate of a right or wrong answer.

1. A movement along the production possibilities frontier would imply that **[LO 2.1]**
A. firms have more labor to produce goods
B. new technology has improved production processes
C. society chose a new combination of output to produce
D. workers are taking more vacation days

2. Which of the following could cause an outward shift of the production possibilities curve? **[LO 2.1]**
A. a decrease in productivity
B. an increase in the amount of labor inputs available to firms

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C. a different choice of outputs produced by society
D. an increase in the price of final goods that society can produce

Feedback: Price increases won't shift the PPF. Remember that the PPF simply shows what we CAN produce, not necessarily what we would WANT to produce. If a good has a higher price, that doesn't automatically give us more capabilities to produce it!

3. The production possibilities frontier model illustrates which economic concept(s)? **[LO 2.1]**
A. scarcity
B. tradeoffs and choices
C. opportunity cost
D. all of the above

4. Gains from trade depend on **[LO 2.4]**
A. absolute advantage
B. comparative advantage
C. finite vs. infinite production possibilities
D. the willingness of individuals to specialize

Feedback: Trade can occur even if one person (or country) has the absolute advantage in all goods. The gains come from comparative advantage, where we take advantage of the lowest opportunity costs.

5. The United States has a lot of land. Japan has very little land area compared to the United States. Compared to Japan, what output do you think the United States would most likely have an absolute and comparative advantage in producing? **[LO 2.4]**
A. agricultural commodities
B. smart phones
C. automobiles
D. clothing

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CHAPTER 2

SPECIALIZATION AND EXCHANGE

Solutions to End-of-Chapter Questions

Review Questions

1. You've been put in charge of a bake sale for a local charity, at which you are planning to sell cookies and cupcakes. What would a production possibilities graph of this situation show? **[LO 2.1]**

   Answer: On one axis, the production possibilities graph would show the total number of cookies you could bake if you spent all of your time and resources baking cookies. The other axis would show the total amount of cupcakes you could bake if you spent all of your time and resources baking cupcakes. The two endpoints would be connected by a downward-sloping line. The slope of this line would represent the tradeoff (opportunity cost) you face between baking cookies and baking cupcakes. If you bake more cupcakes, you must bake fewer cookies. The production possibilities graph would show all of the combinations of cookies and cupcakes you could produce with your time and resources.

2. You manage two employees at a pet salon. Your employees perform two tasks: giving flea baths and grooming animals. If you constructed a single production possibilities frontier for flea baths and grooming that combined both of your employees, would you expect the production possibilities frontier to be linear (a straight line)? Explain why or why not. **[LO 2.1]**

   Answer: You would not expect a production possibilities frontier that combined both of your employees to be linear. Each worker would likely differ in her relative skills at grooming and giving flea baths and would therefore differ in the opportunity cost for performing each task.

3. You and another volunteer are in charge of a bake sale for a local charity, at which you are planning to sell cookies and cupcakes. **[LO 2.2]**

   a. What would it mean for one of you to have an absolute advantage at baking cookies or cupcakes? Could one of you have an absolute advantage at baking both items?
   b. What would it mean for you or the other volunteer to have a comparative advantage at baking cookies or cupcakes? Could one of you have a comparative advantage at baking both items?

   Answer: If you have an absolute advantage in the production of cupcakes (or cookies) it means that you can produce more cupcakes (or cookies) in total with the same amount of resources than the other volunteer. Absolute advantage is about having greater productivity. You could have an absolute advantage in baking both cupcakes and cookies.

   If you had a comparative advantage in baking cookies, it would mean that you have a lower opportunity cost (you give up fewer cupcakes for each cookie you bake) than the other volunteer. It is not possible for you to have a comparative advantage in baking both goods. If you have a

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comparative advantage in baking cookies, the other volunteer will have a comparative advantage in baking cupcakes.

4. You and another volunteer are in charge of a bake sale for a local charity, at which you are planning to sell cookies and cupcakes. Suppose you have a comparative advantage at baking cookies, and the other volunteer has a comparative advantage at baking cupcakes. Make a proposal to the volunteer about how to split up the baking. Explain how you can both gain from specializing, and why. **[LO 2.3]**

   Answer: If you have a comparative advantage in baking cookies and the other volunteer has a comparative advantage in baking cupcakes, then you should specialize in baking cookies and the other volunteer should specialize in baking cupcakes. If you spend all of your time baking cookies and the other volunteer spends all of his time backing cupcakes, you will wind up with more cookies and cupcakes between you than you would have if you each bake both goods.

5. At the flower shop, where you manage two employees, your employees perform two tasks: caring for the displays of cut flowers and making flower arrangements to fill customer orders. Explain how you would approach organizing your employees and assigning them tasks. **[LO 2.3]**

   Answer: You would have your employees specialize by caring for the displays of cut flowers to the worker who has the comparative advantage (lower opportunity cost) in doing that task. This worker should care for the flowers and switch to filling customer orders only grooming if there are orders left to do after all the cut flowers have been cared for (water changed, old blooms removed, etc.). You would assign making floral arrangements to fill customer orders to the worker who has the comparative advantage in that task. This worker should fill customer orders and switch caring for the cut flower displays only if there is such work left to do after customer orders have been filled.

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6. Suppose two countries produce the same two goods and have identical production possibilities frontiers. Do you expect these countries to trade? Explain why or why not. **[LO 2.4]**

   Answer: Assume that each country has the resources to produce any combination of two goods, we would not expect countries with the same production possibilities frontiers to trade. Identical production possibilities frontiers would indicate that the two countries faced the same opportunity costs. The basis for gains from trade is specializing according to differing opportunity costs.

7. Brazil is the largest coffee producer in the world, and coffee is one of Brazil's major export goods. Suppose that in twenty years, Brazil no longer produces much coffee and imports most of its coffee instead. Explain why Brazil might change its trade pattern over time. **[LO 2.4]**

   Answer: Brazil would change from exporting to importing coffee if its comparative advantages change. Over time, Brazil could lose its comparative advantage in coffee if its opportunity costs for growing coffee increase. If this were the case, we would expect Brazil to gain a comparative advantage elsewhere.

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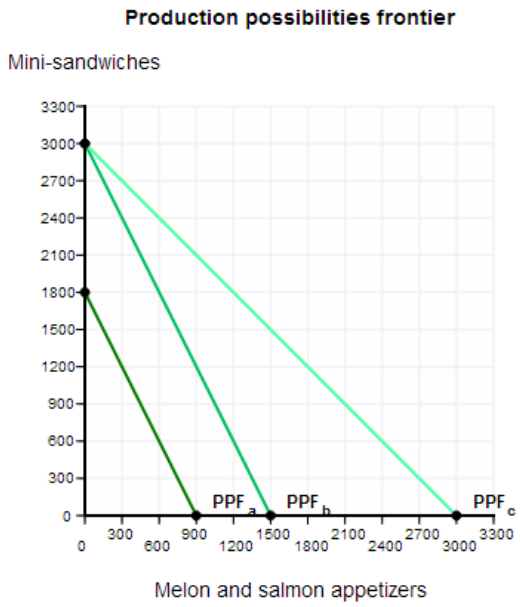
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Problems and Applications

1. Your friend Sam has been asked to prepare appetizers for a university reception. They have an unlimited amount of ingredients but only 6 hours to prepare them. Sam can make 300 mini-sandwiches or 150 servings of melon slices topped with smoked salmon and a dab of sauce per hour. **[LO 2.1]**

    a. Draw Sam's production possibilities frontier.
    b. Now suppose that the university decides to postpone the reception until after the big game, and Sam has an extra 4 hours to prepare. Redraw Sam's production possibilities frontier to show the impact of this increase in resources.
    c. Now, in addition to the extra time to prepare, suppose Sam's friend Chris helps by preparing the melon slices. Sam can now make 300 mini-sandwiches or 300 melon appetizers per hour. Redraw Sam's production possibilities frontier to show the impact of increased productivity in making melon appetizers.

Answer:



a. 300 mini-sandwiches/hr = 1,800 mini-sandwiches in 6 hours. This is the endpoint on the Y-axis. 150 melon appetizers/hr = 900 melon appetizers in 6 hours. This is the endpoint on the X-axis.
b. 300 mini-sandwiches/hr = 3,000 mini-sandwiches in 10 hours. This is the endpoint on the Y-axis. 150 melon appetizers/hr = 1,500 melon appetizers in 10 hours. This is the endpoint on the X-axis.
c. 300 mini-sandwiches/hr = 3,000 mini-sandwiches in 10 hours. This is the endpoint on the Y-axis. 300 melon appetizers/hour = 3,000 melon appetizers in 10 hours. This is the endpoint on the X-axis.

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2. Your friend Sam has been asked to prepare appetizers for the university reception. They have an unlimited amount of ingredients and 6 hours in which to prepare them. Sam can make 300 mini-sandwiches or 150 servings of melon slices topped with smoked salmon and a dab of sauce per hour. **[LO 2.1]**
    a. What is Sam's opportunity cost of making one mini-sandwich?
    b. What is Sam's opportunity cost of baking one melon appetizer?
    c. Suppose the reception has been postponed, and Sam has an extra 4 hours to prepare. What is the opportunity cost of making one mini-sandwich now?
    d. Suppose the reception has been postponed, and Sam has an extra 4 hours to prepare. What is the opportunity cost of making one melon appetizer now?
    e. Suppose Sam's friend Chris helps by preparing the melon slices, increasing Sam's productivity to 300 mini-sandwiches or 300 melon appetizers per hour. What is the opportunity cost of making one mini-sandwich now?
    f. Suppose Sam's friend Chris helps by pre-paring the melon slices, increasing Sam's productivity to 300 mini-sandwiches or 300 melon appetizers per hour. What is the opportunity cost of making one melon appetizer now?

Answer: The opportunity cost is the value of what you have to give up in order to get something. It is the value of your next-best alternative.

a. To make 1 more mini-sandwich you have to give up 1/2 melon appetizer.
b. To make 1 more melon appetizer you have to give up 2 mini-sandwiches.
c. To make 1 more mini-sandwich you still have to give up 1/2 melon appetizer. The opportunity cost has not changed.
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d. To make 1 more melon appetizer you still have to give up 2 mini-sandwiches.
e. To make 1 more mini-sandwich you have to give up 1 melon appetizer. The opportunity cost has changed.
f. To make 1 more melon appetizer you have to give up 1 mini-sandwich.

3. Suppose that Canada produces two goods: lumber and fish. It has 18 million workers, each of whom can cut 10 feet of lumber or catch 20 fish each day. **[LO 2.1]**
    a. What is the maximum amount of lumber Canada could produce in a day?
    b. What is the maximum amount of fish it could produce in a day?
    c. Write an equation describing the production possibilities frontier.
    d. Use your equation to determine how many fish can be caught if 60 million feet of lumber are cut.

Answer:

a. The maximum amount of lumber Canada could produce in a day is 10 feet x 18 million workers = *180 million* feet.
b. The maximum amount of fish Canada could produce in a day is 20 fish x 18 million workers = *360 million* fish.
c. The equation that describes this production possibilities frontier is *0.1X + 0.05Y = 18 million*, where X = the quantity of lumber produced and Y = the quantity of fish produced.
d. 0.1(60M) + 0.05 Y = 18M
   6M + 0.05Y = 18M
   0.05Y = 12M

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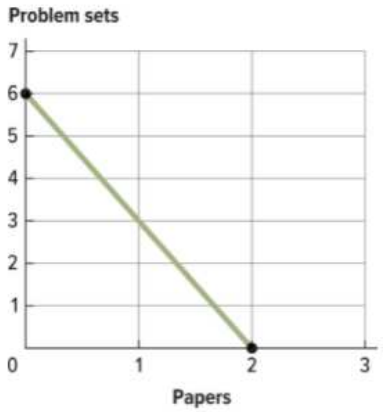
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Y = *240 million fish*

4. The graph in Figure 2P-1 shows Tanya's weekly production possibilities frontier for doing homework (writing papers and doing problem sets). **[LO 2.1]**

FIGURE 2P-1



a. What is the slope of the production possibilities frontier?
b. What is the opportunity cost of doing one problem set?
c. What is the opportunity cost of writing one paper?

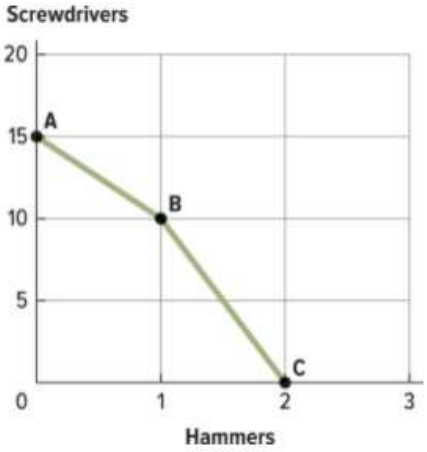
Answer:

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a. The slope of the production possibilities frontier is -(6/2) = *-3*.
b. The opportunity cost of doing one problem set is (2 papers/6 problems sets) = *1/3 paper*.
c. The opportunity cost of writing one paper is (6 problems sets/2 papers) = *3 problems sets*.

5. Use the production possibilities frontier in Figure 2P-2 to answer the following questions. **[LO 2.1]**

FIGURE 2P-2



a. What is the slope of the PPF between point A and point B?
b. What is the slope of the PPF between point B and point C?

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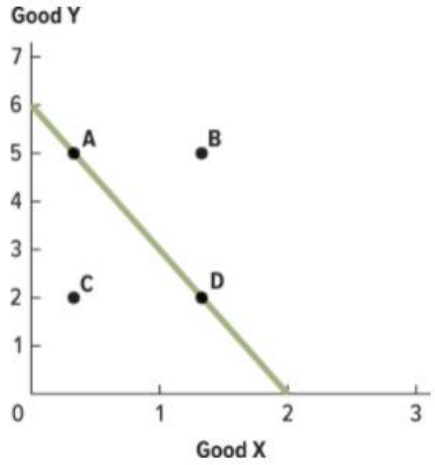
c. Is the opportunity cost of producing hammers higher between points A and B or between points B and C?
d. Is the opportunity cost of producing screwdrivers higher between points A and B or between points B and C?

Answer:

a. The slope of the production possibilities frontier between Point A and Point B is -(5/1) = -*5*.
b. The slope of the production possibilities frontier between Point B and Point C is -(10/1) = -*10*.
c. The opportunity cost of producing hammers is higher between points B and C (10 hammers) than between points A and B (5 hammers).
d. The opportunity cost of producing screwdrivers is higher between points A and B (1/5 screwdriver) than between points B and C (1/10 screwdriver).

6. For each point on the PPF in Figure 2P-3, note whether the point is attainable and efficient, attainable and inefficient, or unattainable. **[LO 2.1]**

FIGURE 2P-3



Answer: Points that lie on the frontier are called efficient, because they squeeze the most output possible from all available resources. Points within (inside) the frontier are inefficient because they do not use all available resources. Points outside the frontier are unattainable with current resources.

a. Attainable and efficient.
b. Unattainable.
c. Attainable and inefficient.
d. Attainable and efficient.

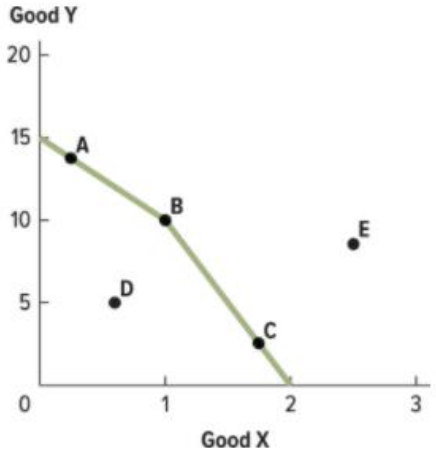
7. For each point on the PPF in Figure 2P-4, note whether the point is attainable and efficient, attainable and inefficient, or unattainable. **[LO 2.1]**

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FIGURE 2P-4



Answer: Points that lie on the frontier are called efficient, because they squeeze the most output possible from all available resources. Points within (inside) the frontier are inefficient because they do not use all available resources. Points outside the frontier are unattainable with current resources.

a. Attainable and efficient.
b. Attainable and efficient.
c. Attainable and efficient.
d. Attainable and inefficient.
e. Unattainable.

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8. Suppose that three volunteers are preparing cookies and cupcakes for a bake sale. Diana can make 27 cookies or 18 cupcakes per hour; Andy can make 25 cookies or 17 cupcakes; and Sam can make 10 cookies or 12 cupcakes. **[LO 2.2]**
   a. Who has the absolute advantage at making cookies?
   b. At making cupcakes?

   Answer: If a producer can generate more output than others with a given amount of resources, that producer has an absolute advantage. When a producer can make a good at a lower opportunity cost than other producers, we say it has a comparative advantage at producing that good.

   a. Of the three workers, Diana has the absolute advantage at making cookies. Diana can make the most cookies (27) in an hour compared with Andy (25) and Sam (10).

   b. Diana also has the absolute advantage at baking cupcakes. Diana can bake 18 cupcakes in an hour, whereas Andy can only bake 17 and Sam can only bake 12.

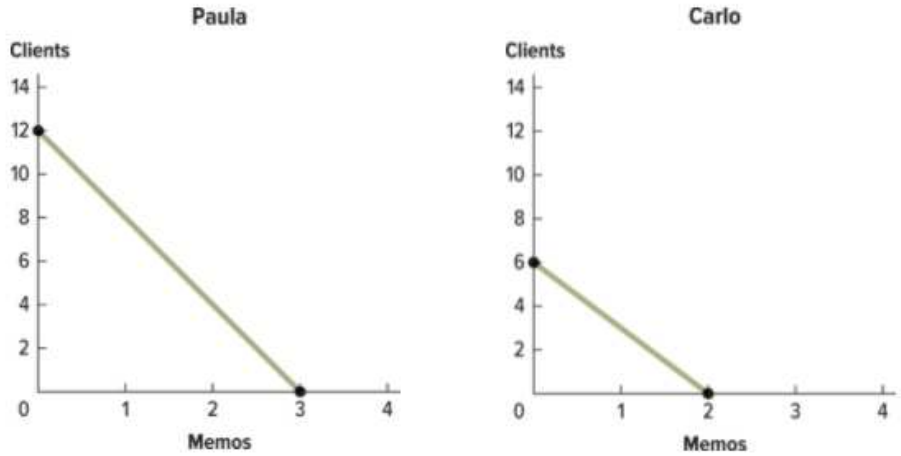
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9. Paula and Carlo are coworkers. Their production possibilities frontiers for counseling clients and writing memos are given in Figure 2P-5. **[LO 2.2]**

FIGURE 2P-5



a. Which worker has an absolute advantage in counseling clients?
b. Which worker has an absolute advantage in writing memos?
c. Which worker has a comparative advantage in counseling clients?
d. Which worker has a comparative advantage in writing memos?

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Answer: Absolute advantage is the ability to produce more of a good or service than others can with a given amount of resources. Comparative advantage is the ability to produce a good or service at a lower opportunity cost than others.

a. Paula has the absolute advantage in counseling clients because she can produce more of this service than Carlo can with a given amount of resources.
b. Paula has the absolute advantage in writing memos because she can write more of them than Carlo can with a given amount of resources.
c. Paula has the comparative advantage in counseling clients because her opportunity cost of counseling a client is 0.25 memos compared to Carlo's opportunity cost of 0.33 memos.
d. Carlo has the comparative advantage in writing memos because his opportunity cost of writing a memo is 3 counseled clients compared to Paula's opportunity cost of 4 counseled clients.

10. Two students are assigned to work together on a project that requires both writing and an oral presentation. Steve can write 1 page or prepare 3 minutes of a presentation each day. Anna can write 2 pages or prepare 1 minute of a presentation each day. **[LO 2.2]**

a. Who has a comparative advantage at writing?
b. Suppose that Steve goes to a writing tutor and learns some tricks enabling Steve to write 3 pages each day. Now who has a comparative advantage at writing?

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Answer: Absolute advantage is the ability to produce more of a good or service than others can with a given amount of resources. Comparative advantage is the ability to produce a good or service at a lower opportunity cost than others.

a. Anna has a comparative advantage at writing because they have the lower opportunity cost. Anna gives up 0.5 minutes of presentation for each page they write, whereas Steve gives up 3 minutes of presentation for each page Steve writes.

b. If Steve goes to a writing tutor and increases his productivity in writing, his opportunity costs change. If Steve is now able to write 3 pages a day, it means his opportunity cost for each page he writes is now 1 minute of presentation. However, Anna still has a comparative advantage at writing because she still only gives up 0.5 minutes of presentation for each page he writes.

11. Suppose that the manager of a restaurant has two new employees, Rahul and Henriette, and is trying to decide which one to assign to which task. Rahul can chop 20 pounds of vegetables or wash 100 dishes per hour. Henriette can chop 30 pounds of vegetables or wash 120 dishes. **[LO 2.3]**
    a. Who should be assigned to chop vegetables?
    b. Who should be assigned to wash dishes?

    Answer: Comparative advantage is the ability to produce a good or service at a lower opportunity cost than others.
    a. Henriette should chop vegetables, as she has the lower opportunity cost for chopping vegetables. Henriette's opportunity cost for chopping 1 vegetable is a loss of 4 dishes washed, whereas Rahul's opportunity cost for chopping 1 vegetable is a loss of 5 dishes washed.
    b. Rahul should be assigned to wash dishes, as she has the lowest opportunity cost for washing dishes. Rahul's opportunity cost for washing 1 dish is a loss of 0.2 vegetables chopped, whereas Henriette's opportunity cost for washing 1 dish is a loss 0.25 vegetables chopped.

12. The Dominican Republic and Nicaragua both produce coffee and rum. The Dominican Republic can produce 20 thousand tons of coffee per year or 10 thousand barrels of rum. Nicaragua can produce 30 thousand tons of coffee per year or 5 thousand barrels of rum. **[LO 2.3]**
    a. Suppose the Dominican Republic and Nicaragua sign a trade agreement in which each country would specialize in the production of either coffee or rum. Which country should specialize in coffee? Which country should specialize in producing rum?
    b. What are the minimum and maximum prices at which these countries will trade coffee?

    Answer:
    a. If the Dominican Republic and Nicaragua sign a trade agreement in which each country would specialize in production, coffee and rum will be produced according to which country has a comparative advantage in the production of each good. Comparing their opportunity costs for producing coffee, we see that Nicaragua has a lower opportunity cost for producing coffee (1/6 of a barrel of rum, versus the Dominican Republic's opportunity cost of 1/2 barrel of rum). *Nicaragua, therefore, should specialize in coffee.* Comparing their opportunity costs for producing rum, we see that the Dominican

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Republic has a lower opportunity cost for producing rum (2 tons of coffee, versus 6 tons for Nicaragua). *The Dominican Republic, therefore, should specialize in rum.*

b. The minimum price at which these countries will trade coffee is *1/6 (0.167) of a barrel of rum* and the maximum is *1/2 (0.500) of a barrel of rum*. If it's any less than 1/6, Nicaragua could produce its own coffee for less. If it's any more than 1/2, the Dominican Republic could produce its own coffee for less.

13. Eleanor and her little sister Joanna are responsible for two chores on their family's farm: gathering eggs and collecting milk. Eleanor can gather 9 dozen eggs or collect 3 litres of milk per week. Joanna can gather 2 dozen eggs or collect 2 litres of milk per week. **[LO 2.3]**
    a. The family wants 2 litres of milk per week and as many eggs as the sisters can gather. Currently, Eleanor and Joanna collect one litres of milk each and as many eggs as they can. How many dozens of eggs does the family have per week?
    b. If the sisters specialized, which sister should gather the milk?
    c. If the sisters specialized, how many dozens of eggs would the family have per week?

    Answer: Comparative advantage is the ability to produce a good or service at a lower opportunity cost than others.
    a. Eleanor's opportunity cost for collecting a gallon of milk is 3 dozen eggs. Therefore Eleanor will gather 9-3 = 6 dozen eggs. Joanna's opportunity cost for collecting a gallon of milk is 1 dozen eggs. Therefore, Joanna will gather 2-1 = 1 dozen eggs. *Together the sisters will gather 7 dozen eggs.*
    b. Joanna should specialize in collecting milk because she has the lower opportunity cost.
    c. If they specialize, Joanna will collect both litres of milk and no eggs. Eleanor will collect 9 dozen eggs and no milk. The family will now have 9 dozen eggs with their 2 litres of milk, more than they were able to have before the sisters specialized.

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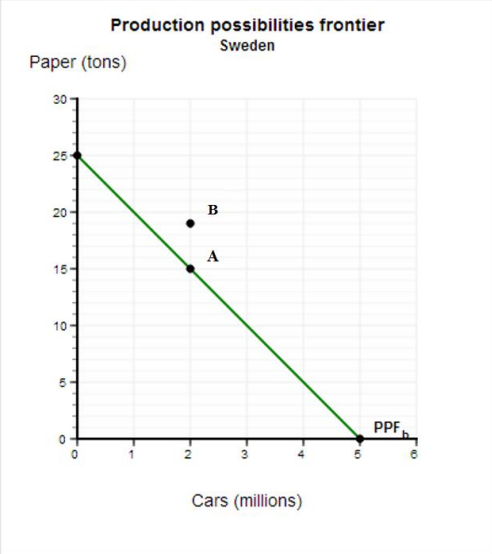
14. Suppose Russia and Sweden each produce only paper and cars. Russia can produce 8 tons of paper or 4 million cars each year. Sweden can produce 25 tons of paper or 5 million cars each year. **[LO 2.4]**
    a. Draw the production possibilities frontier for each country.
    b. Both countries want 2 million cars each year and as much paper as they can produce along with 2 million cars. Find this point on each production possibilities frontier and label it "A."
    c. Suppose the countries specialize. Which country will produce cars?
    d. Once they specialize, suppose they work out a trade of 2 million cars for 6 tons of paper. Find the new consumption point for each country and label it "B."

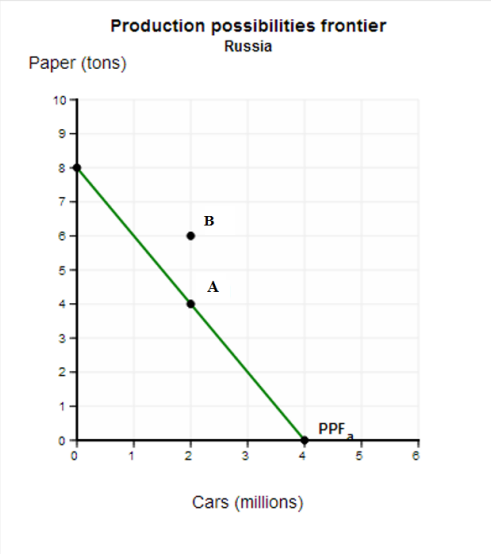
    Answer: a. and b. See graph below.

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c. Russia will produce cars because Russia has a lower opportunity cost for producing cars than Sweden.
d. Russia will produce 4 million cars and trade 2 million cars to Sweden for 6 tons of paper. Sweden will produce 25 tons of papers and trade 6 tons of paper to Russia for 2 million cars.

15. Maya and Max are neighbors. Both grow lettuce and tomatoes in their gardens. Maya can grow 45 heads of lettuce or 9 pounds of tomatoes this summer. Max can grow 42 heads of lettuce or 6 pounds of tomatoes this summer. If Maya and Max specialize and trade, the price of tomatoes (in terms of lettuce) would be as follows: 1 pound of tomatoes would cost between __ and __ heads of lettuce.

Answer: If Maya and Max specialize and trade, the price of tomatoes (in terms of lettuce) would be: 1 pound of tomatoes would cost *between 5 and 7* heads of lettuce. Maya will grow tomatoes because she has the lower opportunity cost (Maya's opportunity cost is 5 heads of lettuce for 1 pound of tomatoes, whereas Max's is 7 heads of lettuce for 1 pound of tomatoes). She must receive at least 5 heads of lettuce from Max for a pound of tomatoes or she is better off growing the lettuce herself. Max will buy tomatoes from Maya but only if she charges him no more than 7 heads of lettuce. Otherwise, Max is better off growing the tomatoes himself. If, for example, Maya charges Max 6 heads of lettuce for a pound of tomatoes both neighbors would be better off than what they can do on their own.

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