

## How to Study for Class 5    Equilibrium

Class 5 introduces the concept of equilibrium price and equilibrium quantity.

1. Begin by looking over the Objectives listed below. This will tell you the main points you should be looking for as you read the chapter.
2. New words or definitions are highlighted in italics in the text. Other key points are highlighted in bold type. Answer the questions in the text as they are asked. Then, check your answer by reading further in the text.
3. You have more work with the demand-supply graph in this chapter. In particular, **you need to differentiate a movement along the demand or supply curve and a shift in the demand or supply curve.** Be sure to go over every point so that you can see how they are derived.
4. Do the three cases involving a change in equilibrium very carefully. Go over the explanations step-by-step. Then, try the three cases at the end of the chapter. In each case, draw the graph.
5. You will be given an In Class Assignment and a Homework assignment to illustrate the main concepts of this chapter. When you have finished the text and the assignments, go back to the Objectives. See if you can answer the questions without looking back at the text. If not, go back and re-read that part of the text. Then, try the Practice Quiz for Class 5.

## Objectives for Class 5    Equilibrium

At the end of class 5, you will be able to:

1. Explain "equilibrium"? How are the equilibrium price and quantity determined?
2. If the price is above (or below) equilibrium, explain what will result?
3. Explain what will happen to the price and the quantity in each of the following cases (as well as why this will happen):
  - a. there is an increase in demand or a decrease in demand
  - b. there is an increase in supply or a decrease in supply
4. Explain what will happen to the price and the quantity in each of the following cases, as well as why it will happen:
  - a. both demand and supply rise    c. demand rises and supply falls
  - b. both demand and supply fall    d. demand falls and supply rises
5. Completely analyze the case of the rent supplement program using demand – supply analysis and the price elasticity of demand.
6. Completely analyze the case of a building subsidy program using demand – supply analysis and the price elasticity of demand.
7. Use demand – supply analysis as well as the price elasticity of demand to explain why American farmers have faced falling prices and profits over the past century.

## Class 5: Equilibrium (latest revision August 2004)

Now, we can take the two sides of the market, demand and supply, and put them together. In the graph on the next page, the demand curve and the supply curve have been superimposed on each other. They reflect the demand and supply schedules that we had before.

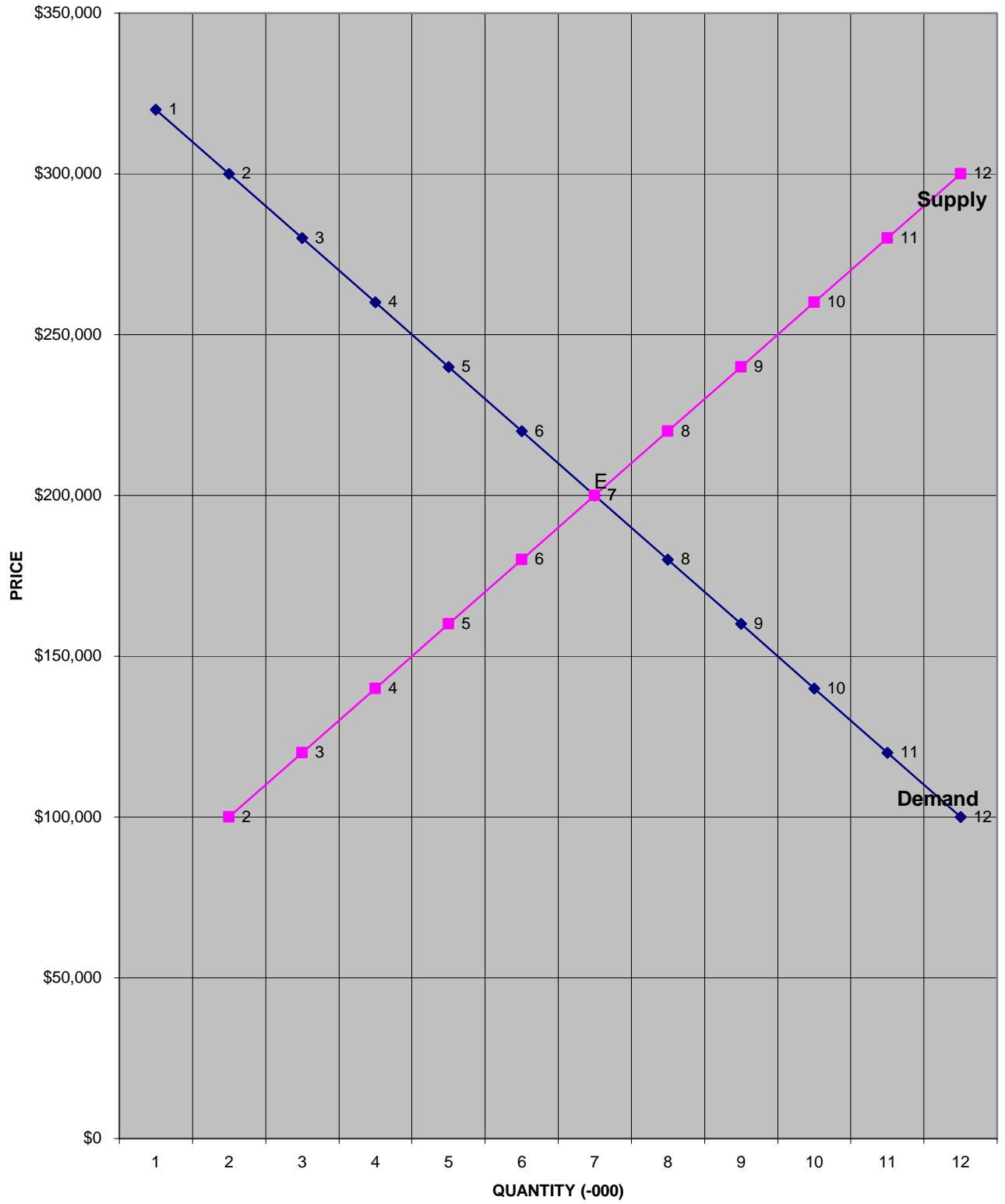
	<u>Price</u>	<u>Quantity Demanded</u>	<u>Quantity Supplied</u>
1	\$340,000	0	14,000
2	\$320,000	1000	13,000
3	\$300,000	2000	12,000
4	\$280,000	3000	11,000
5	\$260,000	4000	10,000
6	\$240,000	5000	9,000
7	\$220,000	6000	8,000
8	\$200,000	7000	7,000
9	\$180,000	8000	6,000
10	\$160,000	9000	5,000
11	\$140,000	10000	4,000
12	\$120,000	11000	3,000
13	\$100,000	12000	2,000

Assume that, for whatever reason, the price is \$300,000 per home. The demand curve tells us that buyers wish to buy 2,000 homes (point 3). The supply curve tells us sellers wish to sell 12,000 homes (point 3). We have a problem. There are 10,000 homes that sellers wish to sell that no one wishes to buy (12,000 - 2,000). This is called a **surplus**. Graphs may seem abstract, but surpluses are not. A seller knows there is a surplus by the fact that goods for sale are not selling. Resale homes go on sale and sit for months and months without any buyer making an offer. New homes have the "Grand Opening" flags out for months and even years. Eventually, sellers figure out that they must **lower the price**. As the price falls, buyers will buy more (a movement along the demand curve). Sellers may even choose to sell less at the lower price, taking homes off the market (a movement along the supply curve). The surplus becomes smaller and smaller until it disappears.

Assume instead that the price begins at \$100,000 per home. The demand curve tells us that buyers wish to buy 12,000 homes (point 13). The supply curve tells us that sellers wish to sell 2,000 homes (point 13). We have a problem. All 2,000 homes for sale will sell quickly and many more buyers will come seeking to buy. We call this a **shortage**. A shortage is also easy to recognize. Homes are to go on sale on a certain date. A week before that date, hundreds of people line up to spend a week in line. The price asked for by the sellers may have seemed a high price. Obviously it was not. As a result, **sellers raise the price**. The higher price will cause buyers to buy fewer homes (move along the demand curve). It may also induce sellers to sell more homes (move along the supply curve). The shortage becomes smaller and smaller.

At the price of \$200,000 (point 8), there is no surplus. There is also no shortage. Sellers want to sell 7,000 homes. This is exactly what buyers want to buy. There is no

## EQUILIBRIUM



reason to either lower to raise the price. We call \$200,000 *the equilibrium price*. We call 7,000 homes *the equilibrium quantity*. The demand and the supply are equal. All forces affecting the price or quantity are in balance; there is no tendency to change!

### Changes in Equilibrium

**Case 1:** Assume that we begin with a market for homes in equilibrium. Then, something changes. Let us assume that **income rises**. How do we analyze this case?

**Case 2:** Again, assume that there is a market for homes that begins in equilibrium. In this case, the change that occurs is **an increase in the price of wood**. How do we analyze this case?

**Case 3:** Again, assume that the market for homes begins in equilibrium. In this case, the change that occurs is that **buyers and sellers both expect the price to rise soon**. How do we analyze this case?

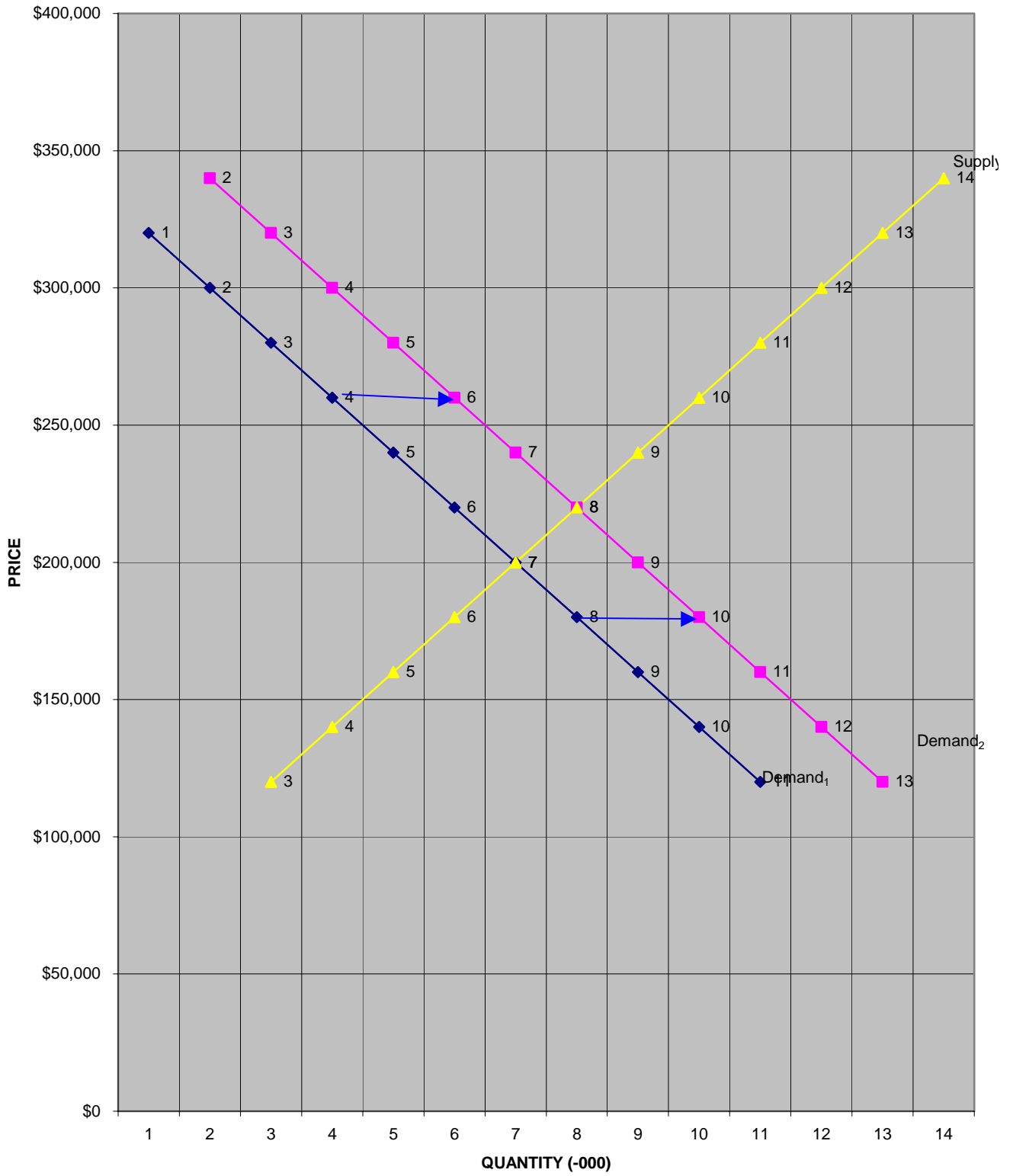
**Case 1:** Does income affect demand or supply? The answer, as we saw in the last chapter, is demand. Will there be a shift or movement along demand? The answer is shift, because the change is caused by something other than the price. Is the shift right or left? The demand will increase, which is a shift to the right. The data below are repeated from the last class.

<u>If the price is:</u>	<u>The quantity demanded is:</u>		<u>The quantity supplied is</u>
	<u>Income = \$50,000</u>	<u>Income = \$100,000</u>	
1 \$340,000	0	2000	14000
2 \$320,000	1000	3000	13000
3 \$300,000	2000	4000	12000
4 \$280,000	3000	5000	11000
5 \$260,000	4000	6000	10000
6 \$240,000	5000	7000	9000
7 \$220,000	6000	8000	8000
8 \$200,000	7000	9000	7000
9 \$180,000	8000	10000	6000
10 \$160,000	9000	11000	5000
11 \$140,000	10000	12000	4000
12 \$120,000	11000	13000	3000

Just looking at the data and at the graph on the next page tells us that there will be a new equilibrium price and quantity. **The equilibrium price will rise to \$220,000 and the equilibrium quantity will rise to 8,000 homes.** With the aid of the numbers and the graph, we can explain what occurs. Buyers wish to buy more homes (9000) at the price of \$200,000 per home because they have more income. But there are no more homes to buy (7000). This causes a shortage to result (a shortage of 2000 homes). Recognizing the shortage, sellers will raise the price (from \$200,000 to \$220,000). As the price rises, sellers will desire to sell more homes (from 7000 homes to 8000 homes). And the quantity demanded will fall from 9000 homes back to 8000 homes. The shortage will be eliminated.

# DEMAND SHIFTS TO THE RIGHT

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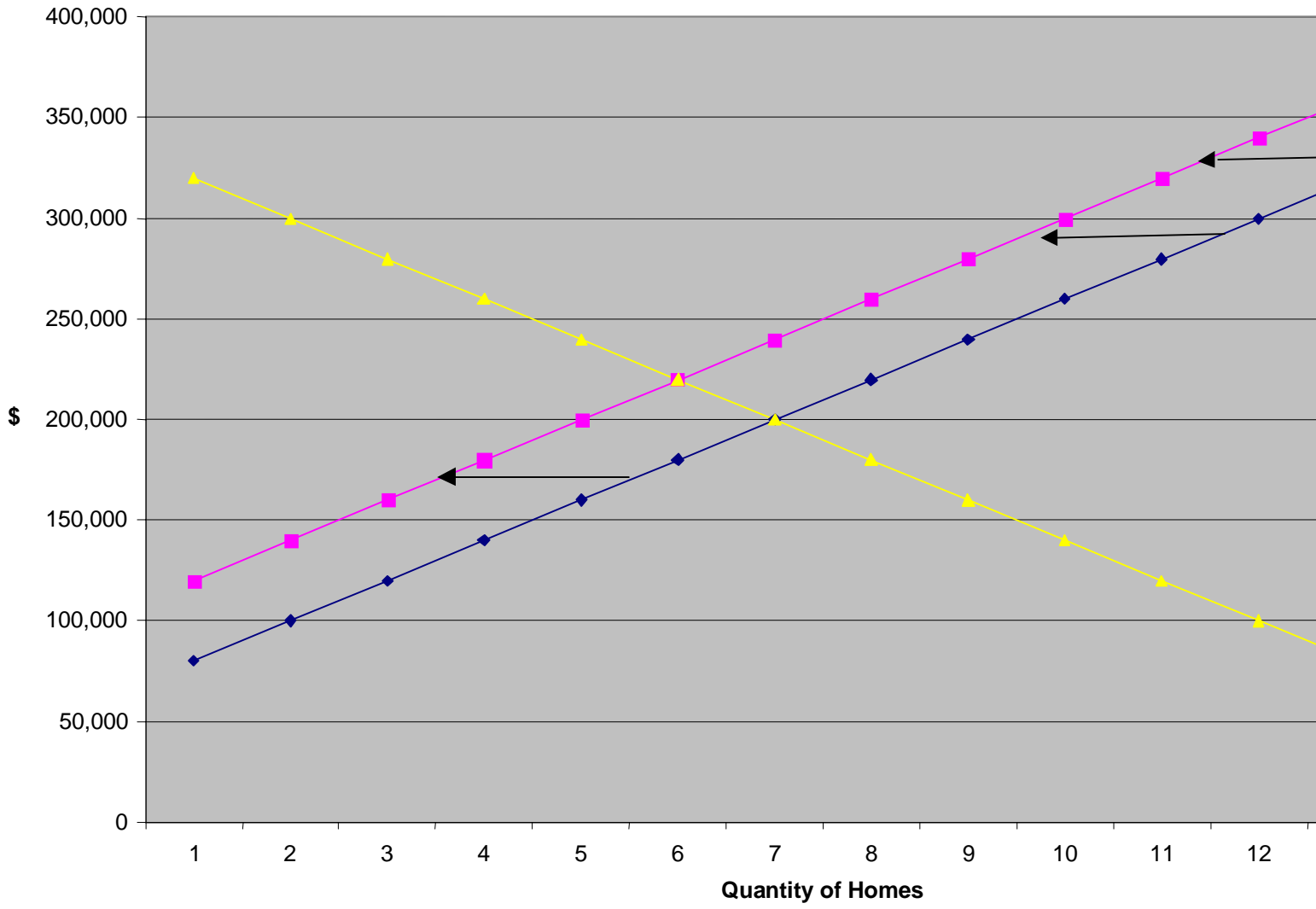
**Case 2:** Since wood is used to build homes, this is **an increase in a cost of production**. Do costs of production affect the demand or the supply? The answer is supply. Will there be a shift in or movement along the supply? The answer is a shift, since the cause is something other than the price of the product. Will the shift be right or left? Since costs are increasing, **supply will decrease --- a shift to the left.**

**If the price is:    quantity demanded is:    quantity supplied is:    new quantity supplied is:**

1	\$340,000	0	14000	12000
2	\$320,000	1000	13000	11000
3	\$300,000	2000	12000	10000
4	\$280,000	3000	11000	9000
5	\$260,000	4000	10000	8000
6	\$240,000	5000	9000	7000
7	\$220,000	6000	8000	6000
8	\$200,000	7000	7000	5000
9	\$180,000	8000	6000	4000
10	\$160,000	9000	5000	3000
11	\$140,000	10000	4000	2000
12	\$120,000	11000	3000	1000

From looking at the numbers and the graph on the next page, you can see that **the price of homes will rise to \$220,000 while the quantity of home will fall to 6,000**. With the aid of the numbers and the graph, we can explain what occurs. As costs rise, selling homes becomes less profitable. Sellers wish to sell fewer homes (shift from Supply<sub>1</sub> to Supply<sub>2</sub> --- from 7000 homes to 5000 homes). But, buyers still want the same number of homes (7000 homes). The result is the creation of a **shortage** (of 2000 homes). Recognizing the shortage, sellers will raise the price (from \$200,000 to \$220,000). As the price rises, buyers will buy fewer homes (from 7,000 to 6,000) while the quantity supplied will rise from 5000 homes to 6000 homes. The shortage will be eliminated.

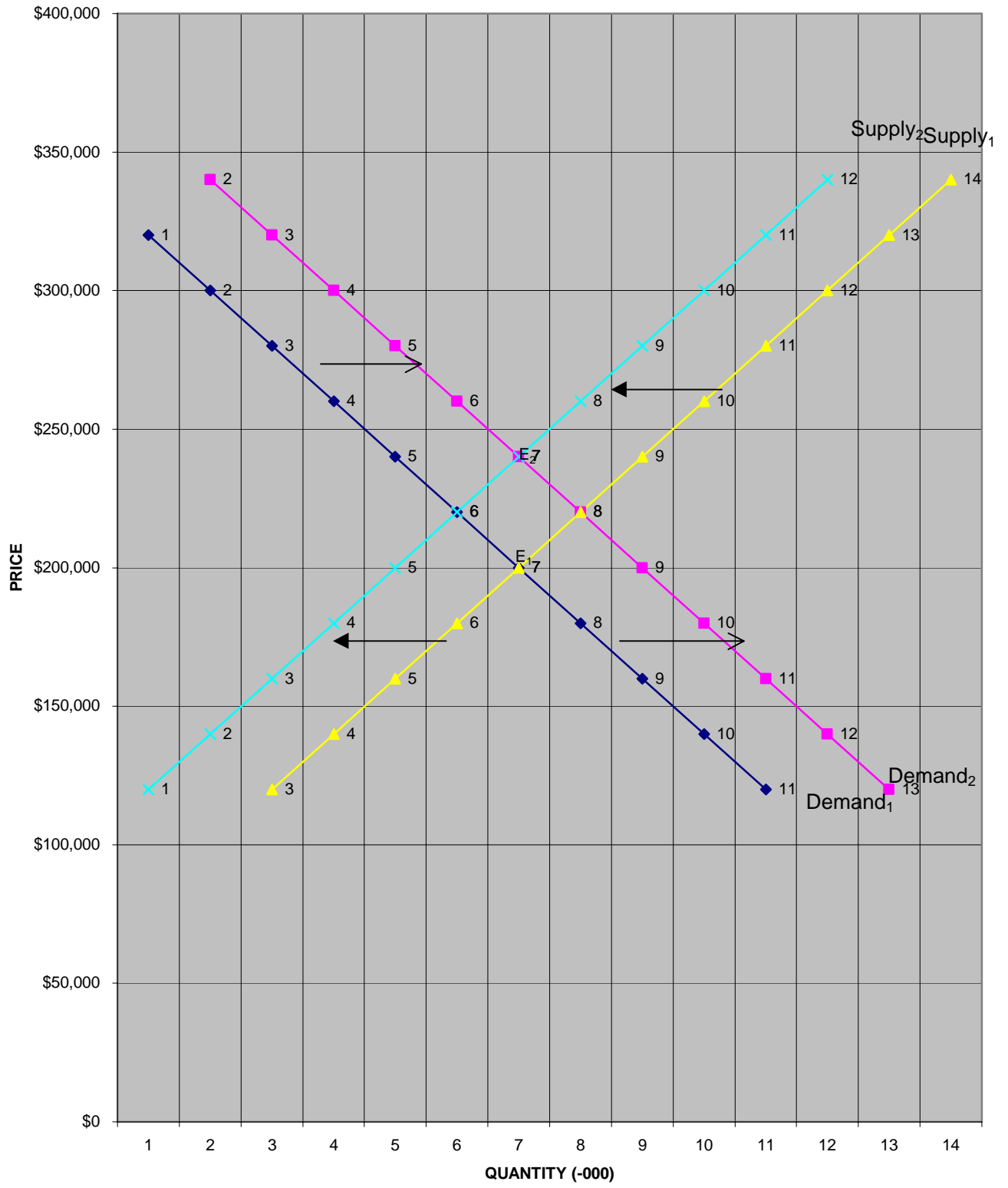
### Case 2: Supply Shifts Left



**Case 3:** In this case, both buyers and sellers are affected. Since the case involves expectations, both the demand curve and the supply curve will shift. **The demand curve shifts to the right because buyers will want to buy more homes now. The supply curve shifts to the left because sellers will not want to sell their homes until the price they will receive rises.** As shown in the graph, if the demand curve shifts to the right and the supply curve shifts to the left, **we know without doubt that the price of homes will rise. But we cannot say definitively what will happen to the quantity of homes.** By itself, an increase in the demand for homes will make the quantity of homes rise. By itself, a decrease in the supply of homes will make the quantity of homes fall. If both happen simultaneously, we cannot know what will happen to the quantity of homes unless we know which of the two shifts is greater.

SHIFTS IN BOTH DEMAND AND SUPPLY

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### Test Your Understanding

1. On the graph, show the demand and the supply for the stock of the Time Warner Company (a producer of entertainment, cable systems, etc.). Label all axes and curves. Show the equilibrium price as \$60 and the equilibrium quantity as 100,000.

Then, America On Line (AOL) offers to buy Time Warner stock in the near future at a price of \$100. As a result, **both buyers and sellers of this stock expected the price to rise to \$100 soon**. Show the result of these changes in expectations on the graph below. Label the new curves and the new equilibrium.

When the new equilibrium is reached, the price will have \_\_\_\_\_ and the quantity of shares bought and sold will have \_\_\_\_\_ (Answer "risen", "fallen", or "cannot be determined")

2. Pick out the stock of a particular company (any company). Find the value of the stock of that company in the most recent week. You will find this information either in a newspaper or on the Internet. Then, find the value of that stock one year ago (or as close to that date as you can).

Value Now \$ \_\_\_\_\_

Value Then \$ \_\_\_\_\_

You will need to do some research as to what has been happening concerning this company. You know that the price is affected by the demand for and the supply of that stock. Demanders are those who wish to buy the stock. Suppliers are those who own the stock and are considering selling. There are six possible determinants of the demand and four possible determinants of the supply. Based on your research, explain what might be responsible for the change in the price you have discovered. **Show your reasoning on the demand – supply graph.**

### Case Using Demand and Supply Analysis

Assume there is a well-defined geographic area of a city. The area is composed exclusively of apartments and is populated by low-income residents. The people who live in the area tend to stay in that area because (1) they cannot afford to live in other areas of the city, (2) they prefer to live with people of their own ethnic group, or (3) there is discrimination against them in other areas of the city. Rents paid are a very high percent of peoples' incomes.

(1) Would the **demand** for apartments in this area be relatively inelastic or relatively elastic? State why.

(2) Draw the demand and supply curves as you have described them, showing the initial equilibrium price and quantity. Label carefully.

(3) Now assume the government creates a **rent supplement program**. Under this program, the renter is required to pay 30% of income in rent. Any additional rent is paid by the government --- up to a limit. For example, a low-income person with an income of \$500 a month would be required to pay \$150 in rent (30%). If the rent is \$350, the other \$200 would be paid by the government. Analyze the results of this program. Show the changes on the graph and explain what will result. Who gains and who loses from this program?

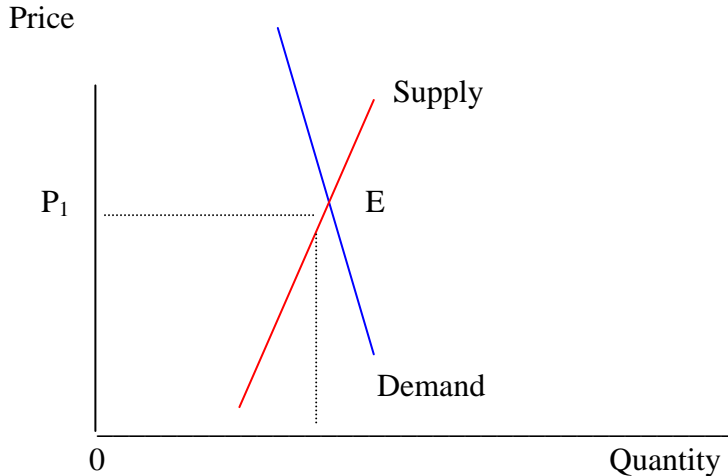
(4) Instead, now assume that the government decides to provide a **building subsidy** to people who build apartments in this low-income area. A certain percent of their costs will be paid by the government. Analyze the results of this program. Show the results on the graph and explain what will result.

(1) Would the demand for apartments in this area be relatively inelastic or relatively elastic? State why.

**Answer:** The demand would be relatively inelastic because there are few substitutes for the apartments in this area. However, you might argue that demand would be relatively elastic because the rent is a high proportion of the renters' incomes. A raise in rent could cause renters to leave the city altogether or to have to live on the streets.

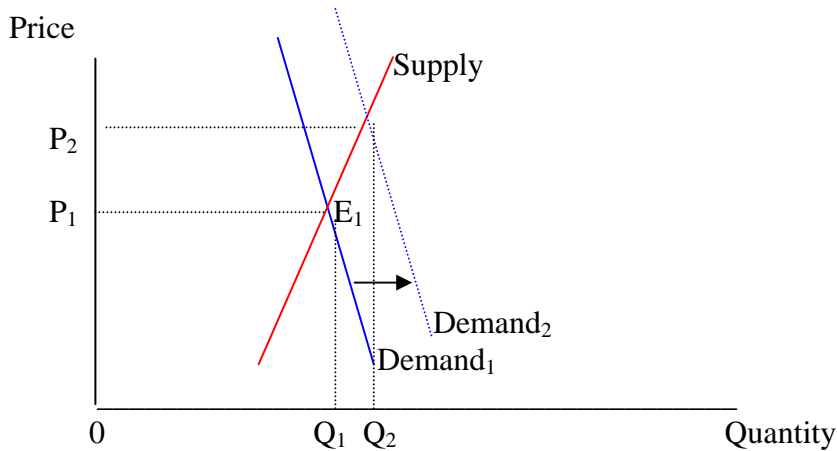
(2) Draw the demand and supply curves as you have described them, showing the initial equilibrium price and quantity. Label carefully.

**Answer:** The demand should be drawn as steep (unless you argued that demand was relatively elastic).



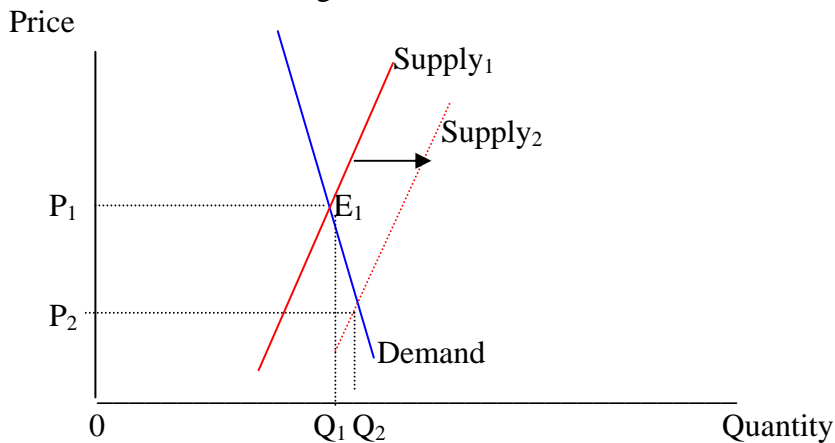
(3) Now assume the government creates a **rent supplement program**. Under this program, the renter is required to pay 30% of income in rent. Any additional rent is paid by the government --- up to a limit. For example, a low-income person with an income of \$500 a month would be required to pay \$150 in rent (30%). If the rent is \$350, the other \$200 would be paid by the government. Analyze the results of this program. Show the changes on the graph and explain what will result. Who gains and who loses from this program?

**Answer:** The payment by the government can be treated as an increase in income. This affects the demand for apartments. An increase in demand would be shown as a shift to the right. This creates a shortage of apartments. As a result, rents rise. The quantity of apartments supplied also rises. It is likely that the quantity supplied will rise very little. The major effect is the rise in rents. Renters gain from the program. But most of the gain goes to the owners of the apartments. This is not what was intended. The "losers" are the taxpayers who pay for the program. See the graph below.



(4) Instead, assume that the government decides to provide a **building subsidy** to people who build apartments in this low-income area. A certain percent of their costs will be paid by the government. Analyze the results of this program. Show the results on the graph and explain what will result.

**Answer:** The subsidy program is a reduction in costs of production. With lower costs of production, supply increases (shifts to the right). This creates a surplus, causing apartment owners to lower the rents. The quantity of apartments supplied increases. If demand is relatively inelastic, the largest effect is the reduction in rents. The quantity supplied increases only a little. Renters and apartment owners gain from the program. But in this case, renters gain the most.

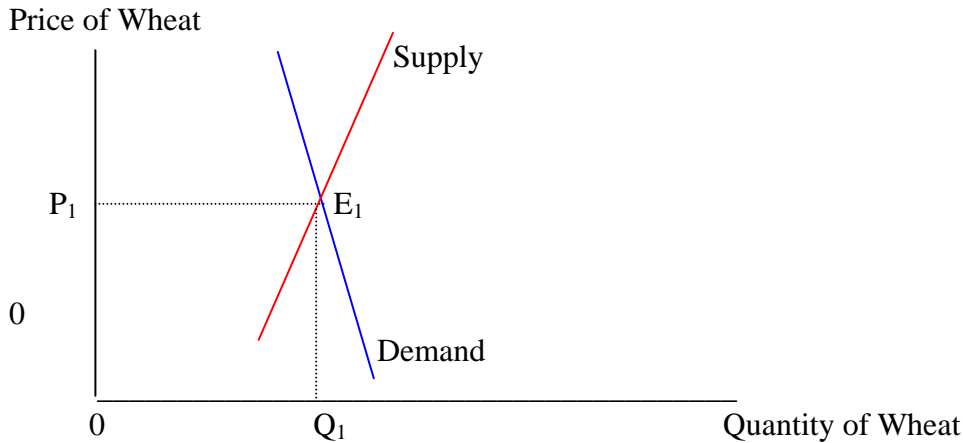


(5) From the point of view of improving housing for the poor, decide for yourself which is the better public policy?

### Case on American Agriculture

Let us look at the market for wheat (the story is the same if we look at the market for a number of other agricultural products). Begin with the demand for wheat. **Would this demand be relatively elastic or relatively inelastic?** The answer, most studies show, is relatively inelastic. Why? One reason is that people are unwilling to substitute from products made from wheat, such as bread. Another reason is that buying wheat products

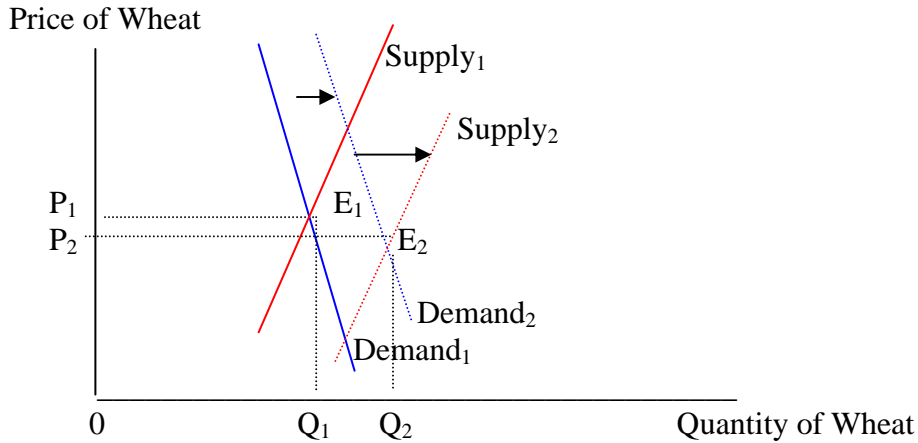
is inexpensive in relation to people's incomes.



**Over time, the demand for wheat will rise (shift to the right).** Why? One reason is that population rises (both because the American population increases and because farmers are able to sell more in foreign markets). Another is that incomes rise. However, according to what is called *Engel's Law*, as incomes rise, the demand for these products (and many other food products) rises very little. A third reason for the shift in demand is that tastes change toward eating more meat. As people eat more meat, the demand for wheat rises. This occurs because about 90% of the sun's energy is lost if the animal eats the plant and then a person eats the animal. However, tastes may have caused a leftward shift in demand for wheat as diet-conscious people have tried all-protein diets.

**Over time, the supply of wheat will also rise (shift to the right).** Why? The cause has been the enormous technological advances that have increased productivity and lowered costs of production. These technological advances have been the result of the work of universities, agricultural extension programs, and the companies that sell products to farmers. A large part of this technological advance has been financed by the federal government.

Which do you believe has experienced the greater shift to the right? The answer has been that *the supply has shifted to the right much more than the demand has shifted to the right*. This is shown in the graph below. The technological advances over the past century have been exceptional. *If the supply increases more than the demand increases, the result is that the price of wheat must fall.* This indeed has been occurring over the past century. *If the price falls, and the demand is relatively inelastic, what will happen to the total revenue received? The answer is that it falls.* As the price falls, people do not eat that much more. When total revenue falls, the farmer would like to reduce costs to maintain profits. But many of the costs cannot be reduced. The land, buildings, and machinery must be paid for. Many of the workers are relatives and cannot be laid-off (although family workers often take part-time jobs in the nearest town). *The result is that profits fall.*



**The market is sending the farmer a signal. It is telling him or her to leave farming and do something else.** What is the farmer's sin? It is not that the farmer has been inefficient or has made bad business decisions. The problem is that the farmer is too good. Farmers produce more food than consumers want to buy at prices that will allow the farmer to make a profit. To many, this seems unfair. How this problem has been dealt with will be considered in the next chapter.

### Test Your Understanding

1. Assume there is a shift in the supply of new homes to the **right**. The data are given below:

	<u>Price</u>	<u>quantity demanded</u>	<u>quantity supplied</u>	<u>new quantity supplied</u>
1	\$340,000	0	14000	16000
2	\$320,000	1000	13000	15000
3	\$300,000	2000	12000	14000
4	\$280,000	3000	11000	13000
5	\$260,000	4000	10000	12000
6	\$240,000	5000	9000	11000
7	\$220,000	6000	8000	10000
8	\$200,000	7000	7000	9000
9	\$180,000	8000	6000	8000
10	\$160,000	9000	5000	7000
11	\$140,000	10000	4000	6000
12	\$120,000	11000	3000	5000

What is the new equilibrium price? \$\_\_\_\_\_

What is the new equilibrium quantity of new homes? \_\_\_\_\_

On a graph, redraw the original demand and supply curves. Then, show the shift in supply. Show the new equilibrium price and quantity of new homes.

Because of the shift in the supply, there is now a \_\_\_\_\_ (shortage or surplus?) equal to \_\_\_\_\_ new homes. This will cause the price of new homes to \_\_\_\_\_ (rise or fall?). The change in the price will \_\_\_\_\_ (increase or decrease?) the quantity demanded for new homes and \_\_\_\_\_ (increase or decrease?) the quantity supplied of new homes.

2. Assume that the market for automobiles begins in equilibrium. Draw the demand and supply curves for automobiles in the graph below. Label all axes and curves. Show the equilibrium price and quantity.

Then, **buyers' incomes fall due to a recession**. Make the appropriate change on the graph. Show the new equilibrium.

When the new equilibrium is reached, the price of automobiles will have \_\_\_\_\_(risen or fallen?) and the quantity of automobiles sold will have \_\_\_\_\_(risen or fallen?)

### Practice Quiz for Class 5

- If the price is **above** equilibrium,
  - quantity demanded equals quantity supplied
  - there are shortages
  - there are surpluses
  - demand must shift to the right
- Equilibrium** occurs where
  - demand is greater than supply by the largest amount
  - demand is less than supply by the largest amount
  - demand equals supply
  - there are shortages
- Assume that a market begins in equilibrium. Then, there is **a decrease in buyers' incomes**. When the new equilibrium is reached:
  - the price and the quantity will both have risen
  - the price and the quantity will both have fallen
  - the price will have risen and the quantity will have fallen
  - the price will have fallen and the quantity will have risen
- Assume that a market begins in equilibrium. Then, there is **a decrease in a cost of production**. When the new equilibrium is reached:
  - the price and the quantity will both have risen
  - the price and the quantity will both have fallen
  - the price will have risen and the quantity will have fallen
  - the price will have fallen and the quantity will have risen
- Assume a market begins in equilibrium. Then, **there is a decrease in buyers' incomes and also a decrease in a cost of production**. When the new equilibrium is reached,
  - the price will definitely fall and the quantity will definitely rise
  - the price will definitely rise and the quantity will definitely fall
  - the price will definitely fall but the change in quantity cannot be determined
  - the quantity will definitely fall but the change in price cannot be determined

Answers: 1. C 2. C 3. B 4. D 5. C