



LESSON 4

A Classroom Market for Cocoa

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LESSON DESCRIPTION

Students participate as buyers and sellers in a classroom market for cocoa. They are encouraged to pursue their own self-interest as they negotiate with other students to achieve the best price for cocoa. Through this exercise, they gain an understanding of the incentives of buyers and sellers and how prices for goods and services are determined in markets. They also learn how they could have predicted the market-clearing (or equilibrium) price using demand and supply curves.

INTRODUCTION

Every day in communities all around the country, decisions are made on what goods and services will be produced, how much of each will be produced, and who will get to consume them. How are these decisions made? A market economy has no central planners to answer these basic economic questions. Instead, the prices and quantities for goods and services are established through the interaction of buyers (consumers) and sellers (producers) in markets. Producers decide which goods and services to produce by considering how much consumers are willing and able to pay for various products. Producers will be successful and earn profits as long as they can sell their product for more than the average cost of producing it. Consumers will be successful and satisfied if they are able to buy the goods and services they want for less than they are willing and able to pay for them. These two groups come together to negotiate a price that, in turn, determines the quantity of product that producers are willing and able to sell and buyers are willing and able to purchase. This determines how much of society's scarce resources will be allocated to the production

of that product and answers two fundamental economic questions: (1) How many units of each good or service will be produced? and (2) Who will produce the units?

COMPELLING QUESTION

How does the interaction of buyers and sellers in a market determine the price of a good?

CONCEPTS

Supply

Demand

Surplus

Shortage

Market-clearing (or equilibrium) price

Equilibrium quantity

OBJECTIVES

Students will be able to:

- Describe the incentives of buyers and sellers in the marketplace and predict how buyers and sellers would react to different market prices.
- Explain how the interaction of buyers and sellers in a market determines the market-clearing (or equilibrium) price.
- Explain how changes in the price of a good or service affect the quantities demanded by buyers and the quantities supplied by sellers.
- Generate and use demand and supply graphs to determine the market-clearing price of a good or service and the equilibrium quantity of it that would be exchanged.

CONTENT STANDARDS

Voluntary National Content Standards in Economics

- Standard 5: Voluntary exchange occurs only when all participating parties expect to gain. This is true for trade among individuals or organizations within a nation, and among individuals and organizations in different nations.
- Standard 7: A market exists when buyers and sellers interact. This interaction determines market prices and thereby allocates scarce goods and services.

Common Core State Standards

Mathematics: High School: Modeling. Modeling links classroom mathematics and statistics to everyday life, work, and decision making. Modeling is the process of choosing and using appropriate mathematics and statistics to analyze empirical situations, to understand them better, and to improve decisions. Quantities and their relationships in physical, economic, public policy, social, and everyday situations can be modeled using mathematical and statistical methods. When making mathematical models, technology is valuable for varying assumptions, exploring consequences, and comparing predictions with data.

TIME REQUIRED

75 minutes. Procedures 1–16, 45 minutes on the first day; procedures 17–25, 30 minutes on the second day.

MATERIALS

- Slides 4.1–4.4
- Activities 4.1 and 4.2, eight copies of each to create 32-card decks of Buyer Cards and Seller Cards. Use different colors for Buyer and Seller Cards. Fill in prices on the cards with the amounts shown in Table 4.1.
- Activity 4.3, one copy per student (half of the copies in the same color as the Buyer Cards and half in the same color as the Seller Cards).
- Activities 4.4–4.6, one copy per student
- A cleared section of the room to serve as a marketplace in which students will trade
- Small prizes for top buyers and sellers in the market simulation (optional)
- Optional: Online interactive for Activity 4.3 at <http://hseconomics.councilforeconed.org>



PROCEDURES

Day One

1. Tell students they are going to participate in a market in which half the students will be buyers of cocoa and half will be sellers of cocoa. Explain that in the real world, it is tons of cocoa (cacao beans) that are exchanged, but to keep things simple they will be trading one unit of a good called “cocoa” during each trade.
2. Select two students to stand on opposite sides of the room, one who will distribute the Buyer Cards, and one to distribute the Seller Cards. (Note: Other teachers or aides can serve these functions if participation of all students as buyers or sellers in the market simulation

Table 4.1

Amount →	\$18	\$20	\$22	\$24	\$26	\$28	\$30	\$32	\$34	\$36	\$38
Number of Buyer Cards	0	4	4	4	4	4	4	2	2	2	2
Number of Seller Cards	2	6	4	4	4	4	4	2	2	0	0

is desired.) Give the 32-card deck of Buyer Cards to the first student and the 32-card deck of Seller Cards to the other. Have them shuffle their decks, and tell them to do so at the beginning of each round.

3. Divide the remainder of the class as evenly as possible into two groups, buyers and sellers. Tell students that they will remain either a buyer or a seller throughout the entire simulation.
4. Show Slide 4.1. Explain that each buyer will receive a Buyer Card. Select one of the “buyers” to read his Buyer Card. Explain that the amount shown on the card is the maximum amount this buyer is willing and able to pay for a unit of cocoa. Note that the cards will have various amounts on them representing the different amounts that individual buyers are willing and able to pay. Explain that buyers should try to negotiate the lowest possible price with a seller. A buyer’s gain on a transaction is based on how much lower the price they negotiate is than the amount shown on their card. Thus, they should not pay more than the amount listed on their card, although it may sometimes be necessary to make a losing transaction to get a new Buyer Card. Stress that during price negotiations with sellers, buyers should never reveal the amount shown on their cards.
5. Repeat procedure 4 with a Seller Card as follows. Select one of the students who will be a seller to read the Seller Card. Explain that the amount shown on the card is the cost to this seller of producing a unit of cocoa. Note that the cards will have various amounts on them representing the different costs that individual sellers incur in producing a unit of cocoa. Explain that sellers should try to negotiate the highest possible price. A seller’s gain on a transaction is based on how much

higher a price they negotiate above the amount shown on their card. Thus, they should not sell for less than the amount listed on their card, although it may sometimes be necessary to make a losing transaction to get another Seller Card. Stress that during negotiations with buyers, sellers should never reveal the amount shown on their cards.

6. Distribute a copy of Activity 4.3 to each student (buyers getting copies in a color matching the Buyer Cards and sellers getting copies in a color matching the Seller Cards). (Note: As an alternative to the manual process, an online interactive for Activity 4.3 can be found at <http://hseconomics.councilforeconed.org>.) Show Slide 4.2. Explain that this will be the score sheet. Each buyer and seller will start out with a card, recording the amount on the card in Column A. They will negotiate the best price they can in the market, record it in Column B, get a new card, and then re-enter the market. Use the two students selected previously to provide an example. Have the two students stand and negotiate a trade based on their respective cards. Complete the transaction sheet based on this transaction. The goal for everyone is to make as large a gain as possible on all the transactions they make. Note that this can be achieved by working to get large gains on a few transactions, accepting smaller gains by making quicker and more transactions, or a combination of both. Tell students that they will calculate their gains after each trading period, so not to worry about Column C until later.
7. Explain the following rules for the simulation:
 - There will be three rounds of trading lasting five minutes each. There will be a one-minute warning given before the end of each round.
 - Any buyer can negotiate with any seller and vice versa. Buyers cannot negotiate with other buyers and sellers cannot negotiate with

other sellers. Therefore, you can only negotiate with students who have a different-colored score sheet. Tell students that they will not actually be exchanging anything, just negotiating a price as if the seller had one unit of cocoa for sale. Also, explain that if they are having a difficult time negotiating a price with a particular buyer or seller, they are free to move to a different buyer or seller.

- All students are free to make as many transactions in a round as they want.
 - All transactions must be in whole dollar amounts, *not* something like \$27.50 or \$33.33, to make recording transactions easier.
 - Once a price is negotiated, both buyers and sellers record it on their score sheet and report the negotiated price to the recorder who will enter a tally on the Transactions Record. Show Slide 4.3. Explain that this will be a record of the prices that have been agreed on, so that both buyers and sellers can see what is happening in the market. (The teacher or an assigned student can serve as the recorder. It may be easier to print a copy of Slide 4.3 and use it to record the prices. A doc cam could be used to project the results.)
 - After a buyer and seller have had their price recorded, buyers and sellers turn in their old card for a new one from the person holding “their” deck.
 - It is permissible to take a loss on a transaction in order to get a new card, but losses will be subtracted from gains.
 - Optional: Tell students that the buyer and the seller with the largest net gains at the end of the simulation will receive a small prize. (Note: Prizes increase the interest in the game, but they also increase the likelihood of collusion or misreporting of figures.)
8. Have the distributor of Buyer Cards give each of the buyers a card. Have the distributor of Seller Cards give each of the sellers a card. Have students record the amount on their respective card on their score sheet in Column A of Transaction Number 1.
 9. Ask if there are any questions, answer them, and then announce that the market is open. (Remind students to report to the recorder, and be sure that Slide 4.3 is visible throughout the simulation.)
 10. At the end of five minutes (and after a one-minute warning) announce that the market is closed. Have students enter the amount of gain (or loss) they made on each transaction in Column C of their score sheet. Only trades completed before the end of the round count. Direct their attention to the Transactions Record and tell them that it should provide useful information about whether a buyer is paying too much or a seller is charging too little.
 11. Have card distributors pick up all Buyer and Seller cards, shuffle their decks, and distribute a new card to each buyer and seller. Announce that the market is once again open.
 12. Repeat procedures 10 and 11 for a second and third round of trading. (Note: If time is limited, play only two rounds. However, desired results [described below] are more likely to occur with more rounds played.)
 13. Announce that the market is closed and have students once again calculate their gain (or loss) in Column C and then complete their score sheet by finding their net gain (by adding gains and subtracting any losses).

This can be negative, but rarely is—unless students were confused about their roles.

14. Determine the buyer and seller who had the largest net gain. Have these students report the amounts on the cards they were given.

Typically, the winning buyer is a student who was given more of the higher-valued Buyer Cards, and the winning seller is a student who was given more of the lower-cost Seller Cards. However, it is possible for others—through good and fast negotiating—to do well despite not having the best cards.

Optional: Reward the top buyer and seller.

15. Conduct a post-simulation discussion focusing students on Slide 4.3.
- a. In which round was the difference between the highest and lowest price negotiated the greatest?

Usually, this happens in the first round with the spread in prices narrowing as each additional round is played.

- b. What price did negotiations appear to be clustering around as the rounds went on or, in other words, what was the most negotiated price in the third round?

Given the cards used, a price at or near \$26.

- c. Why would buyers in early rounds pay prices much higher than \$26, but not negotiate such high prices later?

If they observed the Transactions Record or listened as other prices were being negotiated, they should have seen that they didn't have to pay such high prices to get a unit of cocoa, i.e., there were sellers who would sell for less.

- d. Why would sellers in the early rounds sell for prices much lower than \$26, but not negotiate such low prices later?

If they observed the Transactions Record or listened as other prices were being negotiated, they should have seen that they did not have to sell for such low prices, i.e., there were buyers who would pay more.

16. Explain that as more buyers stopped accepting higher prices and more sellers stopped accepting lower prices, it caused prices in the market to converge. Thus, the interaction of buyers and sellers in the market led to a price around \$26 for a unit of cocoa. Explain that the class will next investigate why \$26 became the price of cocoa.

Day Two

17. Distribute a copy of Activity 4.4 to each student or have them work in pairs. Have them read and complete Column C in the table under “Supply.”

Column C is the cumulative frequency of the numbers shown so the first entry is 2, the second is 2 + 6 or 8, the third is 8 + 4 or 12, and the remaining entries are 16, 20, 24, 28, 30, and 32.

Ask: As the price rises, what happens to the quantity sellers wish to sell?

It rises.

Next have students complete Column C in the table under “Demand.”

Again, Column C is the cumulative frequency of the numbers shown so the first entry is 2, the second is 2 + 2 or 4, the third is 4 + 2 or 6, and the remaining entries are 8, 12, 16, 20, 24, 28, and 32.

Ask: As the price rises, what happens to the quantity buyers wish to buy?

It falls.

18. Distribute a copy of Activity 4.5 to each student. Explain that **supply** shows how sellers would react to various prices, while **demand** shows how buyers would react to various prices. Because this is information that Activity 4.4 provides, they will use it to construct supply and demand curves. Point out that on this graph, prices are listed along the vertical, or y-axis, while quantities of cocoa are listed along the horizontal, or x-axis. Have students begin with supply by plotting the price given in Column A of the Supply table with the quantity that sellers would be willing and able to sell (or supply) at that price, given in Column C. Next, have students graph demand by plotting the price (in Column A of the Demand table) with the quantity that buyers would be willing and able to buy (demand) at that price, given in Column C. Assist students as necessary.

19. Show Slide 4.4 and have students compare their graphs to the one shown.

Point out that the supply curve is upward-sloping indicating as the price of cocoa rises, more units of cocoa are supplied, while the demand curve is downward-sloping indicating that as the price of cocoa rises, fewer units are demanded.

20. Ask students:

- a. If the price was \$34, how much cocoa would sellers want to sell?

Reading from a price of \$34 on the vertical axis over to the supply curve and then down to the horizontal axis yields a quantity of 32 units of cocoa. Note that this is the same quantity shown in the Supply table in Activity 4.4 at a price of \$34.

- b. If the price was \$34, how much cocoa would buyers want to buy?

Reading from a price of \$34 on the vertical axis over to the demand curve and then down to the horizontal axis

yields a quantity of 6 units of cocoa. Again, this is the same quantity shown in the Demand table in Activity 4.4 at a price of \$34.

- c. At a price of \$34, which would be greater: the quantity supplied by sellers or the quantity demanded by buyers?

The quantity supplied is 32 units, while the quantity demanded is six units, so the quantity supplied would be greater by 26 units.

Explain that this is called a surplus, because more of the good is supplied than buyers want to buy (i.e., the quantity supplied exceeds the quantity demanded at this price).

- d. What might you do as a seller to make sure that one of the six buyers buys from you instead of one of the other sellers?

Lower your price to something less than \$34.

Explain that all those sellers with costs lower than \$34 would have the same incentive, so the price of the good would tend to be bid downward.

- e. At what prices would a surplus exist?

At all prices above \$26 since quantity supplied exceeds quantity demanded at all these prices.

Continue: Therefore, at any price above \$26, there would be a surplus that would encourage lower-cost sellers to lower the price until the surplus is eliminated.

21. Repeat procedure 20 for a shortage by asking students:

- a. If the price was \$22, how much cocoa would sellers want to sell?

12 units of cocoa

- b. If the price was \$22, how much cocoa would buyers want to buy?

28 units of cocoa

- c. At a price of \$22, which would be greater: the quantity supplied by sellers or the quantity demanded by buyers?

The quantity demanded is higher by 16 units.

Explain that this is called a **shortage**, because less is supplied by sellers than buyers want to buy (i.e., the quantity demanded exceeds the quantity supplied at this price).

- d. What might you do as a buyer to make sure that one of the 12 sellers sells to you instead of one of the other buyers?

Offer a price higher than \$22.

Explain that all buyers who value a unit of cocoa at more than \$22 would have the same incentive, so the price of the good would tend to be bid upward.

- e. At what prices would a shortage exist?

At all prices below \$26 because quantity demanded exceeds quantity supplied at all these prices.

Therefore, at any price below \$26, there would be a shortage, which would encourage high-value buyers to bid the price upward until the shortage is eliminated.

22. Ask: At what price is there neither a surplus nor a shortage?

\$26

Explain that only at this price does the quantity supplied by sellers equal the quantity demanded by buyers. This is called the **market-clearing**

(or equilibrium) price. Ask: How much cocoa would be exchanged at this price?

20 units

Note that the quantity associated with the equilibrium price is called the **equilibrium quantity**.

23. Point out that while the market-clearing price is easy to find with a supply and demand graph because we can see the price where the two curves cross, knowledge of these curves is *not* necessary for a market to determine this price. Remind students that the only thing they knew in the market simulation was their own personal information; yet, through the interaction of buyers and sellers in the market, \$26 was the price the market was tending toward.
24. Explain that the interaction of buyers and sellers in the cocoa market has answered two fundamental economic questions. First, how much cocoa will be produced? The market equilibrium quantity answers this: 20 units of cocoa. Second, who will get to consume these 20 units? The market equilibrium price answers this: all buyers willing and able to pay \$26 or more.

CLOSURE

25. Review by asking the following questions:

- a. What determines how a buyer reacts towards the price of a good?

A buyer's reaction is based on how much he or she values or is willing and able to pay for the good. If this exceeds the price of the good, buyers have an incentive to buy it. If this is less than the price, there is an incentive not to buy it.

- b. What determines how a seller reacts towards the price of a good?

A seller's reaction is based on how much it costs to produce the good.

If the production cost is greater than the price of the good, they have an incentive not to produce and sell it. If production cost is less than the price, they have an incentive to produce and sell it.

- c. As the price of a good increases, how does the quantity demanded by buyers and the quantity supplied by sellers change?

The quantity demanded decreases, while the quantity supplied increases.

- d. What is a surplus and what is likely to happen if a surplus exists in the market for a good?

A surplus exists when the quantity supplied exceeds the quantity

demanded at the market price. This causes the price to decrease.

- e. What is the market-clearing or equilibrium price?

That price at which the quantity supplied by sellers equals the quantity demanded by buyers—that price at which neither a surplus nor a shortage exists.

- f. Given a graph of supply and demand, how can the market-clearing price and the equilibrium quantity of a good be found quickly?

It is the price and quantity associated with the intersection of the two curves.

ASSESSMENT

Multiple Choice

1. As the price of a good increases, which of the following is generally true?
 - a. Sellers want to produce and sell more of the good, while buyers want to purchase less.**
 - b. Sellers want to produce and sell more of the good, and buyers want to purchase more.
 - c. Sellers want to produce and sell less of the good, while buyers want to purchase more.
 - d. Sellers want to produce and sell less of the good, and buyers want to purchase less.
2. At a price higher than the market-clearing (or equilibrium) price, which of the following is true?
 - a. A surplus will exist, which will cause the price to increase.
 - b. A surplus will exist, which will cause the price to decrease.**
 - c. A shortage will exist, which will cause the price to increase.
 - d. A shortage will exist, which will cause the price to decrease.

3. How are prices determined in markets in market-based economies?
 - a. They are set and regulated by the government in the best interest of everyone.
 - b. They are set solely by sellers acting in their own self-interest.
 - c. They are negotiated by buyers and sellers interacting in their own self-interest.**
 - d. They are determined by economists through analysis of supply and demand curves.

Constructed Response

Have students complete Activity 4.6.

1. At prices of \$10, \$8, \$6, \$4, and \$2, the quantity demanded is 1,000; 2,000; 3,000; 4,000; and 6,000 pounds, respectively, while the quantity supplied is 5,000; 4,000; 3,000; 2,000; and 1,000 pounds, respectively. 2. A surplus exists at any price above \$6 because the quantity supplied would be greater than the quantity demanded. 3. A shortage exists at any price below \$6 and since the quantity demanded would exceed the quantity supplied, the price of cort would likely rise as buyers compete for the limited quantities available. 4. Six dollars, because this is the only price at which the quantity demanded equals the quantity supplied. 5. Three thousand pounds (the quantity associated with the market-clearing or equilibrium price of \$6). 6. Those buyers who value a pound of cort at less than \$6 would believe the equilibrium price of \$6 is too high [i.e., they would believe it is not worth that much] and those sellers whose cost of producing a pound of cort is greater than \$6 would believe the equilibrium price of \$6 is too low because they would be unable to cover their cost of producing it.

ACTIVITY 4.1**Buyer Cards**

You want to buy a unit of cocoa. You are willing and able to pay _____ for this unit, but you want to pay the lowest price you can. The lower the price you negotiate, the greater your gain.	You want to buy a unit of cocoa. You are willing and able to pay _____ for this unit, but you want to pay the lowest price you can. The lower the price you negotiate, the greater your gain.
You want to buy a unit of cocoa. You are willing and able to pay _____ for this unit, but you want to pay the lowest price you can. The lower the price you negotiate, the greater your gain.	You want to buy a unit of cocoa. You are willing and able to pay _____ for this unit, but you want to pay the lowest price you can. The lower the price you negotiate, the greater your gain.

ACTIVITY 4.2**Seller Cards**

You want to sell a unit of cocoa.
This unit cost you _____ to
produce, but you want to sell it
for the highest price you can.
The higher the price you negotiate,
the greater your gain.

You want to sell a unit of cocoa.
This unit cost you _____ to
produce, but you want to sell it
for the highest price you can.
The higher the price you negotiate,
the greater your gain.

You want to sell a unit of cocoa.
This unit cost you _____ to
produce, but you want to sell it
for the highest price you can.
The higher the price you negotiate,
the greater your gain.

You want to sell a unit of cocoa.
This unit cost you _____ to
produce, but you want to sell it
for the highest price you can.
The higher the price you negotiate,
the greater your gain.

ACTIVITY 4.3

Score Sheet

Instructions:

1. Record the amount listed on each card you get in Column A.
2. Record the price you negotiate in each transaction in Column B.
3. After each round, determine your gain on each transaction made and record it in Column C. Buyers: Determine your gain by subtracting the amount in Column B from Column A. Sellers: Determine your gain by subtracting the amount in Column A from that in Column B. If this is negative, it means you had a loss on the transaction.
4. At the end of all rounds, add gains in Column C and subtract the sum of all losses. This is your net gain.

Transaction Number	Column A: Amount on Card	Column B: Price Negotiated	Column C: Gain or Loss (if Negative)
1			
2			
3			
4			
5			
6			
7			
8			
9			

(score sheet continued)

ACTIVITY 4.3 (Continued)

10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			

Net gain: _____

ACTIVITY 4.4

Supply and Demand

SUPPLY

The following table shows the number of sellers (Column B) who had each of the costs shown on the Seller Cards (Column A). Based on this and your knowledge that sellers are willing and able to produce and sell a unit of cocoa as long as the price they get is greater than or equal to their cost, determine (in Column C) the total quantity that would be supplied by sellers if each of the amounts in Column A were the actual price in the market.

Column A Card Amount (Cost)	Column B Number of Sellers	Column C Quantity Supplied
\$18	2	
\$20	6	
\$22	4	
\$24	4	
\$26	4	
\$28	4	
\$30	4	
\$32	2	
\$34	2	

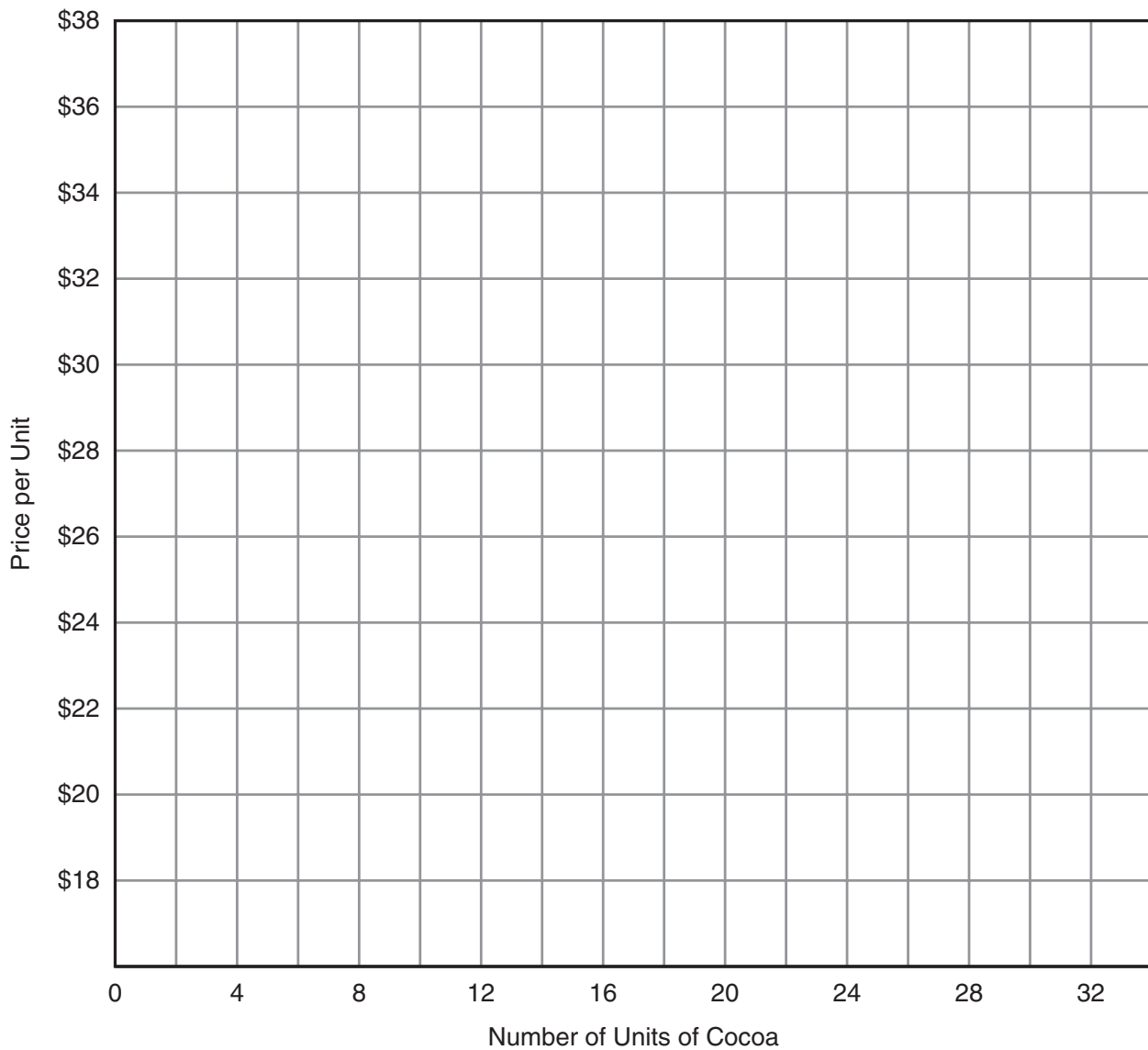
DEMAND

The following table shows the number of buyers (Column B) who had each of the value (or willingness and ability to pay) amounts shown on the Buyer Cards (Column A). Based on this and your knowledge that buyers are willing and able to buy a unit of cocoa as long as their value is greater than or equal to the price, determine (in Column C) the total quantity that would be demanded by buyers if each of the amounts in Column A were the actual price in the market.

Column A Card Amount (Value)	Column B Number of Buyers	Column C Quantity Demanded
\$38	2	
\$36	2	
\$34	2	
\$32	2	
\$30	4	
\$28	4	
\$26	4	
\$24	4	
\$22	4	
\$20	4	

ACTIVITY 4.5

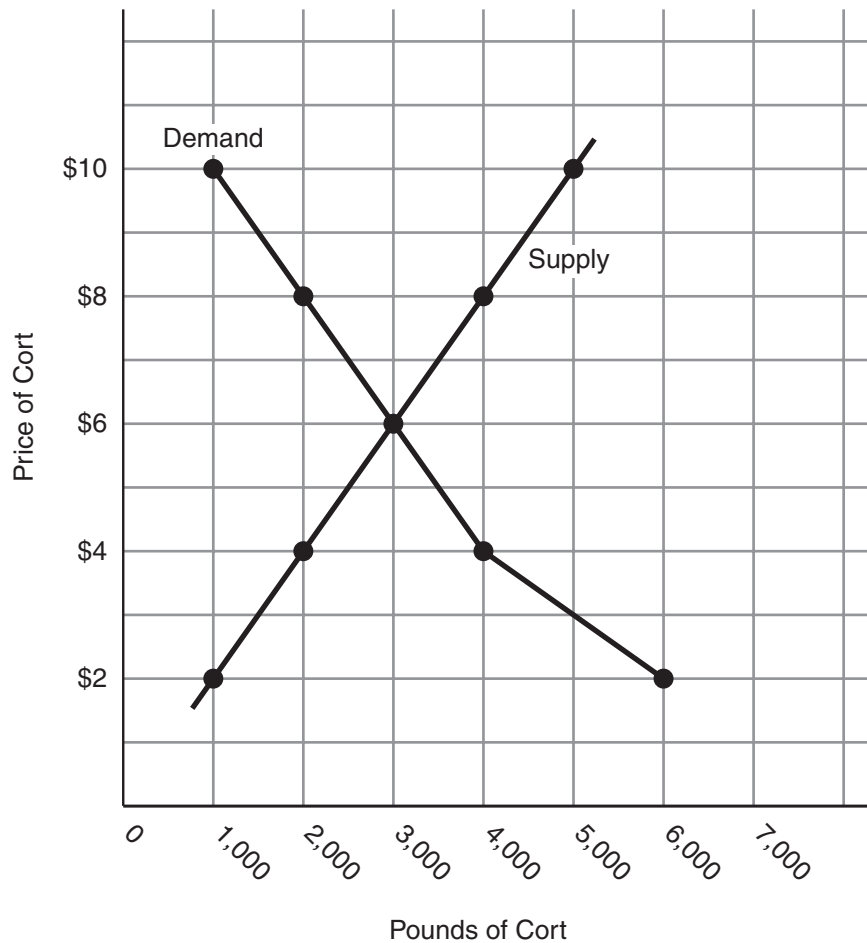
Supply and Demand in the Cocoa Market



ACTIVITY 4.6

The Market for Cort

Consider the following diagram in answering the following questions.



1. What is the quantity demanded by buyers and supplied by sellers at each price?

Price	Quantity Demanded	Quantity Supplied
\$10		
\$8		
\$6		
\$4		
\$2		

ACTIVITY 4.6 (Continued)

2. State a price at which there would be a surplus of cort and explain why.

3. State a price at which there would be a shortage of cort and explain what is likely to happen to the price of cort as a result of this shortage.

4. What is the market-clearing or equilibrium price of cort? ____ Explain why.

5. What is the equilibrium quantity of cort that would be exchanged? _____

6. Explain why some buyers would think the equilibrium price of cort is too high and some sellers would think the equilibrium price is too low.