The Basics of Supply and Demand: A Classroom Cocoa Bean Market

Standards and Benchmarks (see page 18)

Lesson Description

The simulation in this lesson helps students see the decentralized process of goods and services allocation in a market economy and how individual decisions made by buyers and sellers contribute to the economy as a whole.

Accommodation (see pages 17)

Concepts

Demand
Equilibrium price
Market-clearing price
Shortage
Supply
Surplus

Objectives

Students will be able to

- explain how the interaction of buyers and sellers in the marketplace determines the equilibrium or market-clearing price;
- define the equilibrium or market-clearing price as the price at which quantity demanded equals quantity supplied;
- explain how changes in the price of a good or service can affect the quantity demanded and quantity supplied of that good or service; and
- identify the equilibrium price and quantity on a graph and prices at which a shortage or surplus would occur.

Compelling Question

How do markets work?

Time Required

2 50-minute class periods; 10-15 minutes the class period before the lesson to introduce lesson procedures

Materials

- *Visual 1*
- *Visual 2 (this can be projected on an overhead projector, written on the board, or put into a spreadsheet that can be projected to the entire class.)*
- *Visual 3*
- *Thirty-two Buy Cards (4 copies of Handout 1) and 32 Sell Cards (4 copies of Handout 2): Use different colors for the buy and sell cards. Add the "$ per pound" amount to the number of cards as noted in the following table:*

$ per pound	2	4	6	8	10	12	14	16	18	20	22
# Buy cards	0	4	4	4	4	4	3	3	2	2	2
# Sell cards	2	2	2	3	3	4	4	4	4	4	0

- *Handouts 3-6, one copy of each for each student*
- *Handout 7, enough copies so that half of the class may receive one seller badge*
- *Tape so that students representing sellers can affix their name badges*

NOTE: This activity works most effectively in a class with a minimum of 20 students. If space allows, up to 50 students may participate in the simulation at one time.

Pre-lesson procedures (Day before the lesson)

1. For this lesson to be successful, it is very important that students know how to effectively interact in a market simulation. Students who lack an innate sense of how to negotiate the price of cocoa beans will require a pre-lesson training session to effectively simulate their roles as buyers and sellers during the market activity.
2. Take the last 10-15 minutes of class the day before you conduct the market simulation to divide your class into student buyers and sellers.
3. Distribute the buy and sell cards to the students.
4. Ask a student with a buy card to read their card to the class. Tell the student that an acceptable price for them to buy cocoa beans based on their card would be at or below the price on the card.
5. Repeat this exercise with a student seller but tell that student the acceptable price for them to sell cocoa beans should be at or above the price on the card.
6. Now tell students to pair off with someone from the opposite side (one buyer with one seller). Based on your class size, you may have one group of three.
7. Have each pair negotiate a price that is agreeable for both sides without either side revealing the price on their card.
8. Once a price is agreed upon, have each side share their price with the other person. Tell the students that they will not share this information after each trade the next day during the actual simulation. This is simply to help each other understand the trading process.
9. Circulate around the room to make sure no student agrees on a price that results in a significant loss for them.
10. Inevitably there will be a pairing that cannot agree on a price that benefits both the buyer and seller. Tell the students that it is okay and sometimes preferable to walk away from a negotiation if the offer does not benefit them. Also, tell students that they may have to take a loss on a trade during the market simulation in order to move on and get a better card (deal).

Procedure

Day One

1. Tell students that they are going to participate in a simulation where half of the class will be sellers of cocoa beans and the other half of the class will be buyers of cocoa beans. In real world markets, these transactions are made for hundreds and even thousands of pounds of cocoa beans, but to simplify the calculations, beans will be sold by the pound in the activity.

2. Display *Visual 1: Examples of Buy and Sell Cards*. Explain that each buyer will receive one buy card at a time (*from Handout 1: Buy Cards*) and that these cards will have various prices. Each student who is a buyer will try to buy a pound of cocoa beans at the lowest possible price they can negotiate. They should not buy at any price above the price on their card, although at times this may be necessary to make a transaction and receive another buy card. Make sure that buyers know they are not to reveal the price on their buy card at any time during the activity.

3. Review the sell cards, letting sellers know that they will receive one sell card at a time (from *Handout 2: Sell Cards*). Explain that sellers will be trying to sell their pound of cocoa beans at the highest price they can negotiate. They should not sell for any price lower than the price on their card, although at times this may be necessary to complete a transaction and receive another sell card. Make sure that sellers know they are not to reveal the price on their sell card at any time during the activity.

4. Explain the following rules for the cocoa market simulation:
    - Any buyer is allowed to talk to any seller.
    - The goal for both buyers and sellers is to make as much money as they can. The buyers do this by buying a pound of cocoa beans at a price lower than the one written on their cards. The sellers do this by selling a pound of cocoa beans at a price higher than the one written on their cards.
    - Students are free to make as many transactions as they wish during each of the four rounds of the simulation.
    - All transactions must be made in whole dollar amounts.
    - When a transaction is made, both the buyer and seller will report the transaction price to the recorder, who will enter it on *Visual 2: Classroom Tally Sheet*. Display Visual 2 and remind students to watch the tally sheet so that they know what prices are being paid for cocoa beans.
    - After each transaction, students should turn in their cards for new ones and re-enter the marketplace, time permitting. It is important that students understand they are to get a new card after each transaction. (You may want to assign two students the job of distributing the buy and sell cards during the activity and assign another student the job of recorder for the class tally sheet.) Keep the buy and sell cards in separate piles and shuffle each pile between each of the three rounds.
    - Whatever card students have at the end of a round, they will lose that card at the end of the round.

5. Distribute *Handout 3: Score Sheet for "A Classroom Cocoa Bean Market."* Review how to complete the forms with students.

6. Clear a large area in the classroom and designate it as the "Cocoa Bean Marketplace."

7. Divide the class into two groups of equal size. One group will be sellers, and the other group will be buyers. Have the sellers affix their name badges from *Handout 7: Seller Badges* to their shirts with tape so that they are clearly visible. Let students know they will remain in their roles (as either a buyer or seller) for the first three rounds. Assign three students to the following roles if you wish: recorder (for Visual 2), buyer card dealer, and seller card dealer. The recorder will tally up the class transactions in each round. The buyer and seller card dealers will collect and distribute the buy and sell cards. (These roles could be fulfilled by one student if the number of students in the class allow for that.)

8. Tell students there will be four rounds of trading, each lasting five minutes, and that a "one-minute warning" will be given when there is one minute remaining in the round. Let students know that transactions (and their prices) will be recorded during each round.

9. Encourage students to make as many transactions as possible during each round. Remind them that although losses should be avoided, if possible, they are permitted if needed to make a transaction to get a new transaction card.

10. Play Round 1 of the simulation, announcing the one-minute warning after four minutes of trading.

11. After Round 1, direct students' attention to the class tally sheet. Let them know that the information contained on the sheet is useful, but don't give any details.

12. Allow students to conduct Round 2, give a one-minute warning at minute four, and after the round, again direct the class's attention to the tally sheet.

13. Conduct Round 3 (with a one-minute warning) and after the round has concluded, give students time to calculate their total net gain or net loss. Remind them that in a real market, these gains or losses would be magnified, as trading would occur in hundreds or thousands of pounds of cocoa beans.

14. Determine which buyer and seller had the largest net gains. (You may supply a small prize if desired.)

15. Discuss the following with your students after the first three rounds of the simulation:
    - At what price were cocoa beans most frequently sold in each round? *(Students can find these data on their own individual score sheets and on the class tally sheet.)*
    - In what round did the greatest spread in prices occur? *(Use the class data to determine.)*
    - Why did prices get closer together in later rounds? *(Competition between buyers and sellers will cause prices to move closer together. As buyers and sellers gain more information about the amount of goods and services available at different prices, markets tend to move toward equilibrium.)*
    - How did competition among sellers and buyers influence prices? (*Because there was competition between both buyers and sellers, no one single buyer or seller had the power to control prices. Buyers were competing with other buyers, and sellers were competing with other sellers. This pushed prices toward the* ***equilibrium price****.)*

16. Select two of the sellers from the first three rounds to act as sellers in Round 4 and ask the remaining sellers to become buyers. Conduct Round 4 (with a one-minute warning) and after the round has concluded, give students time to calculate their total net gain or net loss.

17. Discuss the following with your students after Round 4:
    - At what price were cocoa beans most frequently sold in Round 4? *(Students can find these data on their own individual score sheets and on the class tally sheet.)*
    - What happened to prices in Round 4 in comparison with Rounds 1-3? *(When there are fewer sellers and more buyers in a market, the supply of cocoa beans decreases while the **demand** increases, which causes prices to increase.)*
    - What happened to the competition among sellers and buyers during Round 4? *(Because there were only two sellers and many more buyers, the sellers had increased power to control prices.)*

Day Two

18. Distribute *Handout 4: Supply and Demand Schedules* and *Handout 5: Cocoa Bean Supply and Demand*. Let students know that the information on the buy and sell cards can be used to create **supply and demand** schedules, which can be transferred onto a graph that illustrates the behavior of both buyers and sellers. The point where the lines (or curves) meet is called the equilibrium point and reveals both the **equilibrium or market-clearing price** and quantity of the good being bought and sold.

19. Tell students to use the information given on Handout 4 to create a graph on Handout 5. Students will create their graphs by placing a dot at the points corresponding to the prices and quantities on the supply schedule and then do the same for the demand schedule. Walk around the classroom to help any students who may need help. Tell students they are to label each curve, and then project *Visual 3: Supply, Demand, and Market Equilibrium* so that students may check their work.

20. Tell students the graph indicates that a price of $12 will prevail in the market for cocoa beans and that 16 pounds will be sold. How does this compare with the market-clearing price that resulted in the class? (*Answers will vary. Usually, a price of $12 will not result until many rounds have been played, although in later rounds the equilibrium price should approach $12.)*

21. After students have concluded the graphing exercise and debriefed, ask students the following questions as review:
    - What does the **demand** schedule show? *(The number of pounds of cocoa beans that buyers are willing and able to buy at each and every price)*
    - What does the **supply** schedule show? *(The number of pounds of cocoa beans that sellers are willing and able to sell at each and every price)*
    - If the price of cocoa beans changes, what happens to the amount of cocoa beans that buyers are willing and able to buy? *(It increases when the price decreases and decreases when the price increases.)* Tell students that this phenomenon is known as the Law of Demand.
    - What happens to the amount of cocoa beans that sellers are willing and able to sell if the price of cocoa beans changes? *(It increases if the price of cocoa beans increases and decreases if the price of cocoa beans decreases.)* Tell students that this is known as the Law of Supply.
    - What happens if the market price is set higher than the **equilibrium or market-clearing price**? *(Quantity supplied will be greater than quantity demanded, so a **surplus** will occur.)*
    - At what prices on the graph will a **surplus** occur? (All prices above $12)

- What happens if the market price is set lower than the **equilibrium or market-clearing price**? *(Quantity demanded will be greater than quantity supplied, so a **shortage** will occur.)*
- At what prices on the graph will a shortage occur? *(All prices below $12)*

Closure

22. Review the main points of the lesson by asking the following questions:
    - What is the **market-clearing or equilibrium price**? *(The price at which quantity demanded equals quantity supplied)*
    - How is the **market-clearing or equilibrium price** determined? *(By the interaction of buyers and sellers in the marketplace)*
    - When does a **shortage** occur? *(At prices below the equilibrium or market-clearing price)*
    - When does a **surplus** occur? *(At prices above the equilibrium or market-clearing price)*
    - How does competition influence prices? *(When there is competition, no one buyer or seller has the power to control prices.)*

Assessment

23. Distribute *Handout 6: Market Survey* and instruct students to complete the handout.
24. When students have completed the handout, you may collect them for grading or review together as a class using the answers in the Teacher Key.

Visual 1: Examples of Buy and Sell Cards

You are authorized to **BUY**
1 pound of **cocoa beans**,
paying as **little** as possible.
If you pay more than

$_____, you lose money.

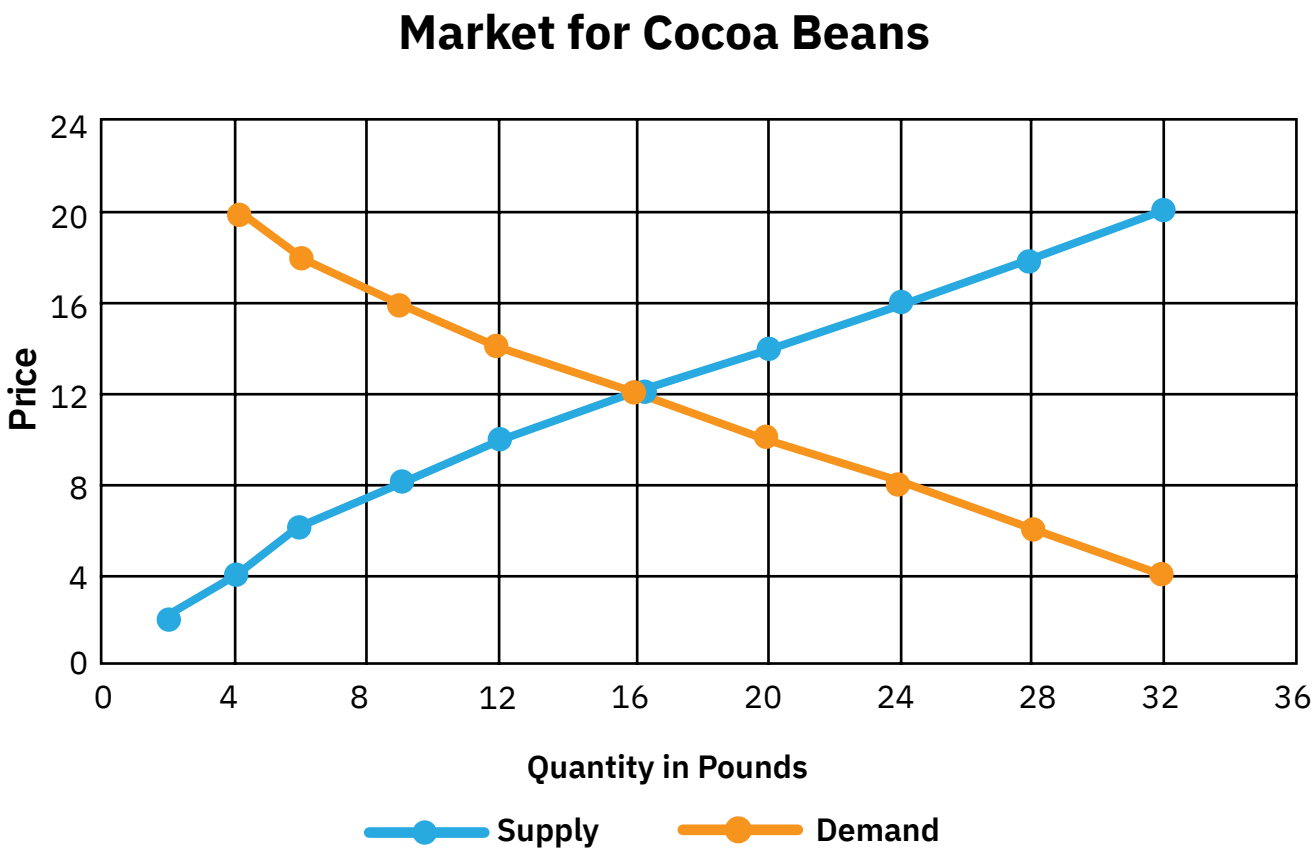
You are authorized to **SELL**
1 pound of **cocoa beans**,
for as **much** as possible.
If you accept less than

$_____, you lose money.

Visual 2: Classroom Tally Sheet

Price per pound	Round 1	Round 2	Round 3	Round 4
$22				
$21				
$20				
$19				
$18				
$17				
$16				
$15				
$14				
$13				
$12				
$11				
$10				
$9				
$8				
$7				
$6				
$5				
$4				
$3				
$2				

Visual 3: Supply, Demand, and Market Equilibrium



Handout 1: Buy Cards

You are authorized to **BUY 1 pound** of **cocoa beans**, paying as **little** as possible. If you pay more than $_______________, you lose money.	You are authorized to **BUY 1 pound** of **cocoa beans**, paying as **little** as possible. If you pay more than $_______________, you lose money.
You are authorized to **BUY 1 pound** of **cocoa beans**, paying as **little** as possible. If you pay more than $_______________, you lose money.	You are authorized to **BUY 1 pound** of **cocoa beans**, paying as **little** as possible. If you pay more than $_______________, you lose money.
You are authorized to **BUY 1 pound** of **cocoa beans**, paying as **little** as possible. If you pay more than $_______________, you lose money.	You are authorized to **BUY 1 pound** of **cocoa beans**, paying as **little** as possible. If you pay more than $_______________, you lose money.
You are authorized to **BUY 1 pound** of **cocoa beans**, paying as **little** as possible. If you pay more than $_______________, you lose money.	You are authorized to **BUY 1 pound** of **cocoa beans**, paying as **little** as possible. If you pay more than $_______________, you lose money.

Handout 2: Sell Cards

You are authorized to **SELL 1 pound** of **cocoa beans** for as **much** as possible. If you accept less than $______________, you lose money.	You are authorized to **SELL 1 pound** of **cocoa beans** for as **much** as possible. If you accept less than $______________, you lose money.
You are authorized to **SELL 1 pound** of **cocoa beans** for as **much** as possible. If you accept less than $______________, you lose money.	You are authorized to **SELL 1 pound** of **cocoa beans** for as **much** as possible. If you accept less than $______________, you lose money.
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You are authorized to **SELL 1 pound** of **cocoa beans** for as **much** as possible. If you accept less than $______________, you lose money.	You are authorized to **SELL 1 pound** of **cocoa beans** for as **much** as possible. If you accept less than $______________, you lose money.

Handout 3: Score Sheet for "A Classroom Cocoa Bean Market"

Name_____ **Circle one:** **Buyer** **Seller**

Keep track of your progress during the game on this score sheet. Each time you receive a card, record the price on the card in Column A. After you have made a sale or a purchase, write that amount in Column B. Repeat this procedure as often as possible until you have completed all four rounds of the game. At the end of the game, determine your gain (Column C) or loss (Column D) for each transaction. Determine the total number of sales, total gains, total losses, and total net gain or loss. Sellers make a gain when they sell for more than the price on their Sell Cards. Buyers make a gain when they pay less than the price on their Buy Cards. Losses are made in the opposite direction.

Transactions	Price on card (A)	Sale/purchase price (B)	Gain (C)	Loss (D)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

Total number of transactions _____Total gains _____ Total losses _____
Total net gain or loss (circle one) _____

Handout 4: Supply and Demand Schedules

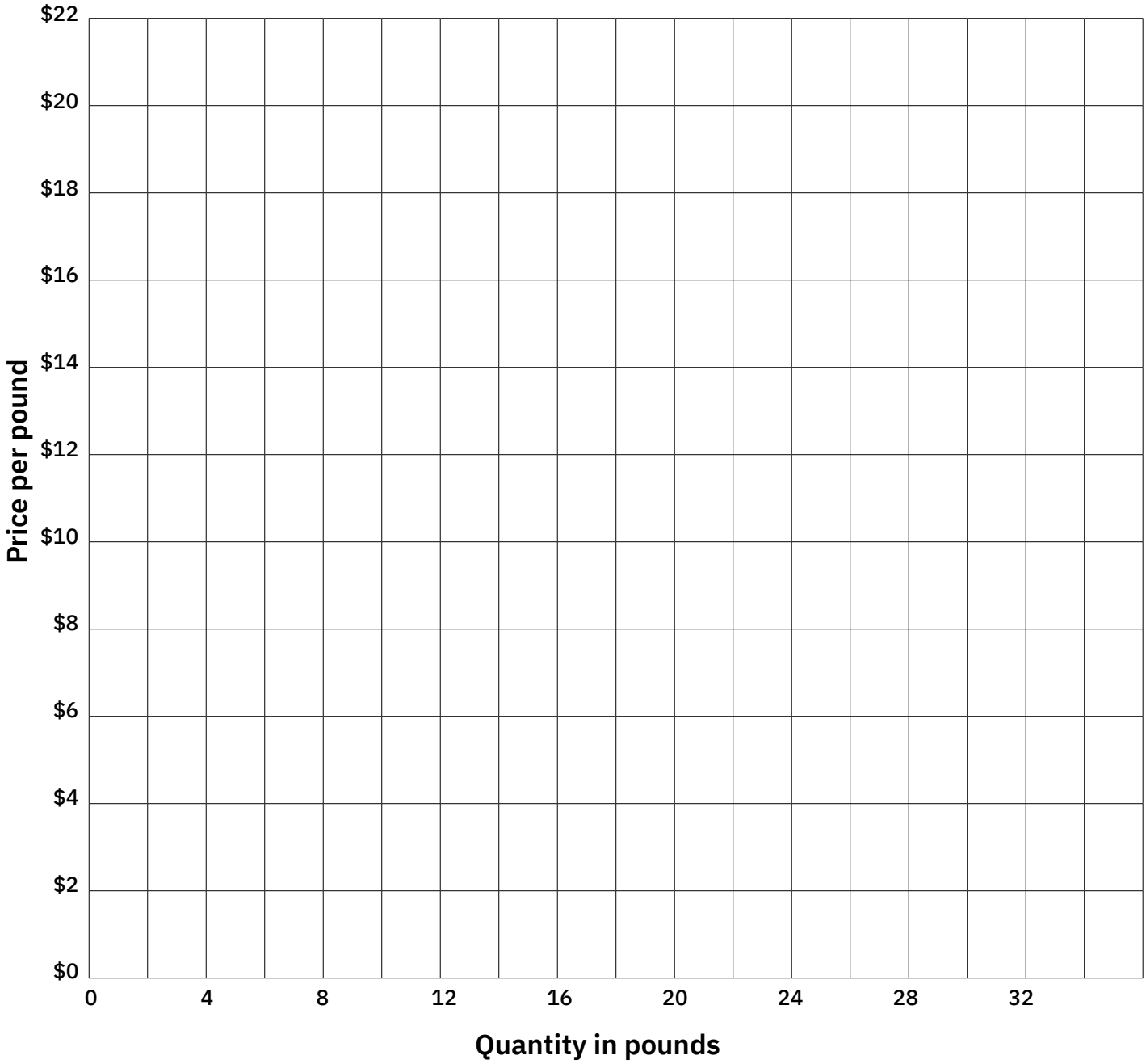
SUPPLY: In the following table, the supply schedule shows how many pounds of cocoa beans will be available for sale at the price indicated.

Price	Total quantity supplied
$2	2
$4	4
$6	6
$8	9
$10	12
$12	16
$14	20
$16	24
$18	28
$20	32

DEMAND: In the following table, the demand schedule shows how many pounds of cocoa beans will be available for sale at the price indicated

Price	Total quantity demanded
$22	2
$20	4
$18	6
$16	9
$14	12
$12	16
$10	20
$8	24
$6	28
$4	32

Handout 5: Cocoa Bean Supply and Demand



Handout 6: Market Survey

Students in an economics class interviewed local grocery store managers to estimate how many bottles of water they would be willing and able to sell at their store next month at each of five different prices selected by the class.

This is the average response for all of the stores, based on what the students learned from the managers:

Price per bottle	$1.89	$1.79	$1.69	$1.59	$1.49
Quantity sold	1000	900	800	700	600

The students also asked 100 adult shoppers at these grocery stores to estimate how many bottles of water each of them would buy next month at each of the prices selected by the class. Then they multiplied the average response from these 100 shoppers by the typical number of shoppers who will use the stores next month, based on what the store managers told them about their usual number of customers. This is what the students learned about average purchases of bottled water that could be expected next month, based on the information provided by the consumers and store managers:

Price per bottle	$1.89	$1.79	$1.69	$1.59	$1.49
Quantity bought	600	700	800	900	1000

Based on this information, answer the following questions:

1. What is the market-clearing price for bottled water?

2. In the marketplace, how will this price be determined? Remember that the store managers don't have the survey information on expected purchases.

3. What will happen if the store managers try to sell their bottled water at $1.89 per bottle?

4. Describe an example of a surplus or shortage that you have experienced in the marketplace or that you have read about or heard about from someone else.

Handout 7: Seller Badges

SELLER	SELLER
SELLER	SELLER
SELLER	SELLER
SELLER	SELLER

Accommodation

Procedure

The following procedure provides a modified method for conducting the lesson:

1. For this lesson to be successful, it is very important that students know how to effectively interact in a market simulation. Students who lack an innate sense of how to negotiate the price of cocoa beans will require a pre-lesson training session to effectively simulate their roles as buyers and sellers during the market activity.
2. Take the last 10-15 minutes of class the day before you conduct the market simulation to divide your class into student buyers and sellers.
3. Distribute the buy and sell cards to the students.
4. Ask a student with a buy card to read their card to the class. Tell the student that an acceptable price for them to buy cocoa beans based on their card would be at or below the price on the card.
5. Repeat this exercise with a student seller but tell that student the acceptable price for them to sell cocoa beans should be at or above the price on the card.
6. Now tell students to pair off with someone from the opposite side (one buyer with one seller). Based on your class size, you may have one group of three.
7. Have each pair negotiate a price that is agreeable for both sides without either side revealing the price on their card.
8. Once a price is agreed upon, have each side share their price with the other person. Tell the students that they will not share this information after each trade the next day during the actual simulation. This is simply to help each other understand the trading process.
9. Circulate around the room to make sure no student agrees on a price that results in a significant loss for them.
10. Inevitably there will be a pairing that cannot agree on a price that benefits both the buyer and seller. Tell the students that it is okay and sometimes preferable to walk away from a negotiation if the offer does not benefit them. Also, tell students that they may have to take a loss on a trade during the market simulation to move on and get a better card (deal).
11. It is important to take the 10-15 minutes to pre-teach the negotiating skills, especially since there are some students who would be less able to effectively process their trades during the simulation without the prior experience.
12. Follow the lesson as written the next day when you conduct the different rounds of the market simulation.

Standards and Benchmarks

Voluntary National Content Standards in Economics

Standard 7: Markets and Prices

A market exists when buyers and sellers interact. This interaction determines market prices and thereby allocates scarce goods and services.

- **Benchmarks: Grade 12**

  At the completion of Grade 12, students will know the Grade 4 and Grade 8 benchmarks for this standard, and also that:

  1. Market outcomes depend on the resources available to buyers and sellers, and on government policies.
  2. A shortage occurs when buyers want to purchase more than producers want to sell at the prevailing price.
  3. A surplus occurs when producers want to sell more than buyers want to purchase at the prevailing price.
  4. Shortages of a product usually result in price increases in a market economy; surpluses usually result in price decreases.

Standard 18: Economic Fluctuations

Fluctuations in a nation's overall levels of income, employment, and prices are determined by the interaction of spending and production decisions made by all households, firms, government agencies, and others in the economy. Recessions occur when overall levels of income and employment decline.