

Saving the Environment with Economic Ideas

Lesson 5: The Emissions Simulation

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Standards and Benchmarks (see page 5.21)

Lesson Description

Students play the roles of companies that must decide to either clean up their pollution or release it into the air. They make their decisions under a variety of scenarios, including a tax on emissions and a tradeable permit (cap and trade) system. The students then compare the results of the scenarios.

Grade Level

High School

Concepts

Emissions tax

Tradable permit system

Objectives

Students will be able to

- define emissions tax and tradable permit system,
 - explain why firms decide to either pollute or clean up their emissions,
 - explain how firms respond to a tax on emissions,
 - explain how a tradable permit system might work, and
 - compare regulation to market-based incentives in terms of costs of controlling pollution.
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Compelling Question

Why do emissions taxes or tradable systems minimize the cost of cleaning up the environment?

Time Required

45 minutes

Materials

- PowerPoint Slides 5.1-5.24
 - Handout 5-1, one copy for every two students (See Preparation section)
 - Handout 5-2, one copy for every two students, cut apart so that each student gets six units/cards (Print on blue paper, if possible.)
 - Handout 5-3, one copy for each student
 - Handout 5-4, one copy for the teacher (Optional: use with a document camera)
 - Handout 5-5, one copy for every four students, cut apart so that each student gets three permits (Print on yellow paper, if possible.)
 - Handout 5-6, one copy for every two students, cut apart so that each student gets \$1,500 (Print on green paper, if possible.)
 - Handout 5-7, one copy for each student
 - Standard letter-size envelopes, one per student
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Preparation

For *Handout 5-1: Emissions Clean-Up Envelope Covers*: The sheet has two sets of instructions. The instructions should be cut apart and taped on envelopes so that half the class gets an envelope with one set of instructions and the other half gets an envelope with the alternate set of instructions.

Introduction

Economists advocate the use of market-based systems that control the disposal of pollution in the environment. Disposal control happens because firms that pollute are able to seek out the lowest-cost method to achieve the levels of pollution prescribed by the government. For example, in a permit system, firms that find pollution control expensive can buy permits from firms that have a lower cost of controlling pollution, making both firms better off and reducing the overall cost of controlling pollution. Market-based systems also provide firms incentives to develop new technologies to reduce pollution.

Procedure

1. Tell the students they will participate in a simulation that illustrates how using market-based incentives minimizes the costs of controlling pollution. Explain that economists recommend market-based incentives as the best way to control pollution because of the cost-minimizing feature of these incentive systems.
2. Tell the students they will each represent a company. Distribute the following to each student:
 - Six units (cards) of CO₂ emissions from *Handout 5-2: Emissions*
 - An emissions clean-up envelope (see Step 3 for special instructions)
 - One *Handout 5-3 Student Sheet—Calculating Profit for Your Company*
3. While handing out the envelopes, be sure to alternate between the two types of envelope covers (one has higher costs than the other). If you have an odd number of students, enlist one student to help with administrative tasks so that the envelopes are evenly distributed.
4. Explain the following (also outlined in Handout 5-3 and Slide 5.2):
 - Your company produces cement. In one month, your company sells \$1,500 worth of cement.
 - Your company is polluting six tons of CO₂ into the air every month. Each card represents one ton of CO₂.
 - This emissions game is played in five rounds. At the beginning of each round, you will start with six emissions cards and an emissions clean-up envelope. The cards begin each round outside of the envelope on your desk or table. The cost of cleaning up the emissions is taped to the envelope.
 - In each round, you clean up CO₂ emissions by placing a CO₂ emissions card into the envelope. Your company must pay the amount shown on the envelope to clean up the CO₂. CO₂ emissions that are not cleaned up are released into the air. To release emissions, you will hold the cards up in the air. Each round is a new month.
 - After you decide what to do in each round, you must calculate your costs and profits. At the end of each round, you must put the six emissions cards back on your desk or table for the next round's instructions.
5. Have the students look at their clean-up envelopes. Explain that the cover of each envelope tells them how much it costs to place an additional unit of pollution into the envelope. Explain the following:
 - The first line tells you how much it costs to put the first unit into the envelope.

- The second line tells you how much it costs to put a second unit into the envelope. This is a marginal cost, which means the second unit adds the cost listed to a firm's total costs.
 - To find the firm's total cost of cleaning up two units, you must *add together* the marginal costs. For example, if the first unit costs \$10 and the second unit costs \$30, the total cost for the two units is \$40. Or, if the first unit costs \$100 and the second unit costs \$500, the total cost for the two units is \$600.
 - Adding marginal costs is very important because to determine your profits, you must figure out the total cost of cleaning up pollution.
 - To find the cost of cleaning up more units, you continue to add together the marginal costs.
6. Ask the students why the marginal (additional) costs increase as more pollution is cleaned up. (*They should correctly guess that it gets technologically more difficult to clean up more units of pollution, and so it is more expensive.*)
 7. Tell the students they will need to understand how to calculate profit for their company. Explain the following:
 - The total revenue is the amount your company received for selling its product. For this simulation, your total revenue will be \$1,500 for each round. A round represents one month.
 - To simplify the calculations, your firm has no labor or material costs. The firm only has pollution clean-up costs. Point out that in the real world things wouldn't be this simple.
 - While later rounds will have taxes and other ways to earn revenue, to calculate profit for the first few rounds, you must subtract the *total* pollution control costs from the total revenue.
 8. Tell the students that in the simulation, the decision they must make is to either clean up their CO₂ by placing the units in the envelopes or release their CO₂ by holding the units high in the air. Answer any questions the students may have before beginning the first round.
 9. After each round, *briefly* discuss the results. Save a full discussion for after the last round when you will compare all the rounds. As you debrief after each round, fill in the summary sheet from *Handout 5-4: Profit Reporting Sheet* while using a document camera. The steps below provide the instructions followed by the intended answers, which should be written on the sheet and noted to the students. Or as an alternative, Slides 5.3 to 5.12 provide the instructions followed by the intended answers for each round.

Round 1

10. Tell the students that to get rid of their emissions they can either release them into the atmosphere for free by holding them up in the air or clean up their emissions and pay the costs found on their envelope. Give the students some time to decide and then tell the students to raise the CO₂ emissions into the air or place them in the envelope. Mentally note the students' decisions and tell them to calculate their profits on their sheets. Display a copy of Handout 5-4 and record the information for each type of firm. Discuss the following:

- Who put their CO₂ emissions into the air? (*All of the students should have*)
- If you didn't put emissions into the air, why didn't you? (*Answers will vary. Some students may not have understood. Some students may have refused for ethical reasons to put pollutants into the air.*)
- Were your firms profitable? (*If they decided to release all of their pollution into the air, then their firms should have been profitable.*) See the following table (Slides 5.3 and 5.4):

Each firm:	Total Rev. \$1,500	Total Cost \$0	Profit \$1,500
Pollution released: Twelve total for each pair of firms (a high- and low-cost firm); six by each firm			

Round 2

11. Tell the students to place their six emissions cards on their desks or tables for Round 2. Explain that in this round, releasing emissions into the air is forbidden by government regulation, so they must clean up the units and pay the costs on their envelopes. Allow time for the students to compute costs and profits. NOTE: Students should have put all of the CO₂ emissions into the envelope. If they did not (some will not), tell them that as the government regulator, you will enforce the pollution law and they must put their pollution into the clean-up envelope. Display Handout 5-4 and record the information for each type of firm. Ask the students if their firms were profitable. (*For firms with lower clean-up costs, the answer is yes. For firms with higher clean-up costs, the answer is no.*) See the following table (Slides 5.5 and 5.6):

Low-cost firm:	Total Rev. \$1,500	Total Cost \$1,000	Profit \$500
High-cost firm:	Total Rev. \$1,500	Total Cost \$6,000	Profit -\$4,500
Pollution released: Zero total for each pair of firms; zero by each firm			

Round 3

12. Tell the students to place the six emissions cards on their desks or tables for Round 3. Explain that as the government regulator, you will charge an **emissions tax** of \$400 for each unit of CO₂ released into the air. Tell them to decide what they are going to do (put units into the air or into the clean-up envelope) and to write the total tax on their sheets. Then, ask them to raise their CO₂ emissions into the air. (As they raise their emissions into the air, verify they have paid the tax on their sheets.) Tell the students to calculate their profit. Display Handout 5-4 and record the information for each type of firm. Discuss the following:

- Which firms decided to pay the tax to put emissions into the air? Why? (*High-cost firms will pay to pollute five units because it is cheaper for them to pay the tax than to clean up five units. Low-cost firms will pay to pollute only one unit.*)
- Which firms decided not to pay the tax? Why? (*Low-cost firms should have decided not to pay because it is cheaper for them to clean up than to pay the tax. The high-cost firm will clean up only one unit.*)
- Which firms made a profit? (*Low-cost firms made a profit.*) See the following table (Slides 5.7 and 5.8):

Low-cost firm:	Total Rev. \$1,500	Total Cost \$500	Tax \$400	Profit \$600
High-cost firm:	Total Rev. \$1,500	Total Cost \$100	Tax \$2,000	Profit -\$600
Pollution released: Six total for each pair of firms; one by low-cost firms and five by high-cost firms				

Round 4

13. Tell the students to place the six emissions cards on their desks or tables for Round 4. Distribute three permits from *Handout 5-5: Permits* to each student. Tell them they can put an emissions card into the air only if they have a permit to hold with it. Any other emissions need to be placed in their clean-up envelopes and paid for. After giving them a short time to realize they have no real decision to make, ask them to hold up their CO₂ emissions and permit cards. Tell the students to calculate their profits. Display Handout 5-4 and record the information for each type of firm. Discuss the following:

- Did you have any real choice to make? (*No, unless students decided to clean up more than required*)
- Which firms made profits? (*The low-cost firms made profits.*)
- Which firms broke even—neither profits nor losses? (*The high-cost firms should break even.*) See the following table (Slides 5.9 and 5.10):

Low-cost firm:	Total Rev. \$1,500	Total Cost \$100	Profit \$1,400
High-cost firm:	Total Rev. \$1,500	Total Cost \$1,500	Profit \$0
Pollution released: Six total for each pair of firms; three by each firm			

Round 5

14. Tell the students to keep the three permits and place the six emissions cards on their desks or tables for the final round. Distribute \$1,500 in revenue from *Handout 5-6: Money* to each student. Tell the students they can either use their permits, sell permits to other students, or buy permits from other students with their revenue. Tell them that to encourage trading, there can be only one trade between any two companies. If they want to make additional trades, they should do so with a different student. Give them about five minutes to make their trades. After five minutes, tell them to hold up their emissions with permit cards. Any other emissions need to go into their clean-up envelopes and paid for. Have the students calculate their profits, reminding them that their revenue may be less if they bought permits or more if they sold permits. Display *Handout 5-4* and record the information for each type of firm. Discuss the following:

- Who traded permits? (*Answers will vary.*)
- For what price did you sell your permits? (*Answers will vary.*)
- Which firms made profits? (*This will vary considerably depending on students' negotiating skills. The simulation is designed such that both firm types are likely to make profits.*)

NOTE: A low-cost firm would be willing to sell its first permit if the price is \$100 or more, a second permit if the price is \$300 or more, and a third permit if the price is \$500 or more. A high-cost firm would be willing to pay up to \$900 for the first permit, up to \$500 for the second permit, and only \$100 for the third permit. Ultimately, high-cost firms will buy two permits from low-cost firms. There is a potential gain of $\$1,000 = (\$900 - \$100) + (\$500 - \$300)$. The following assumes a price of \$400 for each permit (Slides 5.11 and 5.12):

Low-cost firm:	Total Rev. \$2,300	Total Cost \$500	Profit \$1,800
High-cost firm:	Total Rev. \$700	Total Cost \$100	Profit \$600
Pollution released: Six total for each pair of firms; one by low-cost firms and five by high-cost firms. Since permits are fixed, the six total for each pair will be true for the class as a whole.			

15. Discuss the following:

- In which round did the two types of companies together make the most profit? How much? (*Round 1, with no regulation; \$3,000*) Why? (*They did not have to pay for any pollution control.*) See Slides 5.13 and 5.14.
- In which round did the two types of companies together make the least profit? How much? (*Round 2, with no pollution allowed; -\$4,000*) Why? (*They had to clean up all their pollution.*) See Slides 5.15 and 5.16.
- How much total pollution was released by each pair of companies in each of the last three rounds (with regulation)? (*In each round, the total pollution released by a high-cost firm and a low-cost firm together was six units.*) Emphasize that you will now compare these three ways of regulating pollution. See Slides 5.17 and 5.18.
- Do companies prefer tax regulation or permit regulation? (*Companies prefer permit regulation. In this game [much like in reality] permits are given to companies, so they do not have to pay for them. They prefer this is as opposed to paying a tax to pollute.*) See Slides 5.19 and 5.20.
- Is it fair to give permits to companies? (*Answers will vary. Ultimately it is a question of who receives the right to pollute—government, representing society as a whole, or firms.*)
- Which rounds resulted in the lowest clean-up costs to the companies? (*If the companies made good decisions, then Round 3, the tax round, and Round 5, the tradable-permits round, should be the same—\$600. The tax of \$400 is equivalent to issuing six permits in terms of protecting the environment. Results may vary in the permit scenario because of negotiating by students.*) See Slides 5.21 and 5.22.
- Which type of government policy do companies prefer: Emissions tax, non-tradable permits, or tradable permits? (*Tradable permits result in the highest profits because firms can trade to reduce costs and do not have to pay for the permits, as in an auction.*) See Slides 5.23 and 5.24.
- Why might a government prefer an emissions tax? (*It is easier to administer in many situations and raises revenue for the government.*)

Closure

16. Summarize the following points of the simulation:

- While firms prefer no pollution control because it is inexpensive and allows for greater profit, pollution causes great damage for society.
- Allowing no pollution gives society a pristine environment; it also means that people wouldn't get the goods and services they want at prices they could afford because companies would have to pay such high costs to clean up all of their pollution.
- Therefore, society usually must choose between an environment with no pollution at all and one where firms can pollute as much as they want. This means the government

must choose a method to control the amount of pollution that is released into the environment.

- An emissions tax and a **tradable permit system** can attain the same results if they are set appropriately. Both result in the lowest possible cost to firms. This is because market-based systems allow firms to make their own choices that result in the lowest cost combinations.
- A non-tradable permit system does not minimize costs because firms can't trade with one another to minimize costs.

Assessment

17. Distribute a copy of *Handout 5-7: Assessment* to each student. Allow time for the students to work and then review the answers as follows:

Multiple Choice

The table gives the marginal costs for two firms to clean up their pollution. Assume each firm would pollute four units of pollution (a total of eight units) if they were not regulated. Use the table to answer the next three questions.

Marginal cost to clean up	Firm A	Firm B
1st unit	\$10	\$30
2nd unit	\$20	\$40
3rd unit	\$30	\$50
4th unit	\$40	\$60

- Suppose the government charged a tax on pollution of \$25 per unit released into the environment. Firm A would clean up _____ units of pollution and pay the tax to release _____ units into the environment.
 - 0; 4
 - 1; 3
 - 2; 2
 - 3; 1
- Suppose the government charged a tax on pollution of \$25 per unit released into the environment. Firm B would clean up _____ units of pollution and pay the tax to release _____ units into the environment.
 - 0; 4
 - 1; 3
 - 2; 2
 - 3; 1

3. Suppose the government created a permit system where one permit would allow a firm to emit one unit of pollution into the environment, and the government gave Firm A and Firm B two permits each. If the permits were tradable, what would happen?
 - a. Firm A would buy one permit from Firm B.
 - b. Firm A would buy two permits from Firm B.
 - c. *Firm B would buy one permit from Firm A.*
 - d. Firm B would buy two permits from Firm A.

Short Answer

4. When governments create permit systems to control pollution, why is it important that the permits are tradable?

If permits are non-tradable, then the government is just telling firms how much they can pollute without considering costs. When permits are tradable, firms with higher costs of cleaning up their pollution can buy permits from firms with lower costs of cleaning up. This means that cleaning up is accomplished at the lowest possible cost.

5. The table gives the marginal costs for two firms to clean up their pollution. Assume each firm would pollute four units of pollution (a total of eight units) if they were not regulated. Use the table on page 1 to answer the next three questions.

- a. Suppose the government wanted the firms to cut pollution to a total of six units, which means the firms must clean up a total of two units between them. What is the lowest-cost clean-up method?

Firm A would clean up two units for a total cost of \$30.

- b. Explain why charging the firms a tax of \$25 per unit of pollution released would result in the same results as the lowest-cost clean-up method.

Firm A would clean up two units since the cost of doing so (\$10 and \$20) is lower than the tax. Firm A would pay the tax to emit two units since the cost of cleaning up (\$30 and \$40) is higher than the tax. Firm B would pay the tax for all four units because the cost of cleaning up (\$30 and up) is always higher than the tax. This results in the lowest cost possible of cleaning up—\$30 in total.

- c. Suppose the government issued six permits. Each permit allows a firm to emit one unit of pollution into the environment. What would be the most a firm would be willing to pay for a permit?

The most would be \$60, which is the highest cost for a firm to clean up the pollution instead of buying a permit.

Handout 5-1: Emissions Clean-Up Envelope Covers

Clean-Up Envelope

Any unit of emissions placed in this envelope is cleaned up.
But your firm must pay a cost for each unit as described below.

Emissions unit placed in envelope	Cost for this unit (marginal cost)
1st	\$10
2nd	\$30
3rd	\$60
4th	\$100
5th	\$300
6th	\$500

Clean-Up Envelope

Any unit of emissions placed in this envelope is cleaned up.
But your firm must pay a cost for each unit as described below.

Emissions unit placed in envelope	Cost for this unit (marginal cost)
1st	\$100
2nd	\$500
3rd	\$900
4th	\$1,300
5th	\$1,500
6th	\$1,700

Handout 5-2: Emissions

One unit of CO₂ emissions	One unit of CO₂ emissions
One unit of CO₂ emissions	One unit of CO₂ emissions
One unit of CO₂ emissions	One unit of CO₂ emissions
One unit of CO₂ emissions	One unit of CO₂ emissions
One unit of CO₂ emissions	One unit of CO₂ emissions
One unit of CO₂ emissions	One unit of CO₂ emissions

Handout 5-3: Student Sheet—Calculating Profit for Your Company (page 1 of 2)

Your company produces cement. In one month, your company sells \$1,500 worth of cement (total revenue = \$1,500).

Your company is polluting six tons of CO₂ into the air every month. Each card represents one ton of CO₂. To make this exercise simple, your company has no labor or material costs. The only cost your company may have depends on whether the company will have to reduce its CO₂ emissions. You “clean up” CO₂ emissions by placing a CO₂ emissions card into the envelope. Your company must pay the amount shown on the envelope to clean up the CO₂. Each round is a new month.

Round 1: Pollute as much as you want

Total Rev.	–	Total Cost	=	Profit
\$1,500	–	_____	=	_____

Round 2: No pollution allowed

Total Rev.	–	Total Cost	=	Profit
\$1,500	–	_____	=	_____

NOTE: Your total cost is found by adding the values of each emissions card you placed in the envelope.

Government Regulation

The government has decided that while not controlling pollution causes harm, controlling all pollution is too expensive. The government is going to try a number of different policies.

Round 3: Tax on pollution: For every emissions card you put into the atmosphere, you must pay \$400.

Total Rev.	–	Total Cost	–	Total Tax	=	Profit
\$1,500	–	_____	–	_____	=	_____

Handout 5-3: Student Sheet—Calculating Profit for Your Company (page 2 of 2)

Round 4: Permits: For each permit you have in your possession, you are allowed to release one unit of CO₂ for free. If you do not have a permit for a unit of pollution, you must clean it up.

$$\begin{array}{r r r r r} \text{Total Rev.} & - & \text{Total Cost} & = & \text{Profit} \\ \$1,500 & - & \underline{\hspace{2cm}} & = & \underline{\hspace{2cm}} \end{array}$$

Round 5: Tradable permits: You may buy permits from others with your revenue and sell permits to others. You may trade only one permit with a trading partner. To trade more, you must find another trading partner. Write down the total revenue you have remaining after trades.

$$\begin{array}{r r r r r} \text{Total Rev.} & - & \text{Total Cost} & = & \text{Profit} \\ \underline{\hspace{2cm}} & - & \underline{\hspace{2cm}} & = & \underline{\hspace{2cm}} \end{array}$$

Handout 5-4: Profit Reporting Sheet (page 1 of 2)

Round: Firm	Total revenue	Total cost	Total tax	Profits	Pollution released by firm (units)	Total pollution (units)
1: Low-cost						
1: High-cost						
2: Low-cost						
2: High-cost						
3: Low-cost						
3: High-cost						
4: Low-cost						
4: High-cost						
5: Low-cost						
5: High-cost						

Handout 5-4: Profit Reporting Sheet (page 2 of 2)

Round 1

Each firm: Total Rev. \$1,500 Total Cost \$0 Profit \$1,500

Round 2

Low-cost firm: Total Rev. \$1,500 Total Cost \$1,000 Profit \$500

High-cost firm: Total Rev. \$1,500 Total Cost \$6,000 Profit -\$4,500

Round 3 (if done correctly by student)

Low-cost firm: Total Rev. \$1,500 Total Cost \$500 Tax \$400 Profit \$600

High-cost firm: Total Rev. \$1,500 Total Cost \$100 Tax \$2,000 Profit -\$600

Round 4

Low-cost firm: Total Rev. \$1,500 Total Cost \$100 Profit \$1,400

High-cost firm: Total Rev. \$1,500 Total Cost \$1,500 Profit \$0

Round 5

The revenue will now depend on the price of a permit. NOTE: A low-cost firm would be willing to sell its first permit for \$100 or more, a second permit for \$300 or more, and a third permit for \$500 or more.

A high-cost firm would be willing to pay up to \$900 for the first permit, up to \$500 for the second permit, and only \$100 for the third permit. Ultimately, high-cost firms will buy two permits from low-cost firms. There is a potential gain of $\$1,000 = (\$900 - \$100) + (\$500 - \$300)$. The following assumes a price of \$400 for each permit:

Low-cost firm: Total Rev. \$2,300 Total Cost \$500 Profit \$1,800

High-cost firm: Total Rev. \$700 Total Cost \$100 Profit \$600

Pollution released, for each *pair* of firms (low cost and high cost)

Round 1: Twelve; six by each firm

Round 2: Zero; zero by each firm

Round 3: Six; one by low-cost firms and five by high-cost firms

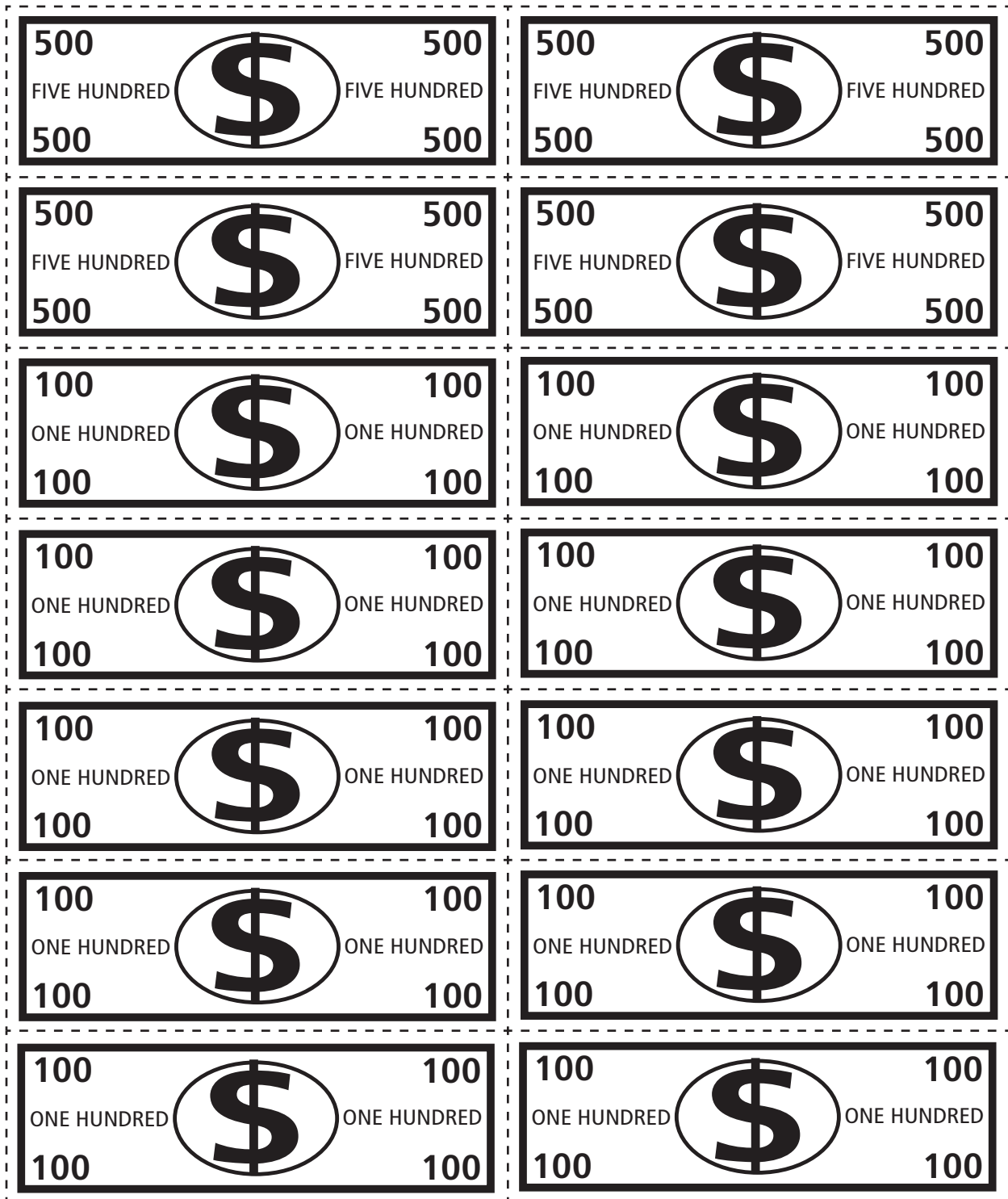
Round 4: Six; three by each firm

Round 5: Six; one by low-cost firms and five by high-cost firms (if all trades occur)

Handout 5-5: Permits

Pollution permit	Pollution permit
Pollution permit	Pollution permit
Pollution permit	Pollution permit
Pollution permit	Pollution permit
Pollution permit	Pollution permit
Pollution permit	Pollution permit

Handout 5-6: Money



Handout 5-7: Assessment (page 1 of 2)

Multiple Choice

Select the best answer for each of the following questions.

The table gives the marginal costs for two firms to clean up their pollution. Assume each firm would pollute four units of pollution (a total of eight units) if they were not regulated. Use the table to answer the next three questions.

Marginal cost to clean up	Firm A	Firm B
1st unit	\$10	\$30
2nd unit	\$20	\$40
3rd unit	\$30	\$50
4th unit	\$40	\$60

- Suppose the government charged a tax on pollution of \$25 per unit released into the environment. Firm A would clean up _____ units of pollution and pay the tax to release _____ units into the environment.
 - 0; 4
 - 1; 3
 - 2; 2
 - 3; 1
- Suppose the government charged a tax on pollution of \$25 per unit released into the environment. Firm B would clean up _____ units of pollution and pay the tax to release _____ units into the environment.
 - 0; 4
 - 1; 3
 - 2; 2
 - 3; 1
- Suppose the government created a permit system where one permit would allow a firm to emit one unit of pollution into the environment, and the government gave Firm A and Firm B two permits each. If the permits were tradable, what would happen?
 - Firm A would buy one permit from Firm B.
 - Firm A would buy two permits from Firm B.
 - Firm B would buy one permit from Firm A.
 - Firm B would buy two permits from Firm A.

Handout 5-7: Assessment (page 2 of 2)

Short Answer

Write a response to the following prompts using complete sentences and correct grammar and punctuation.

4. When governments create permit systems to control pollution, why is it important that the permits are tradable?

5. The table gives the marginal costs for two firms to clean up their pollution. Assume each firm would pollute four units of pollution (a total of eight units) if they were not regulated. Use the table on page 1 to answer the next three questions.
 - a. Suppose the government wanted the firms to cut pollution to a total of six units, which means the firms must clean up a total of two units between them. What is the lowest-cost clean-up method?

 - b. Explain why charging the firms a tax of \$25 per unit of pollution released would result in the same results as the lowest-cost clean-up method.

 - c. Suppose the government issued six permits. Each permit allows a firm to emit one unit of pollution into the environment. What would be the most a firm would be willing to pay for a permit?

Standards and Benchmarks

Voluntary National Content Standards in Economics

Standard 2: Decision Making

Effective decision making requires comparing the additional costs of alternatives with the additional benefits. Many choices involve doing a little more or a little less of something: few choices are “all or nothing” decisions.

Standard 4: Incentives

People usually respond predictably to positive and negative incentives.

Common Core State Standards

CCSS.ELA-Literacy.RH.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, as well as in words) in order to address a question or solve a problem.

