

A Yen to Trade

Lesson 3: The Tortoise and the Hare

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Standards and Benchmarks (see page 3.13)

Lesson Description

Pairs of students play the roles of the tortoise and the hare, working together to win a contest. Through trial and error, they discover the benefits of specialization, and they determine who has a comparative advantage. They then generalize this knowledge to countries.

Grade Level

6-8

Concepts

Comparative advantage

Opportunity cost

Specialization

Objectives

Students will be able to

- define comparative advantage, opportunity cost, and specialization;
 - identify who has a comparative advantage in a given situation; and
 - explain why individuals and countries should specialize in producing those things in which they have a comparative advantage.
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Compelling Question

Why should individuals and countries specialize in producing things in which they have a comparative advantage?

Time Required

40-60 minutes

Materials

- Visual 3-1, one copy for the teacher to display
 - Handout 3-1, one copy for each pair of students
 - Handout 3-2, one copy for each pair of students and one copy for the teacher to display
 - Handout 3-3, one copy for each student
 - Handout 3-4, one copy for each pair of students (optional)
 - Scissors, one pair for each pair of students
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Preparation

1. For the optional character headbands from *Handout 3-4: Tortoise and Hare Illustrations*, use the following:
 - One blank 8½" x 11" sheet of paper for each student pair
 - Stapler or tape
 - Scissors
2. Cut out each picture from the handout. Using an 8½" x 11" sheet of paper, cut out four 1½" x 11" strips of paper. Tape or staple two strips of paper together at the ends to make a longer strip. Do the same with the other two strips. Staple or tape the longer strips to the bottom corners of each character picture to make a headband that will fit around the top of a student's head. When students are directed to put on the headbands, tape can be used to secure it on their heads. Repeat the instructions for each character headband.

NOTE: The headbands can be laminated and Velcro® fastened on each end so that they can be reused. After each use, they can be gently wiped down.

Procedure

1. Display *Visual 3-1: The Big Harvesting Event* and read the story to the class. Then pair students, explaining that one will play the role of the hare, the other the tortoise. Let them decide who will play each role.
 - Optional: Distribute character headbands from Handout 3-4 or instruct students on how to make the headband for their chosen role using the instructions in the Preparation section.
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2. Distribute a pair of scissors and a copy of *Handout 3-1: Carrot and Lettuce Cards* to each student pair. Tell them to cut out the cards along the dotted lines. Explain that the cards represent the 5 carrots and 5 heads of lettuce that must be harvested during the event.

3. Distribute a copy of *Handout 3-2: Harvesting Times* to each student and display a copy of it. Tell students to cut the handout along the dotted line, with each student taking the half for his or her role. Explain that each pair of students is to find the fastest way to divide the task of harvesting 5 carrots and 5 heads of lettuce. The worksheets on Handout 3-2 should be used to help determine how much time would be used. Use the following examples to model the process:
 - Suppose that a team decides to split the task so that the hare harvests 3 carrots and 2 heads of lettuce. The tortoise does just the opposite; that is, he harvests 2 carrots and 3 heads of lettuce.
 - Using one pair's cards, show how the cards are divided between the two students (the hare and the tortoise). Give 3 carrot and 2 lettuce cards to the hare; give 2 carrot and 3 lettuce cards to the tortoise. Tell student pairs to do the same.
 - Using your copy of Handout 3-2, enter "1" under column (1) in the first empty row on both worksheets, explaining that this is the first option. Tell all hares and tortoises to do the same.
 - Tell the students to write the number of heads of lettuce under column (2). Enter those numbers on your copy for the hare and tortoise. (*2 for the hare; 3 for the tortoise*)
 - Have students calculate the number of minutes it would take to harvest their heads of lettuce by multiplying the amount in column (2) by the number of minutes required to harvest lettuce for their animals. Write the answers on the handout. (*4 minutes for the hare; 15 minutes for the tortoise*)
 - Follow the same procedure to record the minutes required to harvest carrots in column (5). Write the answers on the handout. (*3 minutes for the hare; 4 minutes for the tortoise*)
 - Tell the students to add the total minutes required to harvest their carrots and lettuce on their worksheets. (*7 minutes for the hare; 19 minutes for the tortoise*)
 - Ask the students how long it would take if the harvesting were divided in this way. (*It would take 19 minutes.*) In this case, the hare would be finished in just 7 minutes, but the task would not be completed until the tortoise finishes. So, this strategy would lead to a finishing time of 19 minutes.

4. Tell the student pairs to try other strategies (options), such as a 4-1 or 1-4 split. For each strategy, they should complete another row on their worksheets. Help them with the math where needed. Have the pairs report on the fastest strategy they were able to find. (*Most pairs should have discovered that the fastest strategy is to have the hare harvest all 5 heads of lettuce and to have the tortoise harvest all 5 carrots. Each would require 10 minutes to complete their individual harvesting, so the entire task would be completed by the team in*

10 minutes.) Explain that when people, or hares and tortoises in this case, put all their effort into doing or producing one thing, it is called **specialization**. Discuss the following:

- Who should specialize in harvesting heads of lettuce? (*The hare*)
- Who should specialize in harvesting carrots? (*The tortoise*)
- If the hare and tortoise had specialized in the other product, how much time would have been required? (*Some pairs may have tried this option. It would take the tortoise 25 minutes to harvest 5 heads of lettuce; it would take the hare 5 minutes to harvest 5 carrots. Thus, the team would have finished in 25 minutes.*)
- Do the hare and tortoise minimize the amount of time required by specializing, regardless of which each specializes in? (*No, the amount of time is minimized only when the hare specializes in harvesting lettuce and the tortoise specializes in harvesting carrots.*)

5. Point out that there is a way to determine what each should specialize in besides using a trial-and-error process as they did on their worksheets. Explain that specialization should occur when there is a comparative advantage. **Comparative advantage** is the ability to do something at a lower opportunity cost than someone else. **Opportunity cost** is the value of the next-best alternative when a decision is made; it's what is given up. Discuss the following:

- For every head of lettuce that the hare decides to harvest, how many carrots will she be unable to harvest? (*She gives up 2 carrots because each head of lettuce takes the hare 2 minutes to harvest. In 2 minutes, she could have harvested 2 carrots. Therefore, the opportunity cost of harvesting 1 head of lettuce is 2 harvested carrots.*)
- What is the opportunity cost of harvesting a head of lettuce for the tortoise? (*He gives up 2½ carrots because it takes 2 minutes for each carrot.*)
- Who has the lower opportunity cost of harvesting a head of lettuce? (*The hare has the lower opportunity cost because she only gives up 2 carrots, but the tortoise gives up 2½.*)
- Who has the comparative advantage (i.e., the lower opportunity cost) in harvesting lettuce? (*The hare*)
- For every carrot that the hare decides to harvest, how many heads of lettuce will she give up? (*She gives up one-half of a head of lettuce because it takes 1 minute to harvest a carrot and 2 minutes to harvest lettuce. Therefore, 1 minute would only allow her to complete half the harvesting of a head of lettuce.*)
- What is the opportunity cost of harvesting a carrot for the tortoise? (*Two-fifths of a head of lettuce*)
- Who has the lower opportunity cost of harvesting a carrot? (*The tortoise has the lower opportunity cost because he only gives up two-fifths of a head of lettuce, but the hare must give up one-half of a head of lettuce. If necessary, remind the students that one-half is greater than two-fifths.*)
- Who has the comparative advantage (i.e., the lower opportunity cost) in harvesting carrots? (*The tortoise*)

6. Emphasize that when the hare and the tortoise specialize in doing things in which they have a comparative advantage, they're able to produce a given amount of carrots and lettuce in the shortest amount of time. That is, when they specialize in what they do best (where they have the lowest opportunity cost), they can do better.
 7. Refer the students to the Handout 3-2 headings "Hare Worksheet" and "Tortoise Worksheet." Have them replace the word "Hare" with "Canada" and "Tortoise" with "U.S." In the lines below the headings, have them replace the words "head of lettuce" with "ton of leather," "carrot" with "car," "minutes" with "hours of labor," and "harvest" with "produce." Tell them to change the wording in the tables of the worksheet accordingly. Ask them to identify who should specialize in each product. (*The U.S. should specialize in car production, while Canada should specialize in leather production.*) Explain that when the U.S. specializes in car production and Canada specializes in leather production, the least amount of labor time, and labor resources, to produce the total output is used. The two countries could then trade with each other to get the amount of each good they desire. (See Lesson 5.)
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Closure

8. Discuss the following to emphasize the major points of the lesson:
 - What is specialization? (*When people put all their effort into doing or producing one thing*)
 - What is the opportunity cost of doing something? (*The value of the next-best alternative when a decision is made; it's what is given up. It is the most valuable alternative that could have been done.*)
 - What would be the opportunity cost of going to a movie? (*The next-best thing you could have done with your time and the next-best thing you could have spent your money on*)
 - If someone has a comparative advantage in doing something, what does that mean? (*It means his or her opportunity cost of doing it is lower than everyone else's.*)
 - Why is it desirable for people to specialize in things in which they have a comparative advantage? (*Things will be produced in the least costly way.*)

Assessment

9. Distribute a copy of *Handout 3-3: Assessment*. Allow time for the students to work and then review the answers as follows:

Multiple Choice

- Justin has three choices of what to do for the next hour—skateboard, read, or clean his room. He likes skateboarding most, reading next, and cleaning his room least. So, he decides to go skateboarding. What is the opportunity cost of his decision?
 - Reading
 - Cleaning his room
 - Reading and cleaning his room
 - Wear and tear on his skateboard
- LaTanya's opportunity cost of washing 1 plate is washing 1 glass. Tyler's opportunity cost of washing 1 plate is 2 glasses. Who has the comparative advantage in washing plates?
 - LaTanya
 - Tyler
- If the U.S. has a comparative advantage in producing computers, it should
 - import computers from other countries.
 - specialize in producing other goods.
 - specialize in producing computers.*
 - not produce computers.

Short Answer

Check students' worksheets for accuracy.

Students should recognize that because of the change in the tortoise's opportunity costs, he now has the comparative advantage in lettuce harvesting, and the hare has the comparative advantage in carrot harvesting. This implies that the tortoise should now specialize in lettuce harvesting and the hare should specialize in carrot harvesting. However, it should be noted that it would take the hare 5 minutes to harvest all 5 carrots, while it would take the tortoise 15 minutes to harvest 5 heads of lettuce (5 x 3 minutes each). Thus, if they strictly specialize, it will take 15 minutes to complete the task, but the hare would be doing nothing for 10 minutes! Clearly, once the hare has reached the goal of 5 carrots, she could then start helping the tortoise by harvesting lettuce. The fastest time can be achieved by having the hare harvest 5 carrots and 2 heads of lettuce, which takes 9 minutes. The tortoise, then, specializes in harvesting 3 heads of lettuce, which also takes 9 minutes.

NOTE: While the best result is still found by considering who has the comparative advantage and specializing accordingly, strict specialization by both producers may not be best. This helps explain why some countries may produce goods in which they do not have a comparative advantage, such as the hare is doing in this example.

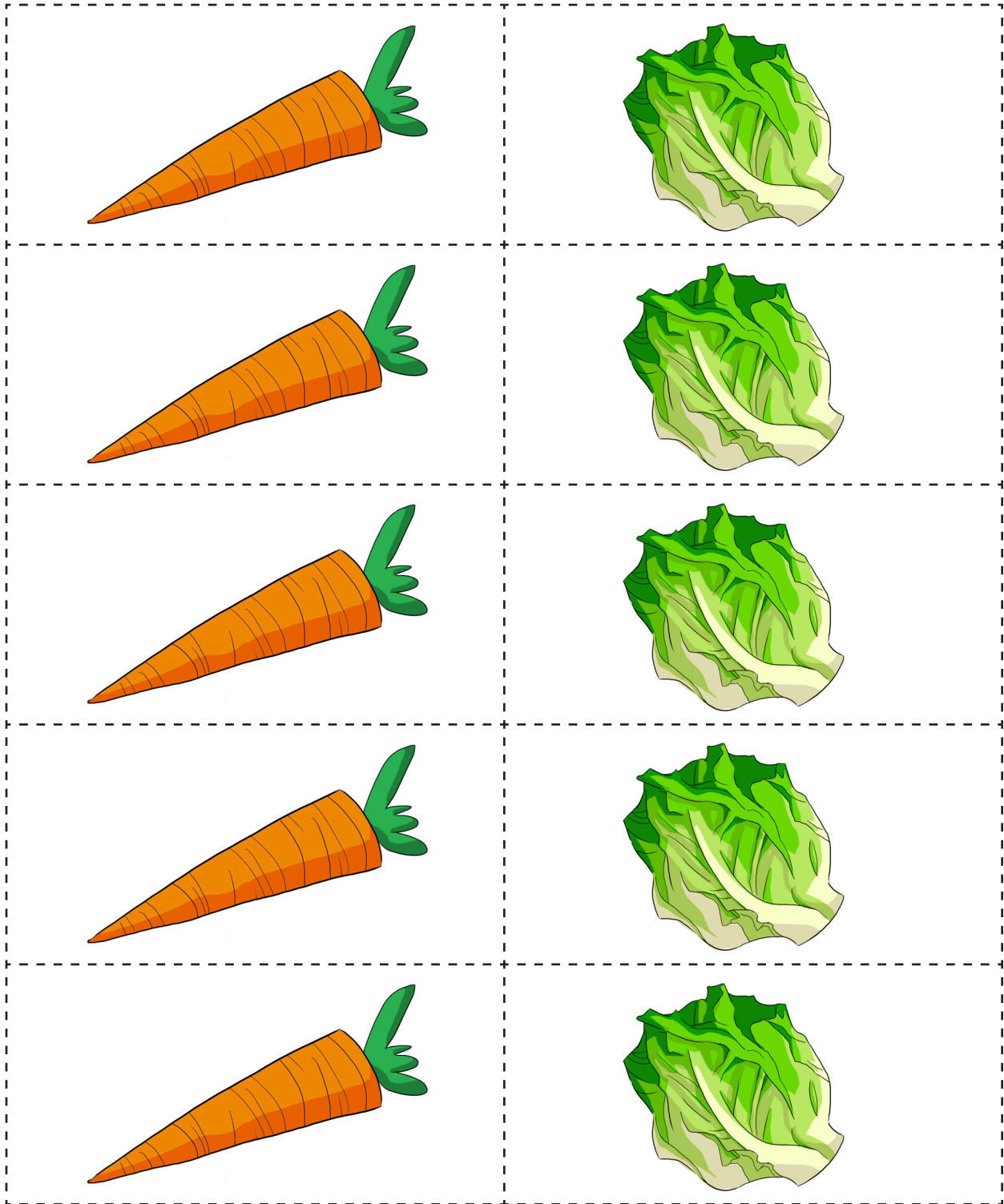
Visual 3-1: The Big Harvesting Event

It has been a year since the big race between the wise tortoise and the speedy hare. In the Meadow Olympics this year, they have decided to team up in the Big Harvesting Event. This event has teams of two harvest **5** carrots and **5** heads of lettuce as fast as they can. The team that does this in the shortest amount of time wins.

The hare and the tortoise have been practicing for months. The speedy hare can harvest **1** carrot in about **1** minute, while the tortoise needs **2** minutes. The hare is also faster at harvesting lettuce. She takes **2** minutes to harvest each head, while the tortoise takes **5** minutes.

They must decide the best strategy to use during the event. That is, how many carrots and heads of lettuce should each of them harvest? The hare says she should harvest everything because she is so much faster. The wise tortoise does not think this would be a good strategy.

Handout 3-1: Carrot and Lettuce Cards



Handout 3-2: Harvesting Times

Directions: Using the times provided below, find the fastest way to divide the task of harvesting 5 carrots and 5 heads of lettuce.

Hare Worksheet					
One head of lettuce takes 2 minutes to harvest. One carrot takes 1 minute to harvest.					
(1) Option number	(2) Number of heads of lettuce	(3) Total minutes to harvest lettuce (2) x 2 minutes	(4) Number of carrots	(5) Total minutes to harvest carrots (4) x 1 minute	(6) Total minutes required (3) + (5)
		minutes		minutes	minutes
		minutes		minutes	minutes
		minutes		minutes	minutes
		minutes		minutes	minutes
		minutes		minutes	minutes
		minutes		minutes	minutes
		minutes		minutes	minutes

Directions: Using the times provided below, find the fastest way to divide the task of harvesting 5 carrots and 5 heads of lettuce.

Tortoise Worksheet					
One head of lettuce takes 5 minutes to harvest. One carrot takes 2 minutes to harvest.					
(1) Option number	(2) Number of heads of lettuce	(3) Total minutes to harvest lettuce (2) x 5 minutes	(4) Number of carrots	(5) Total minutes to harvest carrots (4) x 2 minutes	(6) Total minutes required (3) + (5)
		minutes		minutes	minutes
		minutes		minutes	minutes
		minutes		minutes	minutes
		minutes		minutes	minutes
		minutes		minutes	minutes
		minutes		minutes	minutes
		minutes		minutes	minutes

Handout 3-3: Assessment (page 1 of 2)

Multiple Choice

Directions: Choose the correct answer for each of the following questions.

1. Justin has three choices of what to do for the next hour—skateboard, read, or clean his room. He likes skateboarding most, reading next, and cleaning his room least. So, he decides to go skateboarding. What is the opportunity cost of his decision?
 - a. Reading
 - b. Cleaning his room
 - c. Reading and cleaning his room
 - d. Wear and tear on his skateboard

2. LaTanya’s opportunity cost of washing 1 plate is washing 1 glass. Tyler’s opportunity cost of washing 1 plate is 2 glasses. Who has the comparative advantage in washing plates?
 - a. LaTanya
 - b. Tyler

3. If the U.S. has a comparative advantage in producing computers, it should
 - a. import computers from other countries.
 - b. specialize in producing other goods.
 - c. specialize in producing computers.
 - d. not produce computers.

Handout 3-3: Assessment (page 2 of 2)

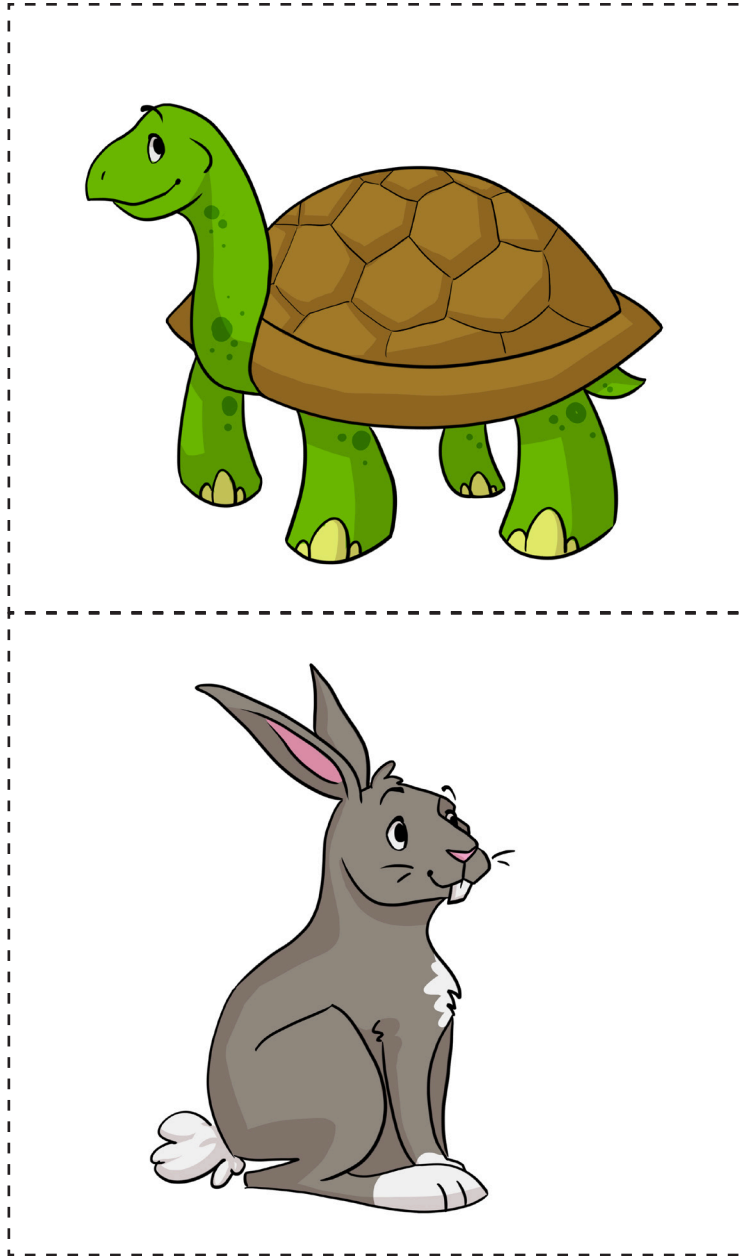
Short Answer

Directions: Using the times provided below, find the fastest way to divide the task of harvesting 5 carrots and 5 heads of lettuce.

Hare Worksheet					
One head of lettuce takes 2 minutes to harvest. One carrot takes 1 minute to harvest.					
(1) Option number	(2) Number of heads of lettuce	(3) Total minutes to harvest lettuce (2) x 2 minutes	(4) Number of carrots	(5) Total minutes to harvest carrots (4) x 1 minute	(6) Total minutes required (3) + (5)
		minutes		minutes	minutes
		minutes		minutes	minutes
		minutes		minutes	minutes
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Tortoise Worksheet					
One head of lettuce takes 3 minutes to harvest. One carrot takes 2 minutes to harvest.					
(1) Option number	(2) Number of heads of lettuce	(3) Total minutes to harvest lettuce (2) x 3 minutes	(4) Number of carrots	(5) Total minutes to harvest carrots (4) x 2 minutes	(6) Total minutes required (3) + (5)
		minutes		minutes	minutes
		minutes		minutes	minutes
		minutes		minutes	minutes
		minutes		minutes	minutes
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		minutes		minutes	minutes
		minutes		minutes	minutes

Handout 3-4: Tortoise and Hare Illustrations



Standards and Benchmarks

National Content Standards in Economics

Standard 1: Scarcity

Productive resources are limited. Therefore, people cannot have all the goods and services they want; as a result, they must choose some things and give up others.

- **Benchmark: Grade 4**

5. The opportunity cost of an activity is the value of the best alternative that would have been chosen instead. It includes what would have been done with the money spent and the time and other resources used in undertaking the activity.

Standard 6: Specialization

When individuals, regions, and nations specialize in what they can produce at the lowest cost and then trade with others, both production and consumption increase.

- **Benchmarks: Grade 4**

1. Economic specialization occurs when people concentrate their production on fewer varieties of goods and services than they consume.
4. Greater specialization leads to increasing interdependence among producers and consumers.

- **Benchmark: Grade 8**

2. Like trade among individuals within one country, international trade promotes specialization and division of labor and increases the productivity of labor, output, and consumption.

- **Benchmarks: Grade 12**

1. Individuals and nations have a comparative advantage in the production of goods or services, if they can produce a product at a lower opportunity cost than other individuals or nations.
2. International trade stems mainly from factors that confer comparative advantage, including international differences in the availability of productive resources and differences in relative prices.

