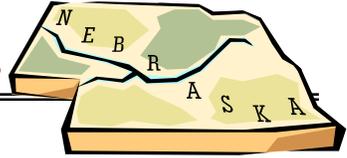


Lesson 9: Production and Costs



Overview: The entrepreneur combines other resources in production. When there are only a fixed amount of tools, or capital goods, to work with the amount of output that can be made is somewhat limited. Within this time frame, the costs of production depend on the ability to produce items. This hands-on lesson will help students understand what an entrepreneur must grapple with in terms of controlling costs of production as well as developing an understanding of the concept of diminishing returns.

Economic Concepts:

Diminishing Returns
Production Costs
Economic Resources (land, labor, capital)
Productivity

Objectives: The students will be able to:

- 1) Define productivity
- 2) Identify the factors of production (land, labor, capital)
- 3) Explain the concept of diminishing marginal returns
- 4) Calculate cost of labor per unit of output produced

Nebraska Standards:

SS/H—8.3.5, 12.4.17, 12.4.26
R/W—005.02A, 005.04A, 006.02A, 006.03A, 006.04A
Mathematics—005.01A, 005.02C, 005.05B, 006.02C

Materials:

- 1) A large supply (100 copies, perhaps) of the Cup Origami pattern found in Microsoft Publisher, or at the end of this lesson plan. (Activity Sheet 9-1)
- 2) One pair of scissors
- 3) A stop-watch, or any time device that can be used to keep track of five minute intervals
- 4) Overhead of Activity Sheet 9-2

Time Required: 1 or 2 class periods

Procedure:

- 1) Explain that production occurs by combining resources such as labor and capital. Have students mention examples of production they are familiar with and have them make a list of the resources used in that production. (McDonald's uses labor and various kitchen appliances. Gasoline stations have labor and gas pumps.)
- 2) Tell the students that they will produce paper cups today and the resources they will use are the pattern of the cups copied from Microsoft Publisher or the pattern on Activity Sheet 9-1 at the end of this lesson, the capital good scissors, and labor.
- 3) Explain that production will occur in several rounds and each round will take five minutes. The first round will have only one unit of labor using all the other resources. The second round will have two units of labor and the third round will have three units of labor and so on. Five or six rounds should be done to see a trend in production occur.
- 4) Read the following "Rules" for production to students before beginning the first round. This will provide instructions for completing the tasks each round as well as help you determine if they are using listening skills to follow directions.
- 5) In each round of production the labor will cut out the box pattern of the cup and then fold along the lines to complete the production of a cup as shown in the directions. (Hold up the cup pattern while explaining this step)
- 6) In a given round the labor will produce as many cups as they can, but the cups should be well constructed if they are going to be sold.
This is not a race.
- 7) Once there is more than one unit of labor, specialization can occur as if along an assembly line. For example, one person could cut out the square pattern, one could make the first fold, and so on.
- 8) Inventory from one period will **NOT** be used in other rounds because we are comparing what can be produced in a given time frame with a given amount of capital.
- 9) After each round the total amount produced will be recorded on the overhead of Activity Sheet 9-2. (Do not be surprised, for example, if

round two does not show exactly twice as much output as round one. Exactly equal increments of output may not be added each round. In fact you will probably eventually see the concept of *diminishing returns*, or *diminishing marginal product*, to labor set in. This means additions of labor add less and less output [total output may even fall if a lot of labor is added]) Explain this concept when it occurs during the rounds of production.

- 10) Have the production occur for rounds 1-5 or 6 remembering to add one more unit of labor each round.
- 11) Using the overhead of Activity 9-2, record the results of production in Column B and then find the marginal product of each unit of labor and record the number in Column C of the overhead. As an example say the production occurred as follows in the four rounds: 5, 12, 17, and 20. Note that if there is no labor there is no output. Then the first worker helped add 5 units of output (*5 minus 0*). The second worker added 7 units of output (*12 minus 5*), the third worker added 5 units and the fourth worker added 3 units. *Diminishing returns* set in with the third worker in this example because the marginal product declined from 7 to 5 with the addition of the third worker. Note the reason for this is that with only one pair of scissors only so much can be cut, so additional workers are probably waiting on patterns to be cut. Thus, additional workers can't add as much output as previous workers.
- 12) Have students calculate the labor cost per unit of marginal product for each of the rounds completed and record the results in Column D of the overhead. For example, say each worker gets paid \$7 during the period of production. Since the first worker added 5 units of output, those units cost the company an additional (in addition to the cost of the scissors and the paper) \$1.40 per unit of output (*\$7 divided by 5*). The second worker added 7 units of output, or added output at \$1 per unit of output (*\$7 divided by 7*). The third worker added output at \$1.40 per unit of output and the fourth worker added output at a cost of \$2.33 per unit of output added.

- 13) Close the lesson by asking the following questions based on the results recorded on the overhead:
- 14) What factors of production were used to produce the cups? (*capital-scissors and paper; labor*)
- 15) With the addition of what worker(s) did diminishing returns occur? (*at any point where marginal product was lower than the previous round*)
- 16) What happens to the cost per unit as diminishing returns set in? (*it rises*)
- 17) Why is it important for an entrepreneur to understand the concept of diminishing returns? (*If they try to produce too much output, it may become so costly that they cannot sell the units at a price high enough to cover costs*)
- 18) To summarize the lesson: Make sure the students understand that additional costs of additional output first falls, but then increases. Not all units of production cost the same amount. When diminishing returns have set in the cost of making additional units rises. As an entrepreneur this is important to know because if you try to make so much output it may get so costly on the additional units that you can never sell the units for a price high enough to recover your costs. As an entrepreneur you may want to give the customers all they want, but you have to balance this against your own bottom line.

Assessment:

- 1) The scissors that were used to cut out the cup origami pattern would be an example of ...
 - A. labor
 - B. land
 - C. capital*
 - D. entrepreneurship
- 2) If 1 worker produces a total of 4 units of output, 2 workers produce a total of 10 units of output, 3 workers produce a total of 18 units of output, 4 workers produce a total of 25 units of output, 5 workers produce a total of 30 units of output, and 6 workers produce a total of

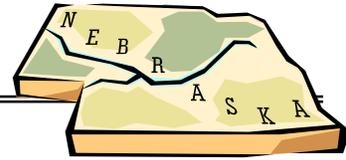
28 units of output, with the addition of what worker do diminishing returns first occur?

- A. worker 6
 - B. worker 3
 - C. worker 4*
 - D. worker 5
- 3) Briefly explain what the entrepreneur could do to improve the productivity of the additional workers hired. Use complete sentences for your answer.

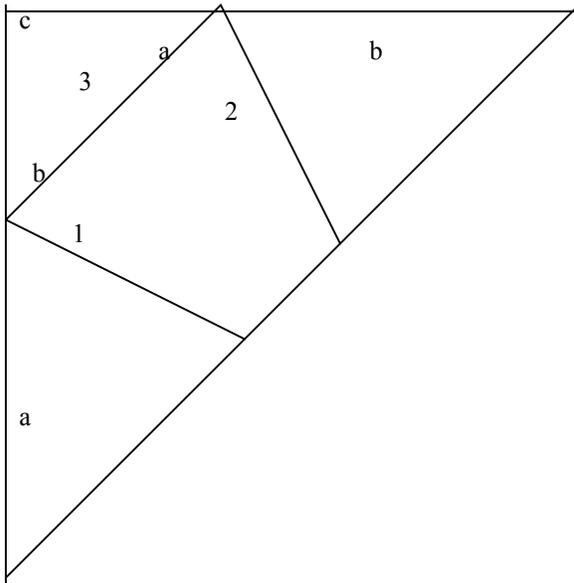
Extension Activities:

Have the students write a letter to the owner of the cup factory explaining the concept of diminishing returns and then offer suggestions on how to improve the productivity of the additional workers hired. Students should apply the principles of six-trait writing to their letters.

Activity 9-1



Step 1 – Fold across diagonal and keep design showing on the outside



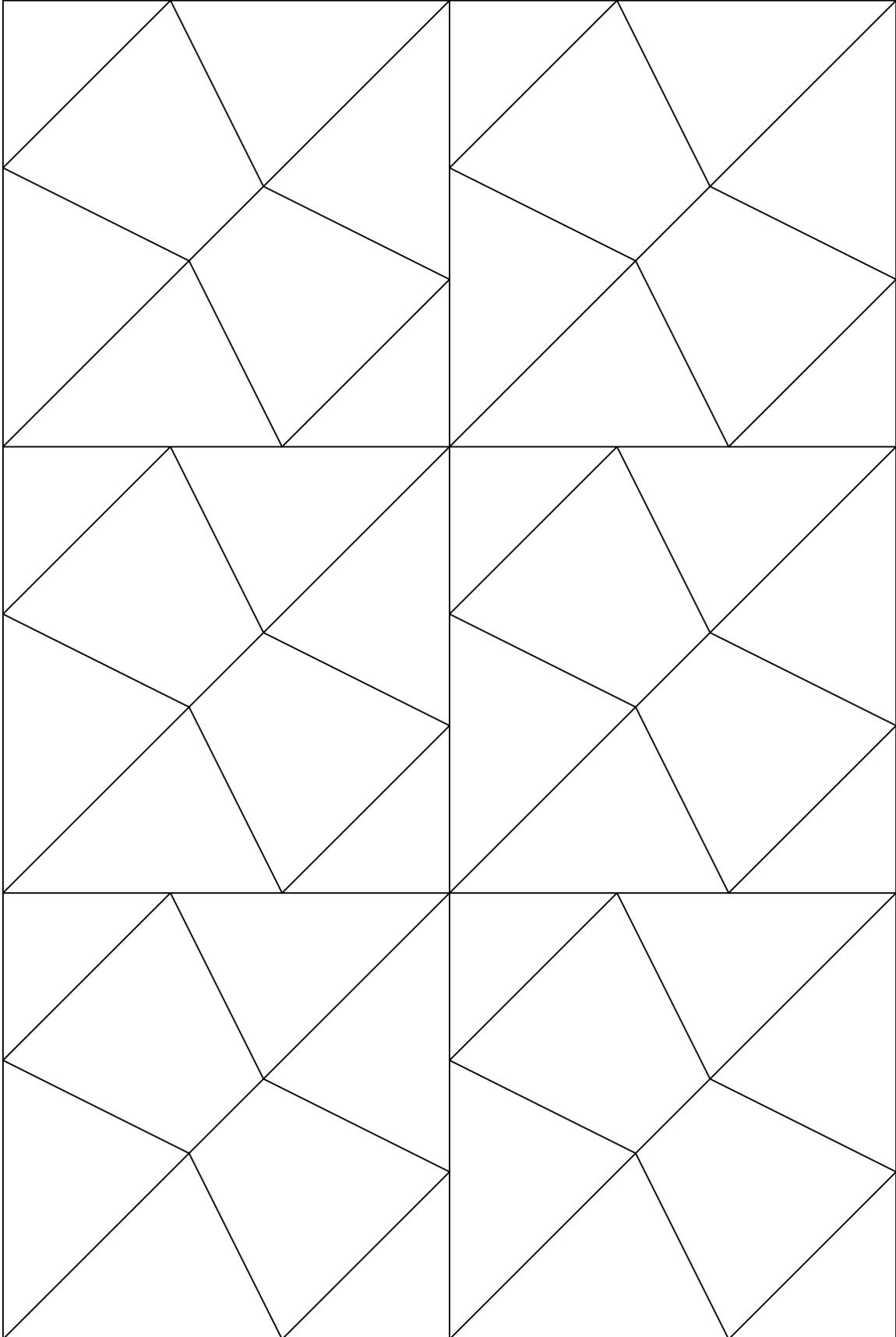
Step 2 – fold along line 1 so that the a's meet.

Step 3 – fold along line 2 so that the b's meet, but over what you did in step 2.

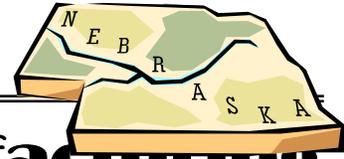
Step 4 – up at top in area labeled c, fold one piece forward to line 3 and one side back to line 3.

Step 5 – Open the cup. You do not have to do this step during production, but a cup should not be considered good if this step is not easy to do.

Activity 9-1 (cont.)



Activity 9-2



Origami Cup Manufacturing

Record of Production

Number of Workers	Total Production	Marginal Product	Cost Per Unit of Marginal Product
0	0	0	0
1	_____	_____	_____
2	_____	_____	_____
3	_____	_____	_____
4	_____	_____	_____
5	_____	_____	_____
6	_____	_____	_____