

ACTIVITY 3

Scarcity, Opportunity Cost, Values, and Choice

Unfortunately for you, both your mathematics and economics teachers have decided to give tests two days from now. (Remember, this is a fictitious example.) You have pondered the problem and realize that you can spend a *total of 9 hours* studying for *both* exams. Your real problem is to decide how to allocate your 9 hours (scarce resource) in studying for both exams (competing goals).

After some deep thought, you construct the following tables to guide you in this decision. These tables tell you what score you expect to get in each course, given the number of hours you might spend studying for each exam.

Economics: Study and Score

<u>Number of Hours Studied</u>	<u>Expected Score</u>
0	0
1	26
2	48
3	61
4	73
5	83
6	91
7	97
8	100

Mathematics: Study and Score

<u>Number of Hours Studied</u>	<u>Expected Score</u>
0	0
1	24
2	44
3	62
4	75
5	84
6	91
7	96
8	100

Part A.

The first problem is to decide what values you attach to the courses.

1. If economics has the highest priority, i.e., you want to get 100 on the economics exam, what will your score on the mathematics test be? _____
2. If mathematics has the highest priority, i.e., you want to get 100 on the mathematics exam, what will your score on the economics test be? _____
3. Now suppose the minimum passing grade is 50 in each subject.
 - a. An **implicit** cost of getting 100 on the economics exam is to (*pass/fail*) mathematics. (Cross out one.)
 - b. An **implicit** cost of getting 100 on the mathematics exam is to (*pass/fail*) economics. (Cross out one.)

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Part B.

Suppose now that instead of trying for 100 in one course, you want to get the highest possible combined score, using the 9 hours you have available for studying.

- One way to proceed is to compare all different 9-hour combinations. To do this, complete the following table by filling in all of the blank spaces.

Combinations of Economics and Mathematics Study

Total Hours		Scores		Combined Score
Economics	Mathematics	Economics	Mathematics	
<u>8</u>	<u>1</u>	<u>100</u>	<u>24</u>	<u>124</u>
<u>7</u>	<u>2</u>	<u>97</u>	<u>44</u>	<u>141</u>
—	<u>3</u>	—	<u>62</u>	—
—	<u>4</u>	—	<u>75</u>	—
—	<u>5</u>	—	<u>84</u>	—
—	<u>6</u>	—	<u>91</u>	—
—	<u>7</u>	—	<u>96</u>	—
<u>1</u>	—	<u>26</u>	—	—

What is the “best” allocation of study hours in terms of attaining the highest combined score? _____ hours economics and _____ hours mathematics

- An alternative method of finding the “best” allocation of study hours is to do what economists call *working at the margin*. In order to utilize this method we must go back to our original tables and add a third column to each one as is done below. These columns, labeled “marginal increase” in the table, give the *change* in the expected score which will result from a one-hour *change* in study time spent upon each particular course.

Marginal Increase of Mathematics and Economics Study

ECONOMICS			MATHEMATICS		
Hours	Scores	Marginal Increase	Hours	Scores	Marginal Increase
0	0	----- 26	0	0	----- 24
1	26	----- 22	1	24	----- 20
2	48	----- 13	2	44	----- 18
3	61	----- 12	3	62	----- 13
4	73	----- 10	4	75	----- 9
5	83	----- 8	5	84	----- 7
6	91	----- 6	6	91	----- 5
7	97	----- 3	7	96	----- 4
8	100		8	100	

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You now proceed by asking: "Where should I use each additional (marginal) hour?" The answer is: "Where it will do the most for increasing my combined score." For example, the first hour of study can be allocated to economics or mathematics. If it is allocated to economics, your total score will increase by 26; if it is allocated to mathematics, your total score will increase by 24. Hence, it is best to allocate hour number 1 to economics. The second hour can either increase your economics score by 22 or your mathematics score by 24—give it to mathematics. Complete all of the appropriate blanks in the table below to record your results. Remember that as you allocate an additional hour to mathematics or economics you move down one row in the corresponding table above.

Allocation of Time to Economics and Mathematics Study

Hour Number	Allocate to		Marginal Increase	Total Score
	Economics	Mathematics		
1	<u>X</u>	—	<u>26</u>	<u>26</u>
2	—	<u>X</u>	<u>24</u>	<u>50</u>
3	—	—	—	—
4	—	—	—	—
5	—	<u>X</u>	<u>18</u>	—
6	—	—	—	—
7	—	—	—	<u>136</u>
8	—	—	<u>12</u>	—
9	—	—	—	—

Total hours: Economics: _____
Mathematics: _____

Total Scores: _____

Explain why these answers agree with your answers in part B1 above.

Indicate the hour(s) at which it makes no difference to allocate an additional hour of study to economics or mathematics.

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Part C.

Now you have figured out three alternative ways to allocate your time **1**: 8 economics, 1 mathematics; **2**: 1 economics, 8 mathematics; **3**: 5 economics, 4 mathematics. Assuming that these three alternatives are the only ones you consider:

- the opportunity cost of selecting alternative **1** would be the loss of alternative _____ or alternative _____ depending on which of these alternatives you prefer.
- the opportunity cost of selecting alternative **2** would be the loss of alternative _____ or alternative _____ depending on which of these alternatives you prefer.
- the opportunity cost of selecting alternative **3** would be the loss of alternative _____ or alternative _____ depending on which of these alternatives you prefer.

The choice you make depends on your values and priorities. The alternative you select should be the one you value most. In other words, this means you should select the alternative with the (*highest/lowest*) opportunity cost as the "best" alternative. (Cross out one.)

Which alternative will you choose? Why? What is its opportunity cost for you?

Part D.

Food for Thought

The preceding analysis may seem very artificial to you. To see the "real world" meaning of this exercise, change things so...

- Rather than 9 hours, you have \$9 billion to allocate.
- Rather than exams, you must choose between two programs: social security payments (economics) and defense needs (mathematics).
- Rather than test scores, you have some measure of society's total welfare.
- Rather than being a student, you are a Member of Congress.

Look over your allocation of study hours from the Table *Allocation of Time to Economics and Mathematics Study* as though they were billions of dollars. Would you change anything? Why or why not?