Scarcity implies that we have to make a choice. Every time we make a choice, we incur an **opportunity cost**. If we choose a $2 slice of pizza instead of a $2 cup of coffee, we have to forego or give up the coffee. Then, the opportunity cost of our pizza is the coffee that we have to forego or give up. In other words, opportunity cost of a choice is the next best choice we could have made.

Consumption combinations we can afford are in our **opportunity set**. Consumption combinations in our opportunity set and consumption combinations we cannot afford are separated by the **budget constraint**. All points on the budget constraint represent consumption combinations that are in our opportunity set using full and efficient use of our budget. All consumption combinations under the budget constraint are not employing full and efficient use of our budget. All consumption combinations above the budget constraint are unaffordable with our budget. The slope of the budget constraint shows the opportunity cost. Consider pizza and coffee. Given the limited budget, we can spend all our money on pizza and none on coffee. In order to get coffee, we must forego some pizza. This opportunity cost is reflected in the slope of the budget constraint.

Utility is a subjective measure of an economic agent's satisfaction. The **more the merrier** applies to total utility of an economic agent. The more that an economic agent gets to consume, the merrier the agent is. **Total utility** increases as an economic agent
consumes more, in most cases. The **law of diminishing marginal utility** says that consuming more and more of the same good or service tends to produce less and less utility at the margin. The tenth slice of pizza is likely to generate less satisfaction for the consumer than the first slice of pizza. When he/she was hungry, the first slice of pizza may have produced a lot of satisfaction. However, the tenth slice is unlikely to provide the same level of satisfaction as the first slice.

The **production possibilities frontier** (PPF) is the budget constraint equivalent for an economy. For an individual economic agent, the consumption combinations in our opportunity set and consumption combinations we cannot afford are separated by the budget constraint. For an economy, the production combinations that are possible and the production combinations that are not possible are separated by the PPF. All points on the PPF represent all possible production combinations using full and efficient use of our limited resources. All production combinations under the PPF are not employing full and efficient use of our resources. All production combinations above the PPF are unattainable with our resources. As before, the slope of the PPF shows the opportunity cost. Consider farming and mining. Given the limited resources, we can use all our resources on farming and none on mining. In order to get some mining, we must forego some farming. This opportunity cost is reflected in the slope of the PPF.

The shape of the PPF can be a straight line or a curved line concave to the origin. The **straight PPF** implies that the opportunity cost is constant. The **curved PPF** implies that the opportunity cost is changing. Consider the same example of farming and mining. In this economy, assume that land and labour exist, where some land is arable and some other land is a mine. As the arable land is more useful for farming than mining and the mines are more useful for mining than farming, not all resources are equally useful for farming and mining. In addition, adding more and more labour to the same task is not always useful. Adding more workers to a farm that can only fit three workers comfortably for example would not necessarily be helpful in the same way that adding more workers to a mine that can only fit three workers comfortably.
These are reasons why the PPF may be curved, indicating changing opportunity cost. Little farming output may be given up in order to get more mining output at the start when the economy is producing only farming output. More farming output may have to be given up in order to get more mining output as mining output increases. This is consistent with the **law of diminishing returns** which says that we have to give up more and more of our limited resources to increase a given output by one unit. A curved PPF is consistent with the law of diminishing returns and it is a more realistic version of our reality than a straight PPF.

**Productive efficiency** implies that it is not possible to produce more of one good or service without giving up the other goods or services. All production combinations on the PPF meet this criterion while all production combinations under the PPF do not. **Allocative efficiency** refers to only one production combination that achieves productive efficiency that also represents the combination that the economy most desires. When the quantity of goods and services supplied by producers meets the quantity of goods and services demanded by consumers, the economy achieves allocative efficiency.

Different economies have different PPFs, indicating different opportunity costs. Consider the same example of farming and mining. This time, assume that there are two economies, Canada and the US producing farming and mining outputs with straight PPFs. Canada can produce 10 units of farming output if Canada employed full and efficient use of all resources only on farming and 20 units of mining output if Canada instead employed full and efficient use of all resources only on mining. The US can produce 40 units of farming output if the US employed full and efficient use of all resources only on farming and 30 units of mining output if the US instead employed full and efficient use of all resources only on mining.

The US produces more of farming and mining outputs than Canada. This means that the US has an **absolute advantage**. The opportunity cost of producing one unit of mining output for the US is $\frac{4}{3}$ unit of farming output when the opportunity cost of producing one unit of mining output for Canada is $\frac{1}{2}$ unit of farming output. The opportunity cost of producing one unit of mining output is lower for Canada than it is for the US. This means that Canada has a **comparative advantage** in producing mining outputs than the US.

<table>
<thead>
<tr>
<th></th>
<th>United States</th>
<th>Canada</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farming Output</td>
<td>40</td>
<td>10</td>
</tr>
<tr>
<td>Mining Output</td>
<td>30</td>
<td>20</td>
</tr>
<tr>
<td>Opportunity Cost of Farming Output</td>
<td>$\frac{30}{40}=0.75$</td>
<td>$\frac{20}{10}=2.00$</td>
</tr>
<tr>
<td>Opportunity Cost of Mining Output</td>
<td>$\frac{40}{30}=1.33$</td>
<td>$\frac{10}{20}=0.50$</td>
</tr>
</tbody>
</table>
Practice Problems

1. What does scarcity mean?
   a) An endless supply of goods and services
   b) A scar in an economy
   c) Cheap labour
   d) A limited supply of goods and services

2. Which of the following separates consumption choices that we can afford and consumption choices that we cannot afford?
   a) Budget constraint
   b) Production possibilities frontier
   c) Production possibilities curve
   d) Consumption choice curve

3. Which of the following contains all affordable consumption choices?
   a) Absolute advantage
   b) Comparative advantage
   c) Opportunity set
   d) Budget constraint

4. What is implied by the slope of the budget constraint with two goods?
   a) Income
   b) Price of one good
   c) Opportunity cost
   d) Budget

5. Which of the following is a measure of satisfaction?
   a) Opportunity set
   b) Comparative Advantage
   c) Slope of production possibilities curve
   d) Utility

6. Which of the following is best description of the law of diminishing marginal returns?
   a) More is better
   b) More is worse
   c) Third piece of pie is not as good as the first piece of pie
   d) First piece of pie is not as good as the third piece of pie

7. What does the production possibilities frontier **NOT** show?
   a) Production constraint
   b) Technology
   c) Opportunity cost
   d) Utility
8. What is the difference between a straight production possibilities frontier and a concave production possibilities frontier?
   a) Changing income level
   b) Changing opportunity cost
   c) Changing preferences
   d) Changing utility

9. If a production combination sits on the production possibilities frontier, which of the following is said to be achieved?
   a) Allocative efficiency
   b) Productive efficiency
   c) Absolute advantage
   d) Comparative advantage

10. Which of the following most likely prevents allocative efficiency?
    a) Government intervention
    b) Free trade agreements
    c) Income inequality
    d) The law of diminishing returns

Answers

1. D
2. A
3. C
4. C
5. D
6. C
7. D
8. B
9. B
10. A