

## Math Activity 1

This activity illustrates the following Econ concepts using the corresponding Math concepts

Table 1	
Econ Concept	Math Concept
Scarce Resources	Line graph of values in Table 2 – titled the <u>Production Possibilities Curve (PPC)</u> ;  Area inside the curve: Attainable versus Area outside the curve - Unattainable
Trade-offs and Increasing Opportunity Cost	Slope calculations between each of the options (A-E) along the Production Possibilities Curve.  Concave shape of the Production Possibilities Curve.
Economic Growth	Increase in the values of either the x- or y-intercept or both the intercepts.
Efficient Use of Resources	Coordinates on the Production Possibilities Curve
Unemployment of Resources	Coordinates inside the Production Possibilities Curve.

There are various ways in which a community can supply water to its residents. The lowest cost source of water is rainwater captured by reservoirs. Groundwater is more costly to collect because of the need to locate and pump it to the surface. Seawater is the most expensive source of usable water because it is costly to desalinate. Expanding the supply of drinking water requires more and more resources – energy, capital equipment, labor and “raw” water that can no longer be used for the production of other outputs like food. Conversely the more food we produce the less water is available to the community to use as drinking water.

You may have seen news stories about the supply of drinking water for growing populations in the southwest US: more and more food output is being given up for the incremental increase in supplies of drinking water. This scenario is currently being played out in California.

Water diverted to farmers in the state’s Central Valley is not available to people downstream for drinking water and other personal needs. For crop production to keep up with growing food demand more and more water is needed to irrigate less fertile and more arid land.

Moreover, in recent years many farmers have been growing more water-intensive crops such as fruit. In terms of drinking water that cannot be produced and consumed by the public, shifting production to these crops has increased the opportunity cost of growing food.

- a) Draw a production possibilities curve that shows the tradeoff between food and drinking water as described in the table below. (Be sure to label your axes and label this PPC – PPC<sub>1</sub>.)

Table 2: Production Possibilities Table		
Option	Food	Drinking Water

A	0	975
B	3000	875
C	4000	750
D	5000	500
E	6000	0

- b) Shade the area that is attainable given that society has scarce resources? What is the unattainable area?
- c) What is the x-intercept? What is the y-intercept? What does the x-intercept represent for the combination of goods produced? What does the y-intercept represent for the combination of goods produced?
- d) Calculate the slope between points A-B, B-C, C-D, D-E. What does the value of the slope imply for opportunity costs as you move down from A - E.
- e) Demonstrate what happens to the initial production possibilities curve (PPC<sub>1</sub>) if California,
- (i) Invests some of its resources in plant research and development (label this curve PPC<sub>2</sub>). Consider what this would mean for either food production or drinking water availability.
  - (ii) Decreases the number of immigrant workers it permits to work in farming (label this curve PPC<sub>3</sub>). Consider what this would mean for food production and drinking water availability.
  - (iii) Wins a court case that gives the state a larger entitlement to water from the Rio Grande River.

Consider what this would mean for food production or drinking water availability

**(Note: For questions i) – iii) you do not have to include numerical values. It is sufficient if you label any changes.)**