Practice Homework
Introductory Material
Production Possibilities

Economics 101
The Economic Way of Thinking

1. Suppose Ted the track team trainer can produce two outputs, fast runners (R) and strong shot putters (S). If Ted works 40-hours per week, Ted's production possibilities frontier (PPF) per semester for these two outputs is given by the equation:

$$S = -(1/3)\,R + 5$$

Or

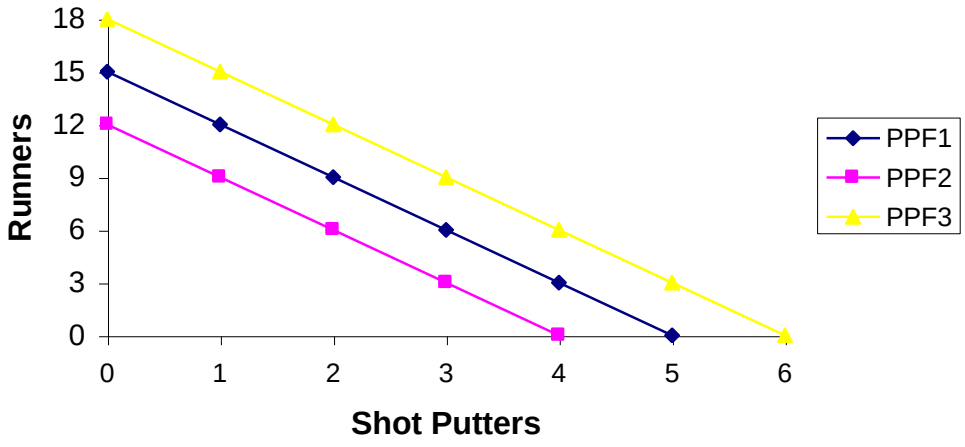
$$R = -3S + 15$$

a. Complete the following table:

Number of trained runners	Number of trained shot putters
15	**0**
12	**1**
9	**2**
6	**3**
3	**4**
0	**5**

b. Graph Ted's PPF for runners and shot putters in Figure 1. Measure shot putters on the horizontal axis.

Figure 1



c. Suppose Ted is currently producing 0 shot putters. What is Ted's opportunity cost of increasing his production of shot putters from 0 to 2?

He must give up 6 trained runners to gain 2 trained shot putters.

d. Suppose Ted is currently producing 2 shot putters. What is Ted's opportunity cost of increasing production of shot putters from 2 to 4?

He must give up 6 trained runners to gain 2 trained shot putters.

e. Does Ted's PPF exhibit **increasing, decreasing, or constant** opportunity costs **(circle one)**? Explain. Does this seem realistic? Explain.

Based on the answers to c and d, producing an additional 2 shot putters costs Ted 6 trained runners, regardless of whether he is producing 0 shot putters or producing 2 shot putters already. Also, Ted's PPF is a straight line, which implies constant opportunity costs.

If Ted had increasing opportunity costs, his PPF would be bowed outward and each increase in production of shot putters by 2 would cost more the more shot putters he was producing. For example, if it costs him 6 trained runners to produce the first 2 shot putters (i.e., to go from producing 0 to producing 2 shot putters costs him 6 trained runners), it would cost him more than 6 trained runners to produce an additional 2 shot putters (i.e., to go from producing 2 to producing 4 shot putters would cost him, say, 10 trained runners). This increasing cost scenario seems more realistic, since it is likely that Ted would train the athletes most suited to each sport first. So the first set of 6 runners would take less time to train (i.e., would cost fewer shot putters) than the next set of runners, since the first runners might be the best ones, while the second set of runners might not be as good and would take more time to train.

f. What is Ted's opportunity cost for **each** shot putter produced?

Each shot putter costs 3 runners.

This is easily computed as the slope of Ted's PPF, or one can compute it as:

5S = 15R, since if Ted devotes all his time to producing runners he'll produce 15 runners and if he devotes all his time to producing shot putters he'll produce53 research papers.

$$5S = 15R$$
$$1S = 15/5R$$
$$1S = 3R$$

g. What is Ted's opportunity cost for **each** runner produced?

Each runner costs 1/3 shot putter.
Using the same computation method as above,

$$5S = 15R$$
$$1R = 5/15S$$
$$1R = 1/3S$$

h. What would you say about Ted's production if 3 shot putters and 2 runners were produced in a given semester? Would he be operating on his PPF?

This combination of production represents a point inside Ted's PPF – this point is inefficient for Ted.

i. Suppose that Ted's computer crashes – his computer that contains the only copy of his program for optimal nutrition and training requirements for athletes, making it harder to train runners and shot putters as well as before. In figure 1, **sketch a new PPF for Ted** that illustrates what this will do to his

production possibilities. Label this PPF "PPF 2." Briefly **explain below** what has happened to Ted's PPF and why.

This represents a reduction in the resources available to Ted. As a result, his production possibilities will be reduced. This will shift his PPF inward.

In the graph, I draw Ted's new PPF parallel to his original one, implying that the opportunity costs of producing runners and shot putters remain the same. This need not necessarily be the case. If the computer program were better at aiding in the production of runners, for example, this would raise the opportunity cost of producing runners and would imply a change in the slope of the PPF as well as shifting it outward.

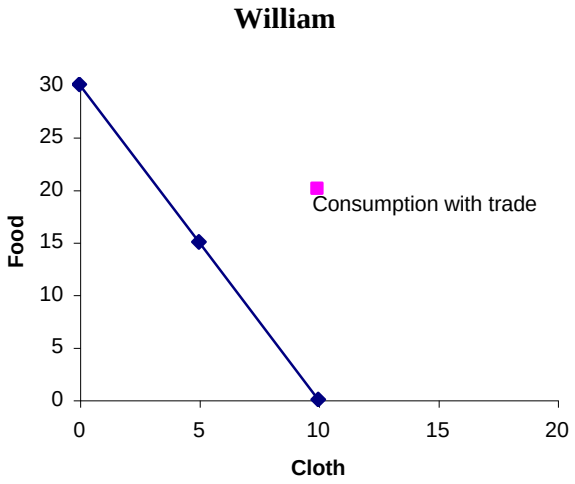
j. Starting from Ted's original PPF, suppose that the athletic department hires an assistant for Ted, allowing him to further refine his training techniques. In figure 1, **sketch a new PPF for Ted** that illustrates what this will do to his production possibilities. Label this PPF "PPF 3." Briefly **explain below** what has happened to Ted's PPF and why.

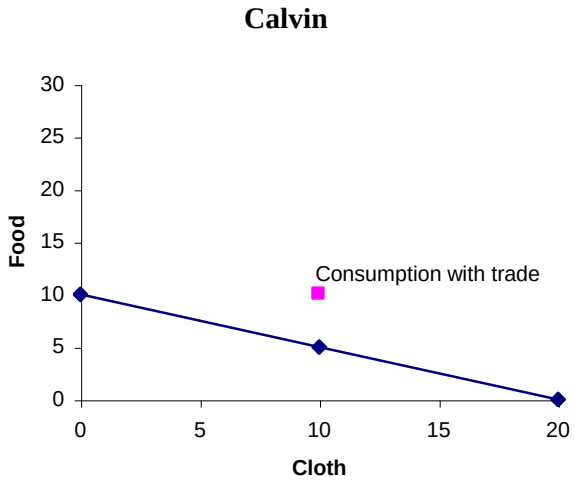
Since the assistant effectively gives Ted more resources, his production possibilities increase. His PPF should shift outward.

2. In one month, two producers, William and Calvin, can produce cloth and food according to the production possibilities given in the following table:

Individual	**Production Possibilities**
William	30 pounds of food or 10 yards of cloth
Calvin	10 pounds of food or 20 yards of cloth

a. Graph the production possibilities curves for the two individuals below. Assume constant opportunity costs and measure cloth on the horizontal axes.





b. William has comparative advantage in producing (circle one): **food, cloth, both, neither.** Why?

To figure William's comparative advantage, we must compare the opportunity costs of food and cloth for William and Calvin

William:

1 month = 30 pounds food (F) and 1 month = 10 yards cloth (C)

So 30 F = 10 C for William

Thus, the opportunity cost of 1 C is 3 F for William.

And the opportunity cost of 1 F is 1/3 C for William.

Each time William produces one yard of cloth, he uses the same amount of resources that it would have taken to produce 3 pounds of food. So for each yard of cloth produced, William gives up 3 pounds of food. Alternatively, each time William produces one pound of food, he uses the same amount of resources that it would have taken to produce 1/3 yard of cloth. So for each pound of food produced, William gives up 1/3 yard of cloth.

Calvin:

1 month = 10 pounds food (F) and 1 month = 20 yards cloth (C)

So 10 F = 20 C for Calvin

Thus, the opportunity cost of 1 C is 1/2 F for Calvin.

And the opportunity cost of 1 F is 2 C for Calvin.

Each time Calvin produces one yard of cloth, he uses the same amount of resources that it would have taken to produce 1/2 pound of food. So for each yard of cloth produced, Calvin gives up 1/2 pound of food. Alternatively,

each time Calvin produces one pound of food, he uses the same amount of resources that it would have taken to produce 2 yards of cloth. So for each pound of food produced, Calvin gives up 2 yards of cloth

So the opportunity cost of a pound of food for William is 1/3 yard of cloth and the opportunity cost of one pound of food for Calvin is 2 yards of cloth. William has a lower opportunity cost of producing food, so he has a comparative advantage in producing food.

c. Calvin has comparative advantage in producing (circle one): **food, cloth, both, neither.** Why?

The opportunity cost of a yard of cloth for William is 3 pounds of food and the opportunity cost of one yard of cloth for Calvin is 1/2 pound of food. Calvin has a lower opportunity cost of producing cloth, so he has a comparative advantage in producing cloth.

d. If the two individuals specialize in production, **William** should specialize in producing food and **Calvin** should specialize in producing cloth? Briefly explain your answer.

William has comparative advantage in producing food and Calvin has comparative advantage in producing cloth. If the two individuals specialize and trade these goods with one another, both can consume more then they could is they did not trade with one another – both can be made better of in terms of their consumption possibilities

e. Suggest a trade that would make both individuals better off than if they produced and consumed independently of one another. In the graphs above, show that their new point of "consumption possibilities" based on your trade terms moves each individual beyond their PPF.

A trade of 10 yards of cloth for 10 pounds of food would make both better off. With this trade, Calvin could consume 10 yards of cloth and 10 pounds of food, a point beyond his PPF. William could consume 20 pounds of food and 10 yards of cloth, also a point beyond his PPF.

Homework 1 -- Multiple Choice

1. Suppose that in one week, Babrara Walters can host **either** 5 editions of *The View* (a daytime talk show) **or** 2 editions of *20/20* (a nighttime news show). Based on this information, the opportunity cost of hosting one edition of *The View* for Barbara Walters is:

a. hosting 2 editions of *20/20*
b. hosting 5 editions of *20/20*
c. hosting 5 editions of *The View*
d. hosting 2/5 an edition of *20/20*
e. hosting 5/2 an edition of *20/20*

2. Opportunity cost refers to

a. the dollars spent on a product
b. the best of the alternatives foregone in order to produce or consume something
c. the resources used to make something
d. the money spent by a business to produce something

3. Assuming that rational people are motivated by incentives, what would occur if the average salary of education majors falls by 30 percent and the average salary of economics majors rises by 10 percent, ceteris paribus?

a. Some students will shift majors from economics to education.
b. Some students will shift majors from education to economics.
c. Some students will stop majoring in both economics and education.
d. Some students will drop out of college.

Note: you could argue that answer d is also a correct answer.

4. According to the principle of comparative advantage, the U.S. imports those goods and services for which it has a relatively high

a. demand
b. sunk cost
c. opportunity cost
d. productivity advantage
e. supply

5. Trade between the U.S. and Mexico allows both countries to gain because they can consume a combination of goods and services that lies

a. inside their production possibilities curves
b. along their production possibilities curves
c. outside their production possibilities curves
d. at the endpoints of their production possibilities curves

6. The war in Iraq significantly impacted Iraq's ability to produce goods and services. This could be represented by

a. a movement down along Iraq's production possibilities curve
b. a movement off Iraq's production possibilities curve to some point inside the curve
c. a movement off Iraq's production possibilities curve to some point outside the curve
d. an inward (leftward) shift of Iraq's production possibilities curve
e. an outward (rightward) shift of Iraq's production possibilities curve

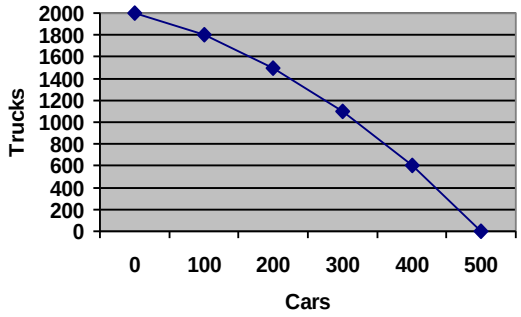
Country	Production per year
Mosnia	10,000 units of textiles or 300,000 autos
Frandlandia	25,000 units of textiles or 100,000 autos

7. Mosnia and Frandlandia are two countries that produce according to the table above. Which of the following is true?

a. Mosnia has comparative advantage in producing autos.
b. Mosnia has comparative advantage in producing textiles
c. Frandlandia has comparative advantage in producing autos
d. Frandlandia has comparative advantage in producing textiles.
e. Both a and d
f. Both b and c

8. When we say "other things equal" with regard to the production possibilities model, we mean that:

a. The PPF can only shift once
b. Only one factor that shifts the PPF outward is allowed to change at a time
c. Factors that shift the PPF are held constant when we draw a given PPF
d. Increasing the amount of the good measured on the x-axis will shift the PPF
e. none of the above



9. Consider the production possibilities curve above showing alternative combinations of cars and trucks that can be produced in Happyville. The opportunity cost of moving from producing 400 to 500 cars is ____ trucks.

a. 100 cars
b. 500 trucks
c. 100 trucks
d. 600 trucks

10. Increasing opportunity cost occurs because

a. workers become more productive as they work longer hours
b. resources are specialized – they tend to be better at producing some goods than others
c. prices rise as additional output is produced
d. unemployment falls as output increases