Production Possibilities Frontier Worksheet   Name(s): _____

Professor James Tierney

School/Class:_____

Below is a worksheet I developed for learning about production possibilities frontiers. Please read it all and fill the parts you need to. If you have questions please refer to your textbook or a Google Search. This is being recorded as a grade so be sure to fill in EVERYTHING and show all work. If you fail to show all of the work you will lose points.

The Production Possibilities Frontier (PPF) represents the ***maximum attainable amount of products for a country, firm, or individual. ← know this definition***

In order to really understand the PPF we need to distinguish between ***trade-offs and opportunity costs.***

I want you to list 5 things you could be doing right now. Make sure these are things you ***cannot be doing at the same time.*** For example, do not put eating and watching TV because you can do those at the same time.

1   _____

2   _____

3   _____

4   _____

5   _____

==Key Point:== *As you can see you have decide what activity to do. You can't do them all. Thus you must trade-off between them.*

Now that we know what a trade-off is let's learn what opportunity cost is. ***Opportunity cost is the next best thing you give up.*** What I want you to do now is on the right hand side of your activities above, number them 1 through 5 in the order in which you would prefer to do them. For example, put a number 1 by what you are currently doing (this means you better have put economics worksheet) and then if you were not doing that activity what would you be doing. If you weren't doing that label the thing you would be doing number 3, and so on. What you have just done is you have labeled your preferences in order.

Whatever you labeled number 2 is your opportunity cost. Because remember, ***opportunity cost is the next best thing you give up.***

==Key Point:== *every decision we make has trade-offs and an opportunity cost.*

Now that the basic understanding is out of the way let's start building a PPF.

The reason why we are building this PPF is to show that ***everyone faces trade offs.*** Let's start off with a simple example involving a student. This student is taking an economics class and a biology class. She only has 12 hours to study for both exams because they are back to back the next day. If she decides to study for her economics class for all 12 hours she cannot study at all for biology. If she wants to study 2 hours for biology she can only study 10 hours for economics. If she wants to sleep for 8 hours then she will only have 4 hours to study for either exam. Thus she has to ***trade-off between the two classes AND sleep***. If we want to complicate the model we can just add in more activities. If she wants to sleep, eat and study she now has more activities she must trade-off from.

A PPF is our first model that we encounter in this class. An ***economic model is just a simplified version of the economy***. In this economy we will have ***2 countries*** and ***2 goods.*** We will not complicate the model in this class by adding more goods or countries. Let's go ahead and pick a couple of countries; France and Germany; and a couple of goods; bread and sausage.

Countries: France   ;   Germany

Goods: Bread   ;   Sausage

Using all of the resources available to them (land, labor, capital, time... etc) here are the combinations of the two goods each country can achieve.

France		Germany	
Bread	Sausage	Bread	Sausage
0	8	0	12
2	6	1	9
4	4	2	6
6	2	3	3
8	0	4	0

For example, this chart tells us that if France wants to produce 6 bread it can only produce 2 sausage.

Let's start with France. Before we construct the actual PPF let's answer a few questions:

If France decides to ***only produce bread***, they will produce _____ units of bread and _____ units of sausage. If France decides to ***only produce sausage***, they will produce _____ units of bread and _____ units of sausage.

What you have just found will be the end points of our PPF! Plot those points on the graph below (remember to pay attention to what the axis labels are).
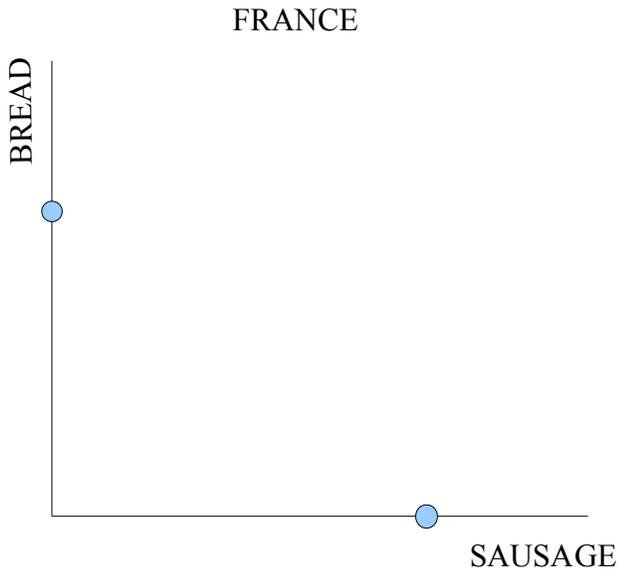
FRANCE

Now that you have labeled the two end points go ahead and plot and label the other 3 combinations of
bread and sausage that France can attain.

Once you have labeled all of the points connect them. What do you notice about it? Is it linear or curved?

As you noticed the PPF is linear. There are a few things you need to know about a PPF being linear. *A linear PPF means constant opportunity cost and that there is no specialization.* We will touch on this more in class.

BREAD

SAUSAGE

Now do the same thing for Germany:

GERMANY

BREAD

SAUSAGE

Congratulations. You have constructed your first two PPFs!

Let's look at the different parts of the PPF now:
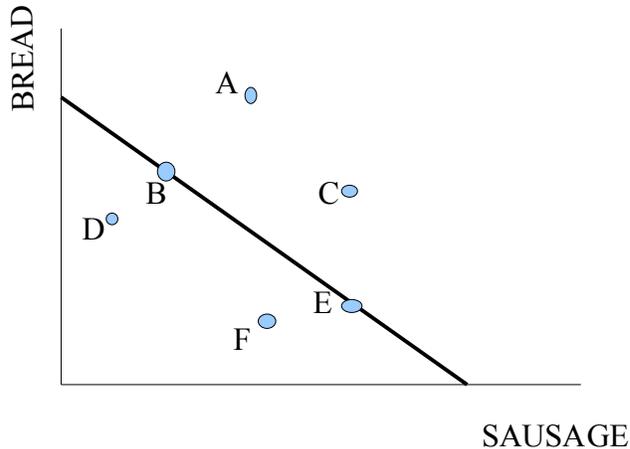
The points inside the PPF (represented by points _____ and _____) are what we call **attainable but NOT efficient**. This is because we are **wasting some resources** because we could be producing more.

The points on the PPF (represented by points _____ and _____) are what we call **attainable AND efficient**. This is because we **can get to these points AND we are using all of our resources**. This is where we want to be.

The points outside of the PPF (represented by points _____ and _____) are what we call **unattainable.** This is because **given the resources we have we cannot get to those points**.

There are possible ways to get to the unattainable points. I want you to go to the textbook or the internet and find 3 of them.

1. _____ ; 2. _____ ; 3. _____

I hope that one of those three were trade. If not that is ok as there are a few different ways to get to the unattainable points. Either way we are going to talk about trade now and I will show you how **trade can make everyone better off.**

In order to do this I think it's best to outline how we are going to show that trade can make everyone better off.

1. We must find the opportunity cost for each country of each good.

   - What I mean by that is **“How much of one good must we give up to get one unit of the other.”** ← KNOW THIS!!!

2. Once we have the opportunity cost we can figure out which country has the comparative advantage in each good.

Define comparative advantage from the textbook.

Comparative Advantage –

3. Once we know which country has the comparative advantage we know that **each country specializes in the good in which they have the comparative advantage in.**

   - To make it easy, in this class, we will say that if you are specializing in that good you will ONLY produce that good.

4. Then we just need to figure out a trade term (the ratio of trading one good for another)

   - We will use a chart I have developed by taking bits and pieces from a few different textbooks.

Let's start with number 1; finding the opportunity costs.

I need you to remember a few things about opportunity cost:

1. Opportunity cost is **the next best thing you give up.** In our on-going example... you have to give up BREAD to get SAUSAGE and vice versa.

2. We can say things like "The opportunity cost of producing 3 more..." or "The opportunity cost of producing 50 more..." but when we just say "The opportunity cost of BREAD is..." we really mean "**The opportunity cost of producing ONE more unit of BREAD is...**"

3. Basically read it as... "**How many units of SAUSAGE must we give up to produce one more unit of BREAD**" and vice versa.

The easiest way for you find the opportunity cost is to take work with the MAXIMUM numbers given to you. By that I mean think of it this way: **You must give up the maximum amount of bread to be able to produce the maximum amount of sausage.** I'm going to make you write some stuff out to show you that.

France must give up _____ (put the maximum amount of bread they can produce there) units of bread to be able to produce _____ (put the maximum amount of sausage there) units of Sausage.

But we **need it in terms of ONE unit of sausage.** We need to be able to say... France must give up <blank> units of bread to be able to produce ONE more unit of sausage. So you tell me:

France must give up _____ units of bread to be able to produce ONE more unit of sausage.

This is France's opportunity cost of producing SAUSAGE. It's what France must give up to produce sausage! It's an opportunity cost!! Now do that for the rest:

France must give up _____ units of sausage to be able to produce ONE more unit of bread.
(this would be the opportunity cost of bread for France)

Germany must give up _____ units of bread to be able to produce ONE more unit of sausage.
(this would be the opportunity cost of Sausage for Germany)

Germany must give up _____ units of sausage to be able to produce ONE more unit of bread.
(this would be the opportunity cost of bread for Germany)

So who has the lower opportunity cost for producing bread??   FRANCE   /   GERMANY

Who has the lower opportunity cost for producing sausage?? FRANCE   /   GERMANY

So you tell me....

_____ has the comparative advantage in producing bread.

_____ has the comparative advantage in producing sausage.

Key Point: *If you have the lower opportunity cost then you have the comparative advantage in that good and should specialize in the production of that good.*

Therefore...

_____ should specialize in producing bread.

and

_____ should specialize in producing sausage.

Last but not least let's prove that ***trade can make you reach a point outside of your production possibilities frontier!*** What we will do is start off with a point on the PPF (most likely at the half-way point... meaning using half of your resources towards each) and work our way towards showing that we can get a point outside of the PPF.

Start by filling in the following:

If France uses half of it's resources for each good it can produce and consume _____ units of bread and _____ units of sausage. If Germany uses half of it's resources for each good it can produce and consume _____ units of bread and _____ units of sausage.

Record these numbers in the row of the chart on the next page labeled Production/Consumption before trade. This is row (1)

Now we need to figure out how much each country will produce if they decide to trade. Well we know that if countries engage in trade they ***should specialize in what they are good at;*** a.k.a. Produce only what ***they have a comparative advantage in.*** So...

After specialization... France produces _____ units of bread and _____ units of sausage. Germany produces _____ units of bread _____ units of sausage.

Record these numbers in the row of the chart on the next page labeled Production after trade. This is row (2)

Now we have to figure out how to make a trade term work...

	France			Germany		
	Bread	Sausage		Bread	Sausage	
Production/ Consumption before trade			(1)			
Production after trade			(2)			
Trade Terms			(3)			
Consumption after trade			(4)			
Gains from trade			(5)			

All you need to do is find a trade that makes it so the "Consumption after trade" row is at least as big as the "Production/Consumption before trade". Meaning that both parties are better off after trading!!

Basically (2) + (3) [which is the same as (4)] must be greater than (1)!!!

Make sure the Gains from trade (5) numbers are all 0 or higher! Gains from train will be (4) – (1) meaning how much better are the countries after they trade compared to before they traded. Or else you didn't show that everyone is at least as well off. Make sure you fill the whole table out!

To wrap up let's draw the PPF's and plot the production/consumption before trade (1) and plot the consumption after trade. **Do this by drawing the original PPF and plotting those points.** Now we have reached a point outside of our PPF!!!! Good luck!!!

BREAD

SAUSAGE

BREAD

SAUSAGE