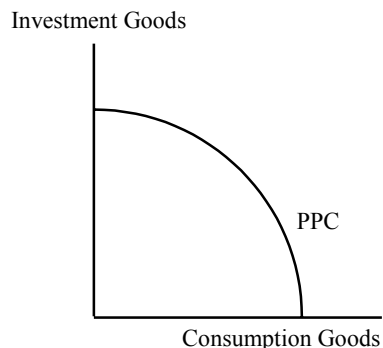


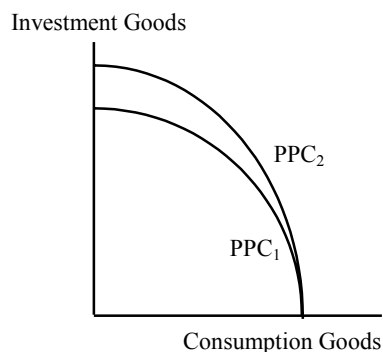
**ECONOMICS 2
INTRODUCTION TO ECONOMICS**

SUGGESTED ANSWERS TO PROBLEM SET 1

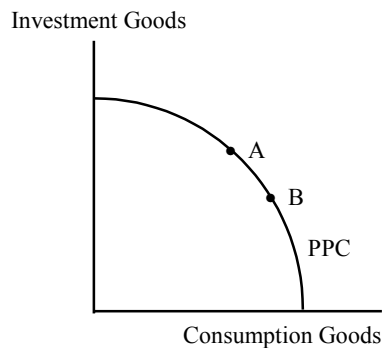
1.a. The PPC for investment goods and consumption goods shows the various combinations of these two goods that the economy can produce using exactly all of the available resources. This PPC for investment and consumption goods probably has the conventional bowed-out shape. Some labor and capital are well suited to the production of investment goods, while other labor and capital are well suited to the production of consumption goods. Therefore, the opportunity cost of producing either of these goods rises as we produce more of the good.



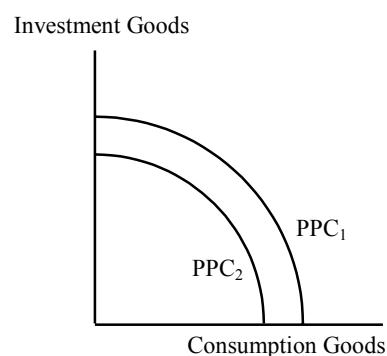
b. A technological change that increases the productivity of capital and labor in the investment goods sector but not in the consumption goods sector will shift the PPC out asymmetrically (from PPC_1 to PPC_2). To see this, think about the extremes. If all of the capital and labor in the country were devoted to investment goods production, the technological change in this sector would mean that more could be produced than before. That is, the intercept on the vertical axis is higher than before. On the other hand, if all of the capital and labor in the country were devoted to consumption goods production, the amount we would be able to produce has not changed. By assumption the technological change did not affect the consumption goods sector, so the intercept on the horizontal axis is the same as before. If we draw a normal curved PPC between these two points it is asymmetrically above the initial PPC.



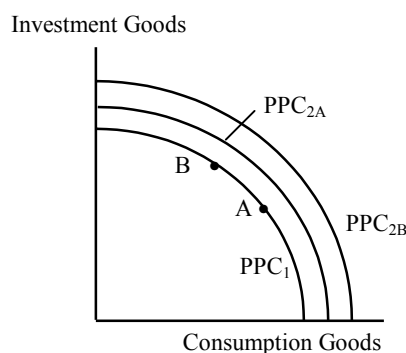
c. The statement that the economy is at full employment implies that we are using all of our available resources. Thus, we must begin at a point on the PPC, such as point A. A change in behavior by American consumers that increases the production of consumption goods will result in a movement along the PPC, to a point such as B. This movement along the PPC illustrates the crucial notion that when the economy is at full employment, a choice to produce more consumption goods is also a choice to produce fewer investment goods. Since there are no spare resources, the capital and labor used to produce the additional consumption goods have to come from the investment goods sector. This will reduce the number of investment goods that can be produced.



d. Labor is used in the production of both types of output. As a result, a decrease in the number of workers will worsen our production possibilities. All of the possible combinations of consumption goods and investment goods will be lower than before the deportation of workers. This corresponds to an inward shift in the PPC (from PPC_1 to PPC_2). Now, whether the PPC shifts in symmetrically or asymmetrically depends on whether labor is more productive in one sector or the other. Without more information, it is impossible to tell.

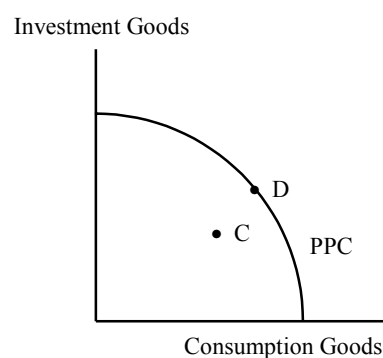


e. The position of the PPC is determined by the available resources in the economy. The PPC shifts if the resources available change, or if improvements in technology allow us to use the resources we have more efficiently. Because machines and other investment goods are some of the resources used to produce goods, the economy's choice about how many investment goods to produce today can have a large impact on the position of the PPC in the future. If the economy chooses to produce at a point like A on its initial PPC (PPC_1) that has relatively many consumption goods and relatively few investment goods, the economy will accumulate new capital goods slowly.



This implies that the PPC will shift out only slowly over time; PPC_{2A} shows where the PPC might be in five years if we produce the combination of investment goods and consumption goods shown by point A. If the economy chooses to be at a point like B on its initial PPC that has relatively many investment goods, the capital available for production in the future is likely to increase rapidly. As a result, the PPC is likely to shift out more rapidly over time. PPC_{2B} shows where the PPC might be in five years if we produce the combination shown by point B.

f. Slipping into a recession will change where the economy is relative to the PPC, but will not change the PPC. The PPC shows the production possibilities of the economy – that is, what it can produce just using all of the available labor and capital. When the economy is at full employment, we are producing somewhere on the PPC, such as point D. If there is a recession, some of the available labor and capital will not be employed. The economy would be producing a combination inside the PPC, such as point C.

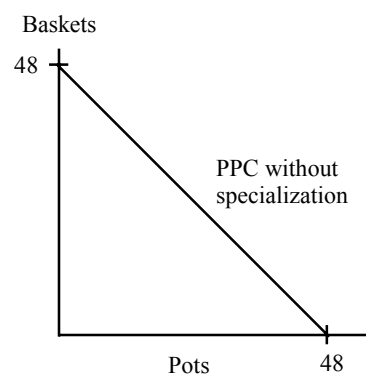


2. a. The opportunity cost of a pot for a worker is the number of baskets he or she could produce in the time it takes to produce 1 pot. Since Matthew could produce 3 pots in an hour or 1 basket, his opportunity cost of 1 pot is $\frac{1}{3}$ basket. Likewise, since he could produce 1 basket in an hour or 3 pots, his opportunity cost of 1 basket is 3 pots. The opportunity costs for each of the workers are given in the table below.

	<u>Opportunity Cost of 1 Pot (in Baskets)</u>	<u>Opportunity Cost of 1 Basket (in Pots)</u>
Katie	1	1
Matthew	$\frac{1}{3}$	3
Paul	3	$\frac{1}{3}$

b. When there is no specialization, we think of each worker splitting his or her time in the same way as the other two workers. That is, if one worker produces pots for 1 hour and produces baskets for 7 hours, the other two workers also produce pots for 1 hour and baskets for 7 hours. We don't allow one worker to spend more time on some activity than another worker. Since the workers always do the same thing, there is a constant opportunity cost for the collective. Every time the three workers work an hour producing pots they produce 6 pots. Every time the three workers work an hour producing baskets, they produce 6 baskets. Therefore, for the collective as a whole, when there is no specialization, the opportunity cost of 1 pot is 1 basket.

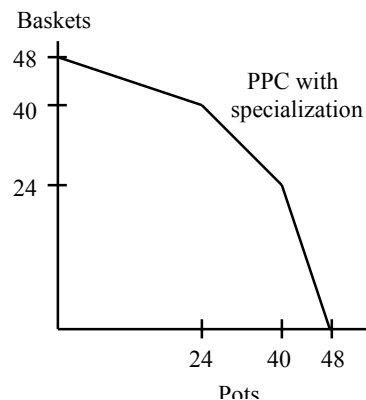
The slope of the PPC is minus the opportunity cost of the good on the horizontal axis. Therefore, if we put pots on the horizontal axis, the slope of the PPC for the collective, assuming no specialization, is -1 . To figure out the vertical intercept, one just needs to figure out how many baskets the three workers could produce in a day if they produced no pots. Since they can work for 8 hours per day, and produce 6 baskets per hour, they could produce 48 baskets. Therefore, the PPC for the collective with no specialization is a line starting at 48 baskets and 0 pots, with a slope of -1 . This implies that if the collective produced no baskets, it could produce 48 pots.



The PPC for the collective without specialization is a straight line because the opportunity cost of a pot does not rise as more are produced. This is true because each worker's abilities are constant and we are forcing the three workers to always split their time in the same way. Therefore, every time they produce one more pot, they give up one basket.

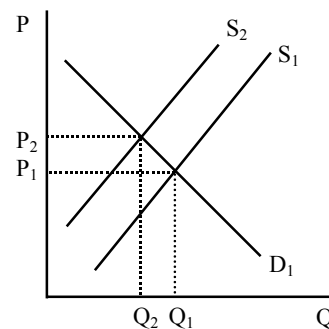
c. When we allow the workers on the island to specialize, the workers will no longer split their time in exactly the same way. Instead, they will divide the activities according to comparative advantage. This means that as we think about producing progressively more of one of the goods, the worker with the lowest opportunity cost produces first, the second lowest next, and the highest last. If the collective decides to have the workers specialize according to who has the lower opportunity cost, it will use Matthew to produce pots first, then Katie, and then Paul. This means that the slope of the PPC will change. Between 0 pots and the maximum amount that Matthew can produce in a day (which is 24 pots), the relevant opportunity cost is Matthew's – he is the one switching between basket production and pot production; Paul and Katie are just making baskets. Therefore, the slope of the PPC is $-\frac{1}{3}$ in this range. Between 24 pots and 40 pots, which is the maximum amount Matthew and Katie can produce together, the relevant opportunity cost is Katie's – she is the one who is switching between the two activities; Paul is just producing baskets and Matthew is just producing pots. Therefore, the slope of the PPC is -1 in this range. Finally, between 40 pots and 48 pots, which is the maximum number of pots the three can produce if they all just produce pots, the relevant opportunity cost is Paul's – he is the one switching between the two activities; Matthew and Katie are already producing pots. Therefore, the slope of the PPC is -3 in this range. The vertical intercept of the PPC is 48 baskets – the total number of baskets the three workers could produce if they each spent all 8 hours producing baskets. The horizontal intercept is 48 pots – the total number of pots the three workers could produce if they each spent all 8 hours producing pots.

The PPC of the collective now has two kinks in it. This reflects the fact that with specialization the opportunity cost will rise as the collective produces more of a good. The slope of the PPC changes from $-\frac{1}{3}$ (Matthew's opportunity cost) for the first segment, to -1 (Katie's opportunity cost) for the second, and finally to -3 (Paul's opportunity cost) for the third. This happens simply because the collective will use the worker with the lowest opportunity cost first, the next lowest opportunity cost second, and so on. As we add more and more workers, the PPC would start to take on its characteristic curved shape.

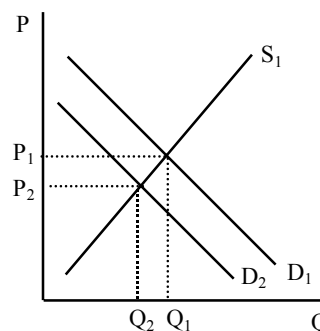


The quantities of pots and baskets at each kink point are calculated by thinking about how much the workers can produce. The first kink occurs at the point where Matthew is producing pots full time and Paul and Katie are producing baskets full time. When Matthew is spending 8 hours producing pots, he will produce 24 pots; when Paul and Katie are producing baskets full time, they will produce 40 baskets (16 from Katie and 24 from Paul). The second kink point occurs at the point where Matthew and Katie are both producing pots full time and Paul is making baskets full time. If Matthew and Katie work 8 hours producing pots, they will produce 40 pots (24 from Matthew and 16 from Katie); when Paul is producing baskets for 8 hours, he will produce 24 baskets.

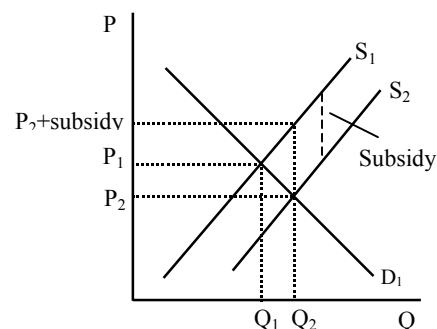
3.a. The cold weather in Florida reduces the size of the orange crop and raises the price of oranges. Oranges are obviously the key input into orange juice. Therefore, this increase in the price of oranges increases the cost of an input in the market for orange juice. An increase in the price of an input shifts back (or up) the supply curve of orange juice (from S_1 to S_2). Orange juice producers are only willing to supply the same quantity as before at a higher price because their additional costs of producing each unit have risen. The shift back in the supply curve will cause the equilibrium quantity to fall (from Q_1 to Q_2) and the equilibrium price of juice to rise (from P_1 to P_2).



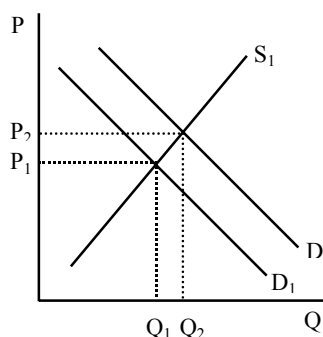
b. Pomegranate juice is a substitute for orange juice. That is, it is something that satisfies the same need or want as orange juice. When the price of a substitute falls, this tends to decrease the quantity demanded of the good at the prevailing price. Consumers seeking to make themselves as well off as possible find that they can have more total happiness if they substitute away from the good (in this case orange juice) and toward the substitute that has gotten less expensive (pomegranate juice). As a result, at any price for orange juice, less will be demanded than before. This corresponds to a shift back in the demand curve (from D_1 to D_2). The equilibrium price and quantity of orange juice will both fall (from P_1 to P_2 and from Q_1 to Q_2 , respectively).



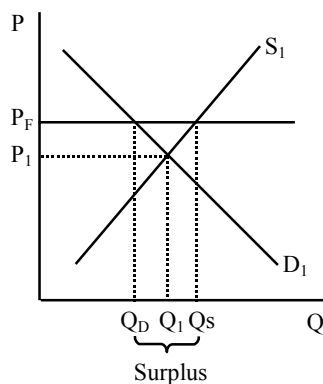
c. A subsidy is a negative tax; the government gives producers a payment for each gallon of orange juice they supply. A subsidy paid to producers of orange juice will shift the supply curve of orange juice down by the amount of the subsidy (from S_1 to S_2). The market price necessary to bring forth a given quantity of orange juice will be less by the amount of the subsidy because producers know they will be receiving a payment from the government. The shift down in the supply curve will reduce the equilibrium price (from P_1 to P_2) and increase the equilibrium quantity (from Q_1 to Q_2). Notice, the amount that sellers actually receive for a gallon of juice rises when there is a subsidy. Consumers pay P_2 , but sellers receive $P_2 + \text{subsidy}$. Thus, as with a tax, both sides of the market feel the effects of a subsidy physically paid to sellers. Also, notice that the equilibrium price does not fall by the full amount of the subsidy. This happens because the subsidy causes consumption to rise. That is, some of the effect of the subsidy shows up as an increase in quantity rather than as just a fall in price.



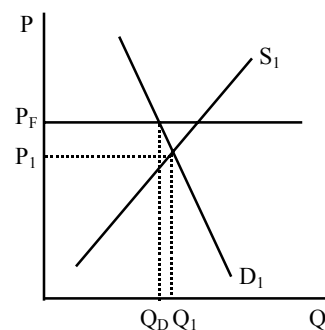
d. A new study shows that orange juice has previously unknown health benefits. This finding is likely to change consumers' tastes toward liking orange juice more. This means that at any given price for a gallon of orange juice, we want to consume more juice than before. This corresponds to a shift out in the demand curve (from D_1 to D_2). The equilibrium price and quantity of orange juice will both rise (from P_1 to P_2 and from Q_1 to Q_2 , respectively).



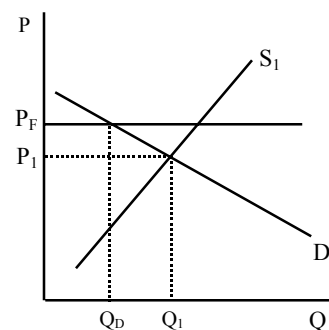
4.a. Before the implementation of the price floor, the equilibrium price for milk was P_1 and the equilibrium quantity was Q_1 . If the government sets the price of milk at P_F (F for floor), which is above P_1 , the quantity demanded at that price (Q_D) will be less than the quantity supplied (Q_S). There will be a surplus of milk. (In this problem we are assuming that the milk producers are forced to destroy the surplus milk or give it away. In real life, a price floor is often coupled with a program in which the government purchases the surplus at the controlled price.)



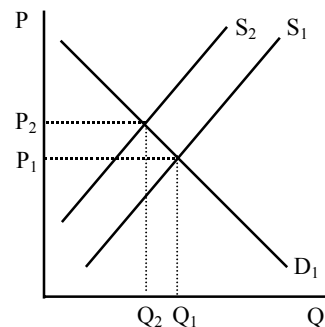
b. Whether such a price floor will raise or lower the total revenue of milk producers depends on the price elasticity of demand. If demand is inelastic, then the price floor will raise total revenue. This is true because the rise in price will lead to a less than proportional percentage fall in the quantity demanded. As a result, price times quantity will rise. We can see the effect on revenue in our diagram. Inelastic demand can be represented (crudely) by a relatively steep demand curve. Before the price floor, total revenue was P_1 times Q_1 . This is the rectangle formed by these two distances. After the price floor is imposed, total revenue is P_F times Q_D , which is larger.



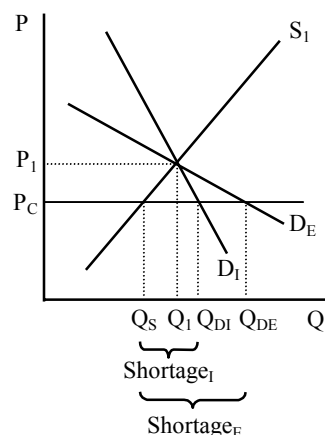
On the other hand, if demand is elastic, then the price floor will lower total revenue. This is true because the rise in price will reduce demand by a more than proportional percentage amount. As a result, price times quantity will fall. Elastic demand can be represented (again, only as an approximation) in the diagram by a relatively flat demand curve. Before the price floor, total revenue was P_1 times Q_1 . This is the rectangle formed by these two distances. After the price floor is imposed, total revenue is P_F times Q_D , which is clearly smaller.



5.a. False. A shift back in the supply curve for lemons (from S_1 to S_2) will create a shortage of lemons at the initial equilibrium price (P_1). The shortage will cause the price of lemons to rise (from P_1 to P_2). As the price rises, the quantity demanded falls (from Q_1 to Q_2). That is, the shift back in the supply curve for lemons causes a movement up along the demand curve.



b. False. A binding price ceiling will reduce the amount consumers spend on a good regardless of whether demand is elastic or inelastic. This is true because under a binding price ceiling, the quantity bought and sold will be determined by the intersection of the supply curve (S_1) and the controlled price (P_C). The fact that the price ceiling is binding means that the controlled price is set below the equilibrium price (P_1). At a lower price, suppliers will supply less (the quantity falls from Q_1 to Q_S). Since both the price and the quantity fall, the total amount that consumers spend on the good (P times Q) will fall (from P_1Q_1 to P_CQ_S).



The price elasticity of demand, will affect the size of the shortage that results from the price ceiling. If demand is highly inelastic (crudely represented in the diagram as the steep demand curve D_I), the imposition of the binding price ceiling will have little impact on the quantity demanded (it will increase to Q_{DI}), so the shortage will be relatively small ($Shortage_I$). If demand is highly elastic, the binding price ceiling will have a large impact on the quantity demanded (it will increase to Q_{DE}), so the shortage will be relatively large ($Shortage_E$).

c. Uncertain. If a person has an absolute advantage in the production of some good, this means that he or she can produce the good in less time than it takes the other person. However, what matters for opportunity cost is not just the time it takes to produce one good, but also the time it takes to produce an alternative good. Suppose our person is twice as fast as the other person at producing one good and three times as fast at producing another. Then, our person would have an absolute advantage in the production of the first good, but still be the higher opportunity cost producer. He or she would give up more of the second good to produce the first good than the other producer.