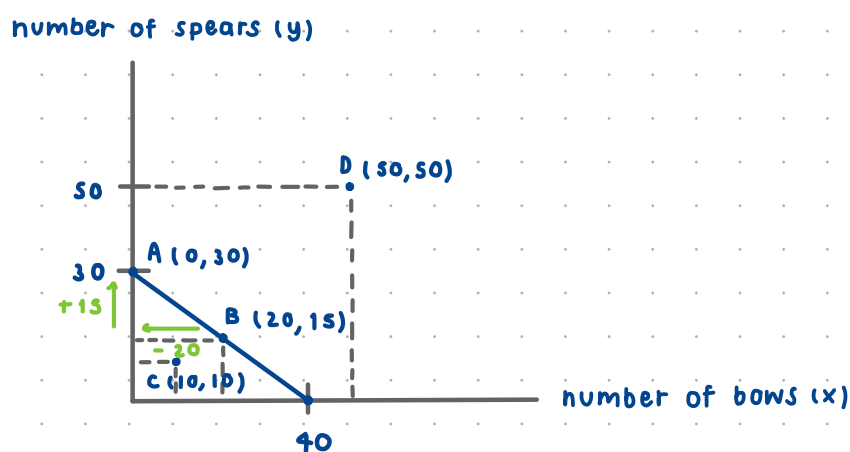


1. A human civilization finds a new wood source of total 120 units. Wood can either be used to produce spear or bow for hunting. A wood master then calculates that in order to produce a spear, it takes 4 units of wood while 3 units for a bow. Answer the following questions.

1.a) Assumed that the opportunity cost of using this 120 units of wood to produce the products is constant, draw a production possibility curve (PPC), displaying quantity of spear on the vertical axis and quantity of bow on the horizontal axis, and indicate all the essential details in the graph and explain.

spear : 4 units $\rightarrow$ 1 spear
 120 units $\rightarrow$ 30 spears
 (max)

bow : 3 units $\rightarrow$ 1 bow
 120 units $\rightarrow$ 40 bows
 (max)



From the graph above, at point c, it is feasible but it is not efficient because there are some resources left. For point D, it is not feasible due to the limited resources. Also, at points A and B, it is both feasible and efficient in production because it utilises all of the resources available.

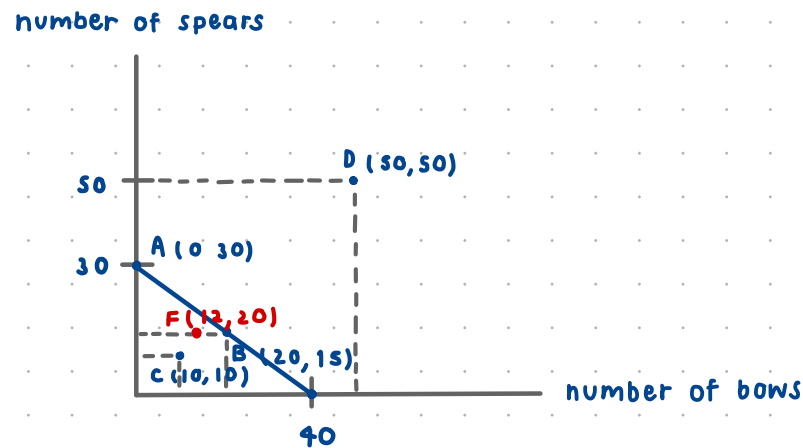
1.b) How much is the opportunity cost for a spear, in terms of bow? Show how you calculate this figure.

from point B to A, they give up 20 bows to have 15 more spears
 and for 1 spear, they have to give up :

rule of three : 15 spears $\rightarrow$ 20 bows
 1 spears $\rightarrow$ $\frac{4}{3}$ bows

$\therefore$ in order to produce 1 more spear, they have to give up $\frac{4}{3}$ or 1.333 bows
 so the opportunity cost for a spear is $\frac{4}{3}$ *

1.c) With this newly found resource, is it possible for this civilization to produce 20 spears and 12 bows? If it is, is this option efficient? Display this option on a graph from (a) and explain.



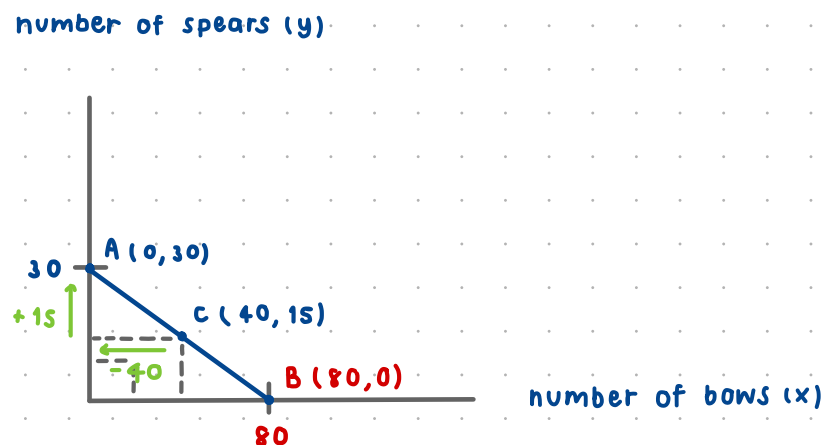
It is possible to produce 20 spears and 12 bows because it is located under the line which means there are enough resources for the production but it is inefficient because there are some resources left.

1.d) If a new method of making bow is discovered and requires only 1.5 units of wood for each bow, how does it affect the PPC and the opportunity cost for a spear? Illustrate the change and explain.

OLD bow : 3 units $\rightarrow$ 1 bow
120 units $\rightarrow$ 40 bows

spear : 4 units $\rightarrow$ 1 spear
120 units $\rightarrow$ 30 spears

NEW bow : 1.5 units $\rightarrow$ 1 bow
120 units $\rightarrow$ 80 bows



As a new method of making bow is discovered, it requires 1.5 units fewer than the previous method. With the same amount resources that producer has, we can produce 40 more of bow which means the number of bows (horizontal axis) on a PPC shifts from 40 to 80

1 d) the opportunity cost :

from point C to A , they give up 40 bows to have 15 more spears.

for 1 spear, they have to give up

rule of three . 15 spears $\longrightarrow$ 40 bows

$$1 \text{ spears} \longrightarrow \frac{8}{3} \text{ bow}$$

$\therefore$ in order to produce 1 more spear, they have to give up $\frac{8}{3}$ or ≈ 2.666 bows

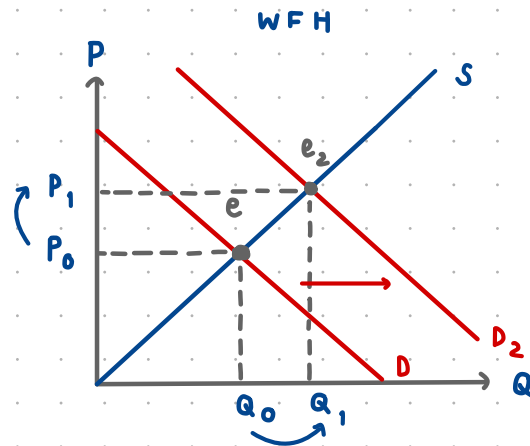
so the opportunity cost for spear with the new production of bow is $\frac{8}{3}$ #

the opportunity cost when it takes 1.5 units for 1 bow is more than

when it takes 3 units for 1 bow ($\frac{8}{3} > \frac{4}{3}$) which means for the new method, it gives up more than the previous one.

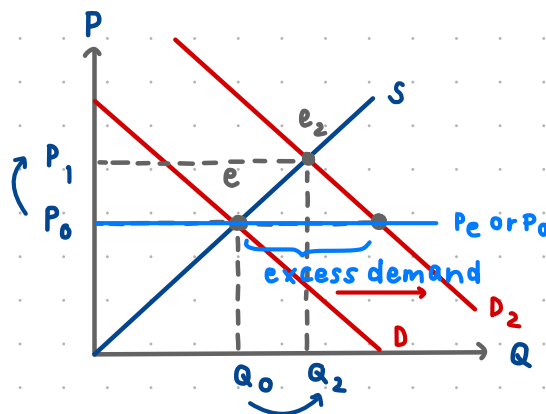
2. Assumed that a computer devices market is perfectly competitive, answer the following questions in detail.

2.a) Draw a graph showing that the computer devices market is in equilibrium at a certain original equilibrium price P_0 and equilibrium quantity Q_0 . During the pandemic, many people are assigned to work from home and computer devices are crucial. Does the market demand or market supply of computer devices change? Explain.



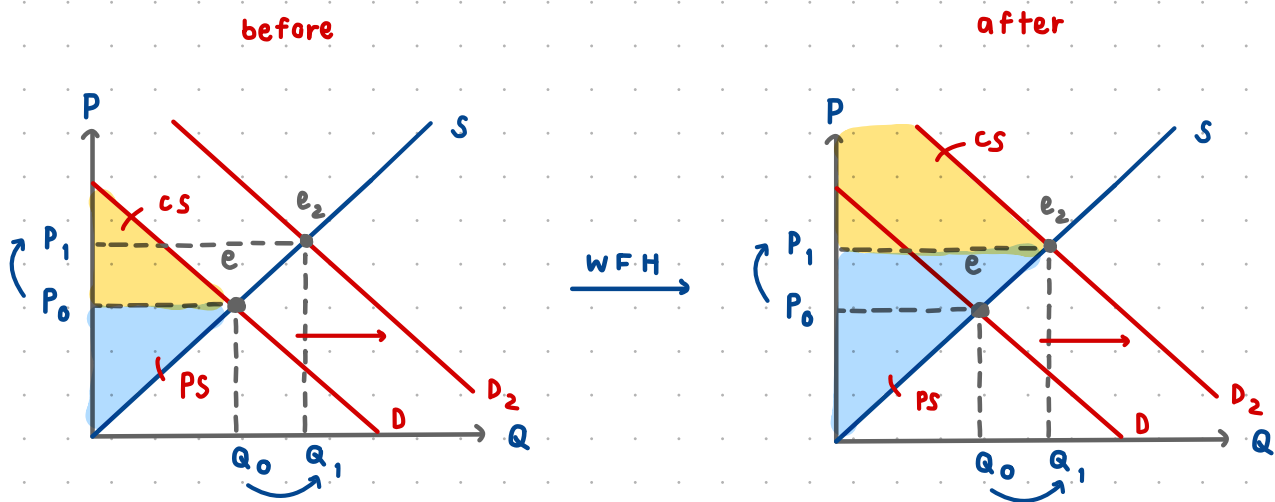
The market demand changes because during the pandemic, computer devices are more essential so the quantity demanded for computer devices shifts the demand curve to the right. So, both price and quantity of computer devices are rising.

2.b) After what happened in 2.a), at the original equilibrium price P_0 will there be excess demand or excess supply? Show the new market equilibrium and state the equilibrium condition. Does the pandemic cause the equilibrium price and quantity to increase or decrease?



There will be an excess demand because the quantity demanded is greater than quantity supplied since the price stays the same and at the point P_0 , after the situation in the 2.a) happened, the price P_0 is below the equilibrium price. After the demand curve shifts from D to D_2 , the equilibrium price and the equilibrium quantity both increase from e to e_2 (new equilibrium point). Resulting in a higher equilibrium price and higher equilibrium quantity.

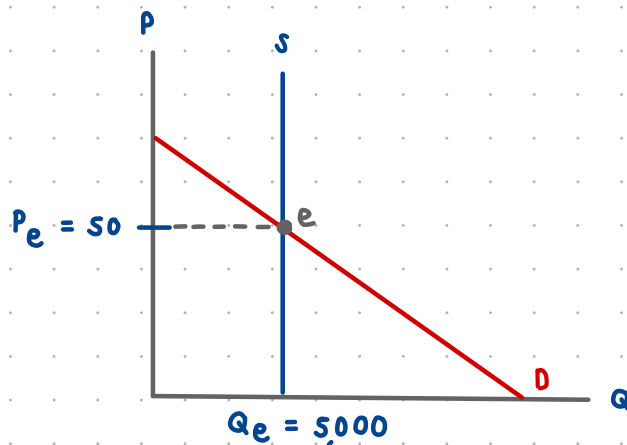
2.c) From the situation in 2.b), compare the consumer surplus and producer surplus in this computer market before and during the pandemic.



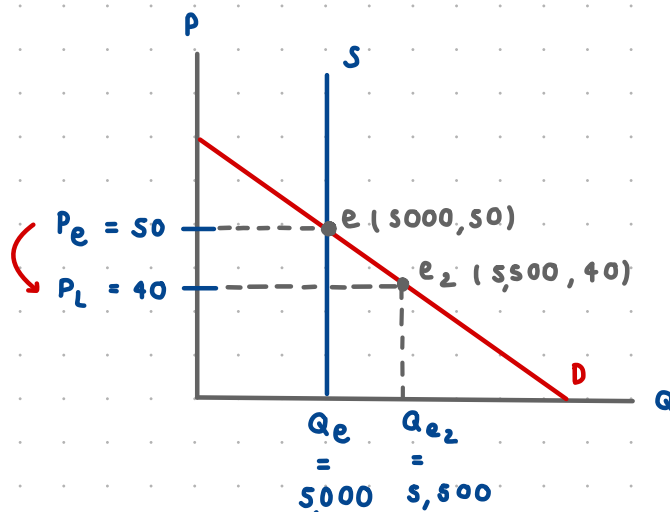
As the price goes up due to the pandemic, the willingness that buyer wants to sell also goes up. So the blue area (producer surplus) will increase when the pandemic hits while the willingness to pay (the consumer surplus in the yellow area) decreases.

3. Consider a System-on-a-Chip (SoC) market that is assumed to be perfectly competitive, due to a technical problem of production, there are only a few factories that can produce the next generation SoC. Answer the following questions in detail.

3.a) Draw a demand and supply on graph when the demand has normal downward slope while the supply is perfectly inelastic. The equilibrium price is at \$50 and the equilibrium quantity is at 5,000 units a day.



3.b) With the situation in 3.a), a study reveals that when the price drops to \$40, there will be 500 units of excess demand. Calculate the price elasticity of demand and supply at the equilibrium.

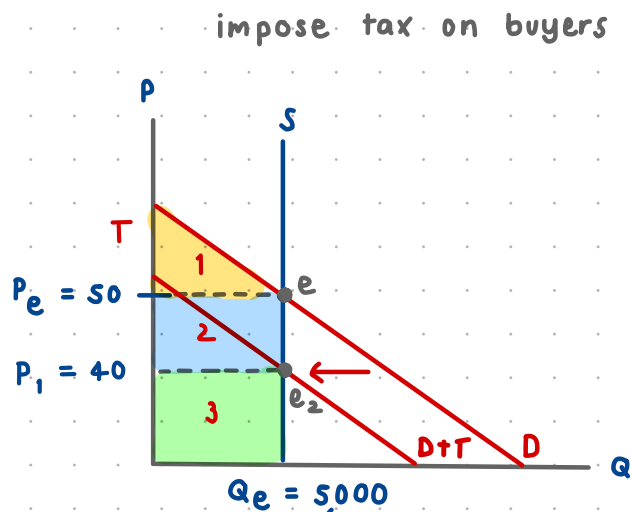


$$\begin{aligned} \epsilon_{d(e_2)} &= \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q} = \frac{Q_2 - Q_1}{P_2 - P_1} \cdot \frac{P_1}{Q_1} = \frac{5500 - 5000}{40 - 50} \cdot \frac{50}{5000} \\ &= -50 \cdot 0.01 \\ &= -0.5 \text{ or } -\frac{1}{2} \end{aligned}$$

when price increases 10%, the quantity demanded decreases for 2%.

and when the supply is perfectly inelastic, the price elasticity of supply = 0 because it leaves the quantity supplied unchanged.

3.c) With the situation in 3.a), if a unit tax is imposed on buyers for \$10, portray the result of this intervention including the new equilibrium price and quantity, deadweight loss, and tax burden. Also, indicate which part of the burden belongs to either the buyers or the sellers.



Surplus	Before	After	Diff.	Tax burden
CS	1	1	-	-
PS	2 3	3	-2	2
Gov. revenue	-	2	2	-
Total	1 2 3	1 2 3	-	2

as the supply is perfectly inelastic, there is no deadweight loss because the burden is beared by the producers. After the tax imposition, those burden (part number 2) will belong to only the producers.