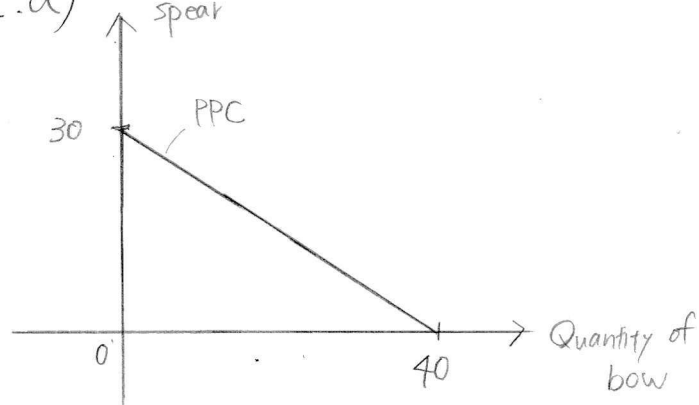


1.a) Quantity of spear



From the problem statement, we know that there are 120 units and the human civilization uses 4 units to produce a spear and 3 units to produce a bow. Therefore, if it uses all the resources for spears, it can make 30 spears, while for bows, it can make 40 bows. Thus, the graph is as shown on the left.

1.b) If it uses all resources for spears or bows, it can produce 30 or 40, respectively. Therefore, the equation is

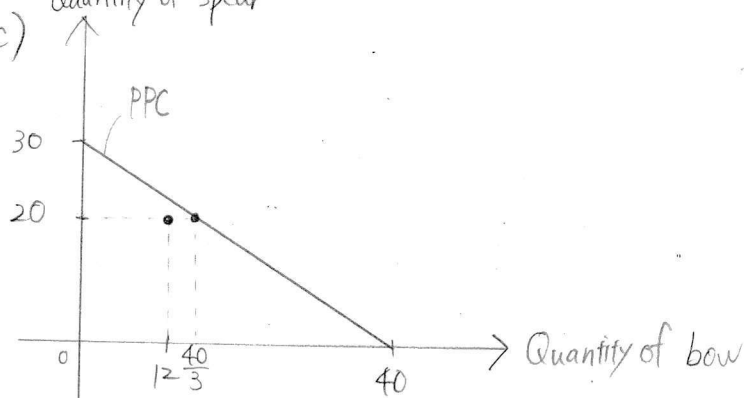
$$30 \text{ spears} = 40 \text{ bows}$$

Since we calculate the opportunity cost for a spear,

$$1 \text{ spear} = \frac{40}{30} \text{ bows} \\ = \frac{4}{3} \text{ bows}$$

$$A. \frac{4}{3} \text{ bows}$$

1.c) Quantity of spear



If it produces 20 spears and converts that to the number of bows,

$$20 \times \frac{4}{3} = \frac{80}{3} \text{ bows}$$

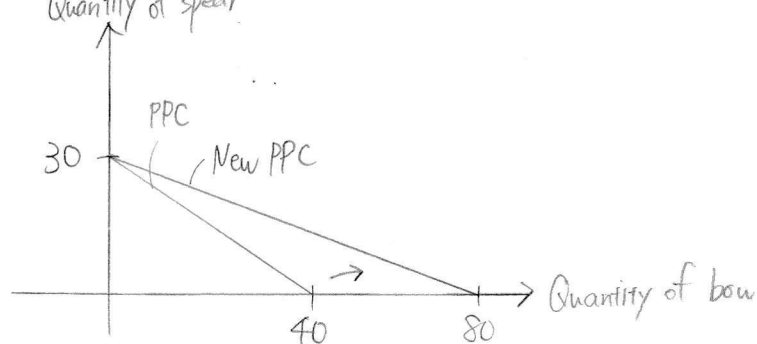
Then, calculated the rest of bows it can produce,

$$40 - \frac{80}{3} = \frac{120-80}{3} \\ = \frac{40}{3} > 12$$

Therefore, to produce 20 spears and 12 bows is possible. As we can see from the above formula, it can produce more than 12 bows, so this option will be inside this PPC.

Also, this option is efficient because the two combined are more functional for hunting.

1.d) Quantity of spear



Since it can make a bow by using only 1.5 units, so if it uses all resources for bows,

$$\frac{120}{1.5} = 80$$

it can make 80 bows.

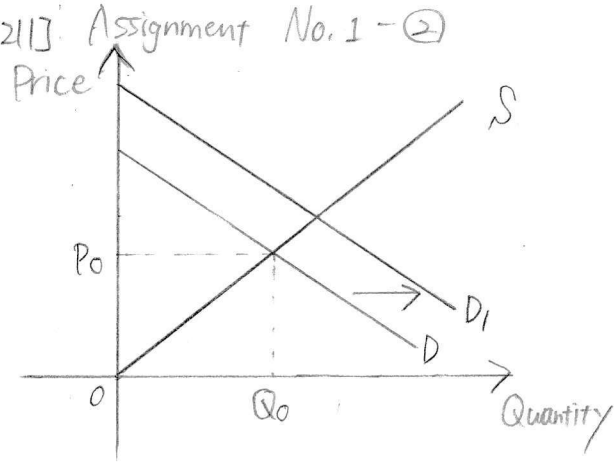
About the opportunity cost for a spear, as the same as 1.b,

$$30 \text{ spears} = 80 \text{ bows}$$

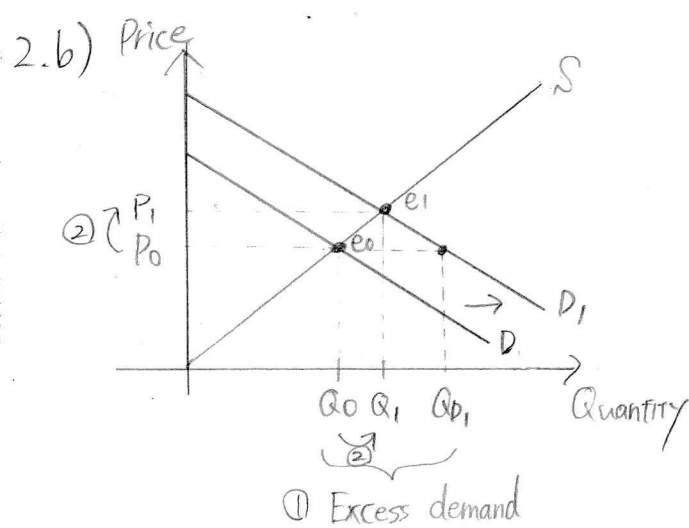
$$1 \text{ spear} = \frac{80}{30} \text{ bows}$$

$$= \frac{8}{3} \text{ bows}$$

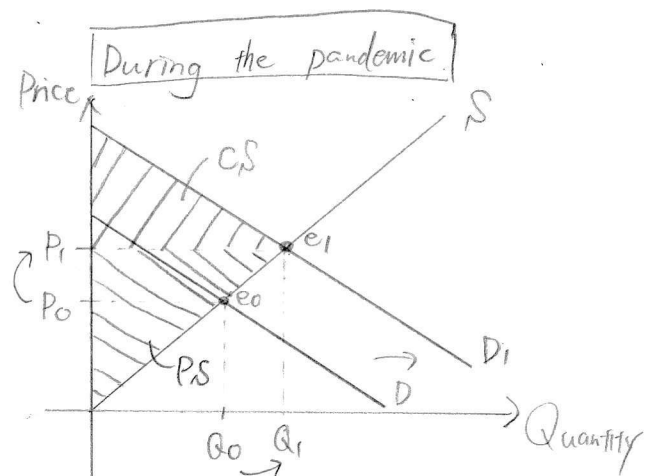
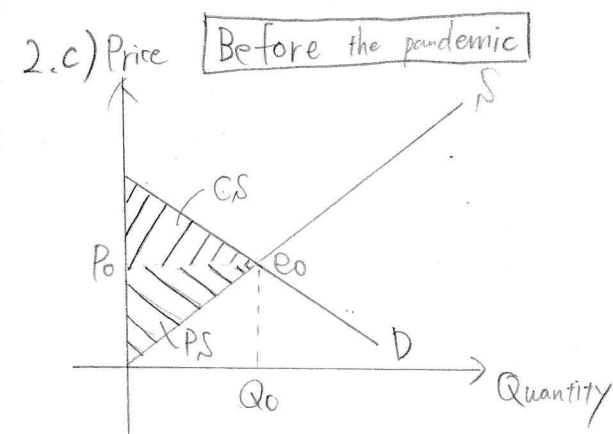
Therefore, the opportunity cost will increase, and new one will be $\frac{8}{3}$ bows.



Since to work from home and computer devices are crucial, the market demand of computer devices increases, while the market supply does not change. Therefore, the demand shifts to the right hand side.

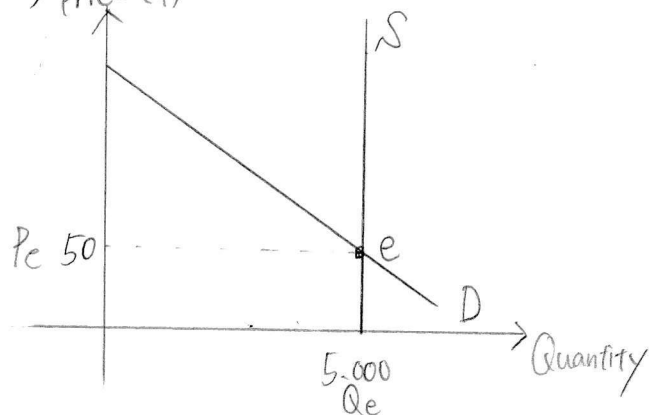


Since the demand line shifts to the right hand side (D_1), the quantity of demand at price P_0 will be Q_{D_1} which is more than Q_0 at price P_0 . Therefore, there will be excess demand (①). Also, as shown the new market equilibrium in the graph on the left, the equilibrium price and quantity increase due to the pandemic (②).



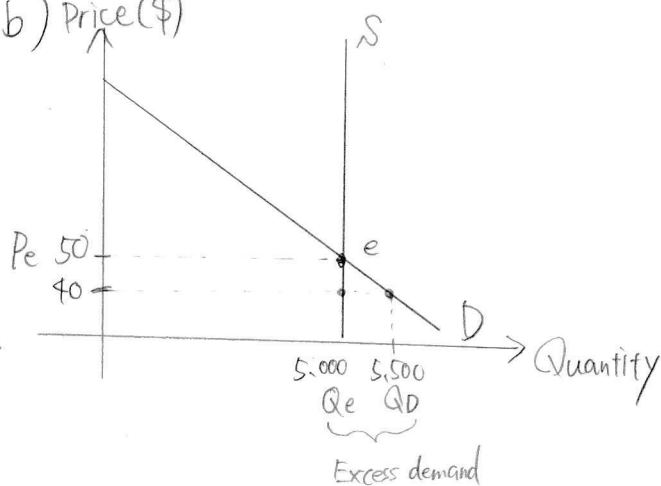
When we compare the above 2 graphs in term of the consumer surplus (CS) and producer surplus (PS) both of them increase: About CS, although price goes up, the quantity of demand increases and then the willingness to pay increases as well, so as a result CS goes up. On the other hand, about PS, both price and quantity increase, and PS goes up as well.

3.a) Price (\$)



Since we know the supply line is perfectly inelastic from the problem statement, the supply line is a vertical line.

3.b) Price (\$)



Since we can calculate them by using the formula $\frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$,

$$\epsilon_d = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$$

$$= \frac{5,500 - 5,000}{40 - 50} \cdot \frac{50}{5,000}$$

$$= \frac{500}{-10} \cdot \frac{1}{100}$$

$$= -\frac{1}{2}$$

$$= \frac{-0.5}{1}$$

$$A. \epsilon_d = \frac{-0.5}{1}$$

$$\epsilon_s = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$$

$$= \frac{5,000 - 5,000}{40 - 50} \cdot \frac{50}{5,000}$$

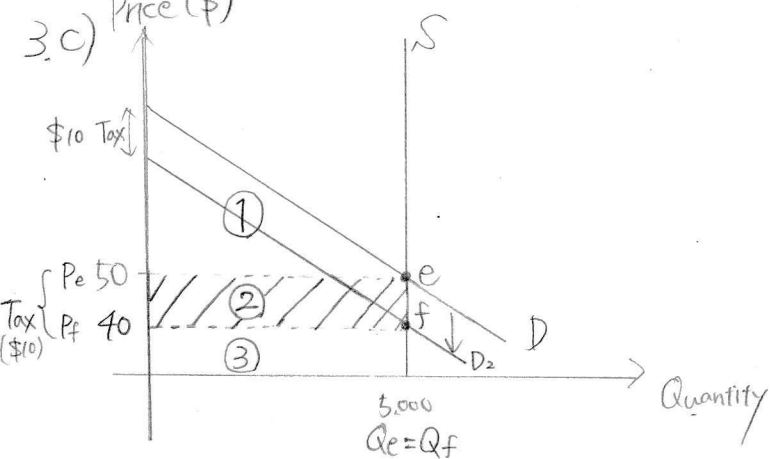
$$= \frac{0}{-10} \cdot \frac{1}{100}$$

$$= \frac{0}{-1000}$$

$$= \frac{-0.001}{1}$$

$$A. \epsilon_s = \frac{-0.001}{1}$$

3.c) Price (\$)



Because of tax which is imposed on buyers, the demand line shifts to the left hand side.

Also, the new equilibrium price is \$40 at P_f and the equilibrium quantity is the same as before because the supply is perfectly inelastic (Q_f).

About deadweight loss, in this case there is no deadweight loss. In addition, as for tax burden, that is the shaded area in the left graph (②) and all of it belongs to the sellers as shown in the left figure.

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