

Incorrect Tax Problem: Key
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Q1. Set marginal cost equal to the marginal benefit.

$$120 - \frac{2}{3}Q = 30 + \frac{2}{3}Q$$

$$\frac{4}{3}Q = 90$$

$$Q = \frac{270}{4} = 67.5$$

$$P = 30 + \frac{2}{3} * \frac{270}{4}$$

$$P = 75$$

Q2. Adding the tax to the marginal cost curve (or subtracting from marginal benefit)

$$MC (\text{with tax}) = MC + T = 30 + \frac{2}{3}Q + 45$$

$$120 - \frac{2}{3}Q = 30 + \frac{2}{3}Q + 45$$

$$45 = \frac{4}{3}Q$$

$$Q(\text{tax}) = \frac{135}{4} = 33.75$$

To solve for the price consumers pay (producers receive), we insert the $Q(\text{tax})$ in to our original demand (supply) equation.

$$P^C = 120 - \frac{2}{3}(33.75) = 97.5$$

$$P^P = 30 + \frac{2}{3}(33.75) = 52.5$$

Q3. Calculate the change in surplus associated with the tax. Is the society better or worse off with an incorrect tax? Show DWL graphically and explain who pays the tax burden

The actual social marginal cost curve is calculated as- $SMC = MEC + MCSMC = 30 + 30 + \frac{2}{3}Q$

$$SMC = 60 + \frac{2}{3}Q$$

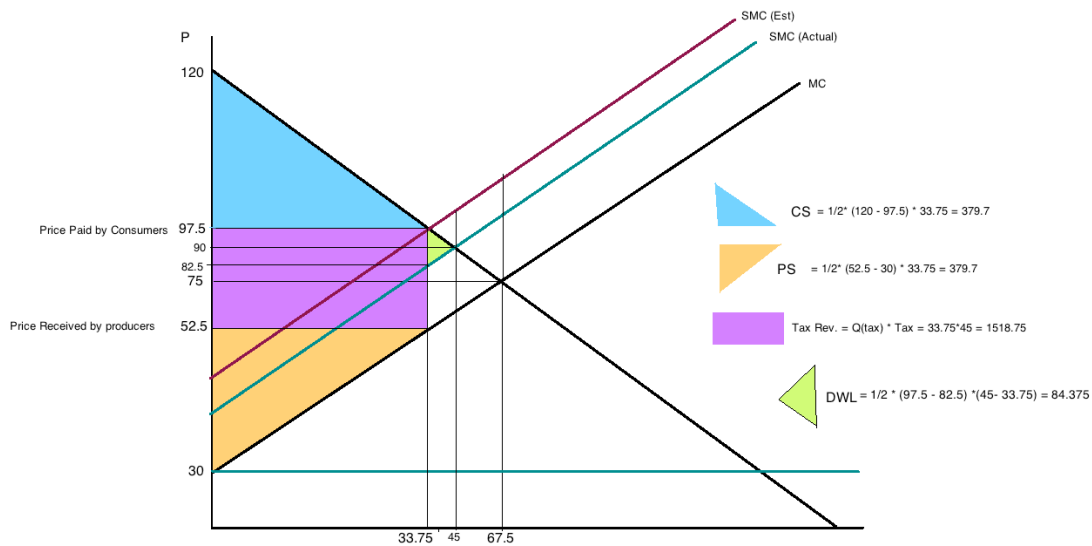
The optimal level of consumption and production occurs where $SMC = MB$

$$120 - \frac{2}{3}Q = 60 + \frac{2}{3}Q$$

$$Q = 45$$

$$P = 60 + \frac{2}{3}45 = 90$$

WELFARE WITH TAX

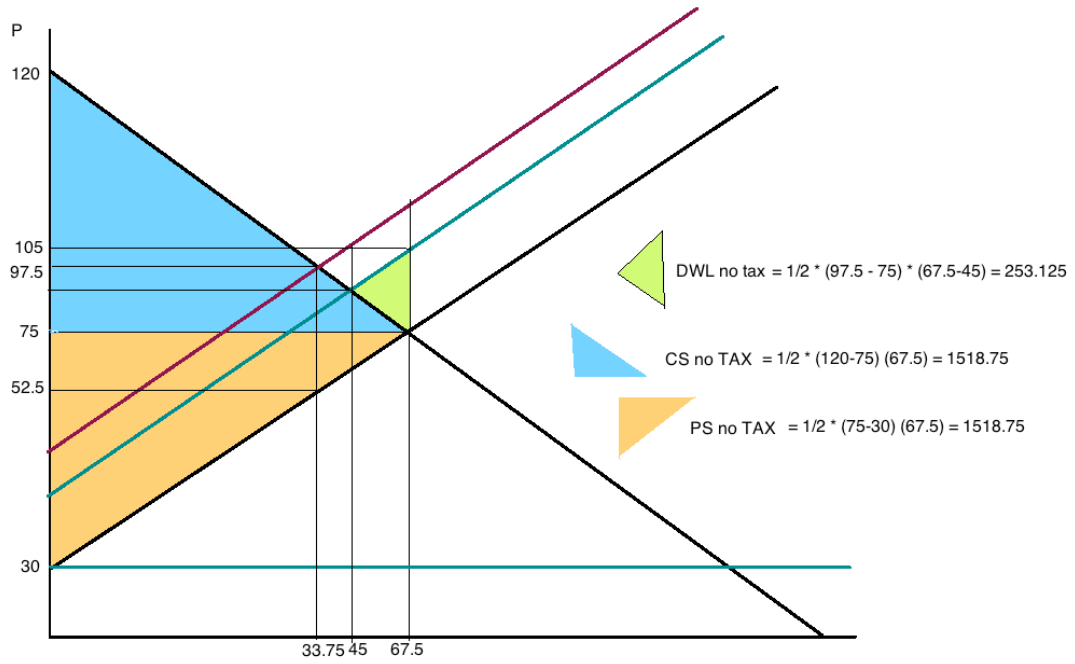


Total Welfare (with tax = 45)

$$TW = CS + PS + TR - DWL = 2194.35$$

Total welfare with tax (set incorrectly) is less than total welfare with no tax.

WELFARE: NO TAX



$$TW \text{ (no Tax)} = CS + PS - DWL = 2784.4$$