

## Quiz 3 Solution

1. Norway has adopted a tax of \$50 per ton of carbon dioxide. Convert this to \$/tC:

$$\left[ \frac{\$50}{t_{\text{CO}_2}} \right] \left[ \frac{44 \text{ g}_{\text{CO}_2}}{\text{mole}_{\text{CO}_2}} \right] \left[ \frac{\text{mole}_{\text{CO}_2}}{12 \text{ g}_C} \right] = \frac{\$183}{t_C}$$

2. Gasoline is 85% C; density is 0.75 kg/L. How much would a \$100/tC tax add to the price of a gallon of gasoline?

$$\left[ \frac{\$100}{t_C} \right] \left[ \frac{0.85 t_C}{1000 \text{ kg}} \right] \left[ \frac{0.75 \text{ kg}}{\text{L}} \right] \left[ \frac{3.785 \text{ L}}{\text{gal}} \right] = \frac{\$0.24}{\text{gallon}}$$

## Quiz 3 Solution

3. How much revenue would be collected from gasoline sales in the US from a tax of \$100/tC?

$$\left[ \frac{\$0.24}{\text{gal}} \right] \left[ \frac{\text{gal}}{20 \text{ mi}} \right] \left[ \frac{12,000 \text{ mi}}{\text{car} \cdot \text{y}} \right] \left[ 230 \cdot 10^6 \text{ cars} \right] = \frac{\$33 \cdot 10^9}{\text{y}}$$

4. This ignores changes in demand. Assume the price elasticity of demand for gasoline is  $-0.8$ .

$$\frac{\Delta D}{D} \approx \varepsilon \frac{\Delta P}{P} = -0.8 \frac{0.24}{1.75} = -0.11 \approx 11\% \text{ decrease}$$

Revenue ~\$30 billion instead of ~\$33 billion.