REVIEW 8.1 SOLUTIONS (U.S. IMPORT DEMAND)

U.S. demand for brooms is \( P = 48 - 2Q_D \), and U.S. supply is \( P = 16 + 2Q_S \).

1. Determine the U.S. autarky price.

   *The U.S. autarky price equates U.S. demand and U.S. supply.*

   \[
   48 - 2Q_D = 16 + 2Q_S \\
   \rightarrow 4Q = 32 \rightarrow Q = \frac{32}{4} = 8
   \]

   \[
   P = 48 - 2Q_D = 48 - 2(8) = 48 - 16 = 32
   \]


   *U.S. import demand is the amount that quantity demand exceeds quantity supplied for various prices.*

   \[
   P = 48 - 2Q_D \rightarrow Q_D = 24 - \frac{1}{2}P \\
   P = 16 + 2Q_S \rightarrow Q_S = -8 + \frac{1}{2}P
   \]

   \[
   M = D - S = Q_D - Q_S = 24 - \frac{1}{2}P - \left( -8 + \frac{1}{2}P \right) \\
   \rightarrow M = 32 - P \rightarrow P = 32 - Q_M
   \]
REVIEW 8.2 SOLUTIONS (MEXICAN EXPORT SUPPLY)
Mexican demand for brooms is \( P^* = 32 - 2Q_D^* \), and Mexican supply is \( P^* = 2Q_S^* \).

1. Determine the Mexican autarky price.
   Mexican autarkic price equates Mexican demand and Mexican supply.
   \[
   32 - 2Q_D^* = 2Q_S^* \\
   \rightarrow 4Q^* = 32 \rightarrow Q^* = \frac{32}{4} = 8 \\
   P^* = 32 - 2Q_D^* = 32 - 2(8) = 32 - 16 = 16
   \]

2. Construct Mexican export supply.
   Mexican export supply is the amount that supply exceeds demand for various prices.
   \[
   P^* = 32 - 2Q_D^* \rightarrow Q_D^* = 16 - \frac{1}{2}P^* \\
   P^* = 2Q_S^* \rightarrow Q_S^* = \frac{1}{2}P^* \\
   X^* = S^* - D^* = Q_S^* - Q_D^* = \frac{1}{2}P - \left( 16 - \frac{1}{2}P \right) \\
   X^* = -16 + P \rightarrow P = 16 + Q_x^*
   \]
REVIEW 8-3 SOLUTIONS  (WORLD EQUILIBRIUM)

1. Determine the world price under free trade.
   The world price equates U.S. import demand and Mexican export supply.

   \[ M = X^* \]
   \[ \Rightarrow 32 - P = -16 + P \]
   \[ \Rightarrow 2P = 48 \Rightarrow P = \frac{48}{2} = 24 \]

2. Determine U.S. imports under free trade.
   U.S. imports under free trade are

   \[ M = 32 - P = 32 - 24 = 8 \]

3. Determine Mexican exports under free trade.
   Mexican exports under free trade are also

   \[ X^* = -16 + P = -16 + 24 = 8 \]
8.3 World Market

![Diagram showing world market with axes for quantity traded and world price, with lines representing market forces and equilibrium point X^* and M.](image-url)
REVIEW 8-4 SOLUTIONS (U.S. IMPORT TARIFF)
Suppose the United States now places a specific tariff $T = 8$ on brooms.

1. Construct the tariff-ridden U.S. import demand.
\[
    M_T = 32 - P_T = 32 - (P_T^* + T)
\]
\[
    = 32 - (P_T^* + 8) = 32 - 8 - P_T^*
\]
\[
    \rightarrow M_T = 24 - P_T^* \rightarrow P_T^* = 24 - Q_M
\]

2. Find the tariff-ridden Mexican price.
\[
    M_T = X^* \rightarrow 24 - P_T^* = -16 + P_T^*
\]
\[
    \rightarrow 2P_T^* = 40 \rightarrow P_T^* = \frac{40}{2} = 20
\]

3. Find the tariff-ridden U.S. price.
\[
    P_T = P_T^* + T = 20 + 8 = 28
\]

4. Find the tariff-ridden volume of trade (imports or exports).
\[
    M_T = 24 - P_T^* = 24 - 20 = 4
\]
**REVIEW 8-5 SOLUTIONS (U.S. WELFARE)**

1. Determine the change in U.S. producer surplus due to the tariff.

   *U.S. producer surplus increases by the area of a*
   
   \[
   (P_T - P) \left( \frac{S + S_T}{2} \right) = (28 - 24) \left( \frac{4 + 6}{2} \right) = 4(5) = 20
   \]

2. Determine the change in U.S. consumer surplus due to the tariff.

   *U.S. consumer surplus decreases by the area of a+b+c+d*
   
   \[
   (P_T - P) \left( \frac{D + D_T}{2} \right) = (28 - 24) \left( \frac{12 + 10}{2} \right) = 4(11) = 44
   \]

3. Determine the change in U.S. government revenue due to the tariff.

   *U.S. government tariff revenue increases by the area of c+e*
   
   \[
   TM_T = 8(4) = 32
   \]

4. Determine the change in U.S. welfare due to the tariff.

   *U.S. welfare gain is the area of e-(b+d)*
   
   \[
   \Delta W = \Delta CS + \Delta PS + \Delta GR = -44 + 20 + 32 = 8
   \]