21. C**orrect. The answer is true.**

Who absorbs a unit tax in a competitive market is totally determined by the responsiveness of suppliers and demanders. In this question,

$$\varepsilon_d = -0.2,\ \varepsilon_s = 0.8,\ \text{and } t = \$1.50$$

Then, we know from the definition of elasticity that:

$$\frac{dQ_d}{dP_d}\frac{P_d}{Q_d} = \varepsilon_d = -0.2 \text{ and } \frac{dQs}{dPs}\frac{Ps}{Qs} = \varepsilon_s = 0.80.$$

In the above formulas, dQ_d and dQ_s are how much quantity demand and quantity supply change and they can be solved to be:

$$dQ_d = -0.2\frac{dP_d}{P_d}Q_d$$

$$dQ_s = 0.80\frac{dP_s}{P_s}Q_s$$

Now, since we must be in equilibrium before and after the price change, the quantity changes must be the same or:

$$dQ_d = -0.2\frac{dP_d}{P_d}Q_d = dQ_s = 0.80\frac{dP_s}{P_s}Q_s$$

Old demand quantity Q_d and old supply quantity Q_s are the same, so they cancel.
If we started out with no tax, then old demand price P_d and the
old supply price P_s are the same and can also be cancelled and we are left with:

$$-0.2\mathrm{dP_d} = 0.80\mathrm{dP_s}$$

Rearranging we get that:

$$\frac{dPd}{dPs} = \frac{0.80}{-0.2} \quad (1)$$

We know that the increase in demand price minus the decrease in supply price must equal the tax or:

$$dP_d - dP_s = \text{tax} \quad (2)$$

For example, with a tax of \$1.50, if demand price goes up \$0.20, dP_d= 0.20, and the supply price falls 1.30, dP_s = -\$1.30, then 0.20 - (-1.30) = 1.50.

Now solve equation (2) for dP_s:

$$dP_s = dP_d - \text{tax} \quad (3)$$

Substitute the tax and (3) into (1)

$$\frac{dPd}{1.50 - dPd} = \frac{0.8}{-0.2}$$

Solve for dP_d:

$$dP_d = \frac{0.8(dP_d - 1.50)}{-0.2} = -4(1.50 - dP_d) \rightarrow -5dP_d = -6.00 \rightarrow dP_d = \$1.20$$

$$dP_s = dP_d - \text{tax} = \$1.20 - \$1.50 = -\$0.30$$

The solution tells us that with a \$1.50 tax per unit, supply price falls by \$0.30 and demand price goes up by \$1.20. Thus, the more elastic supplier pays less than the more inelastic demander. What is even more interesting is to do this example for the general case to see what elasticities imply about

who absorbs the tax. Go back to equation 1 and substitute in general elasticities to get

$$\frac{dPd}{dPs} = \frac{\varepsilon_s}{\varepsilon_p}$$

The equation above tells us that the larger the elasticity of supply, the larger will be the change in the demand price. Or in other words, the more responsive are suppliers, the more they can pass the tax on to demanders.

Similarly the more responsive are demanders, the more they can pass the tax back to suppliers.