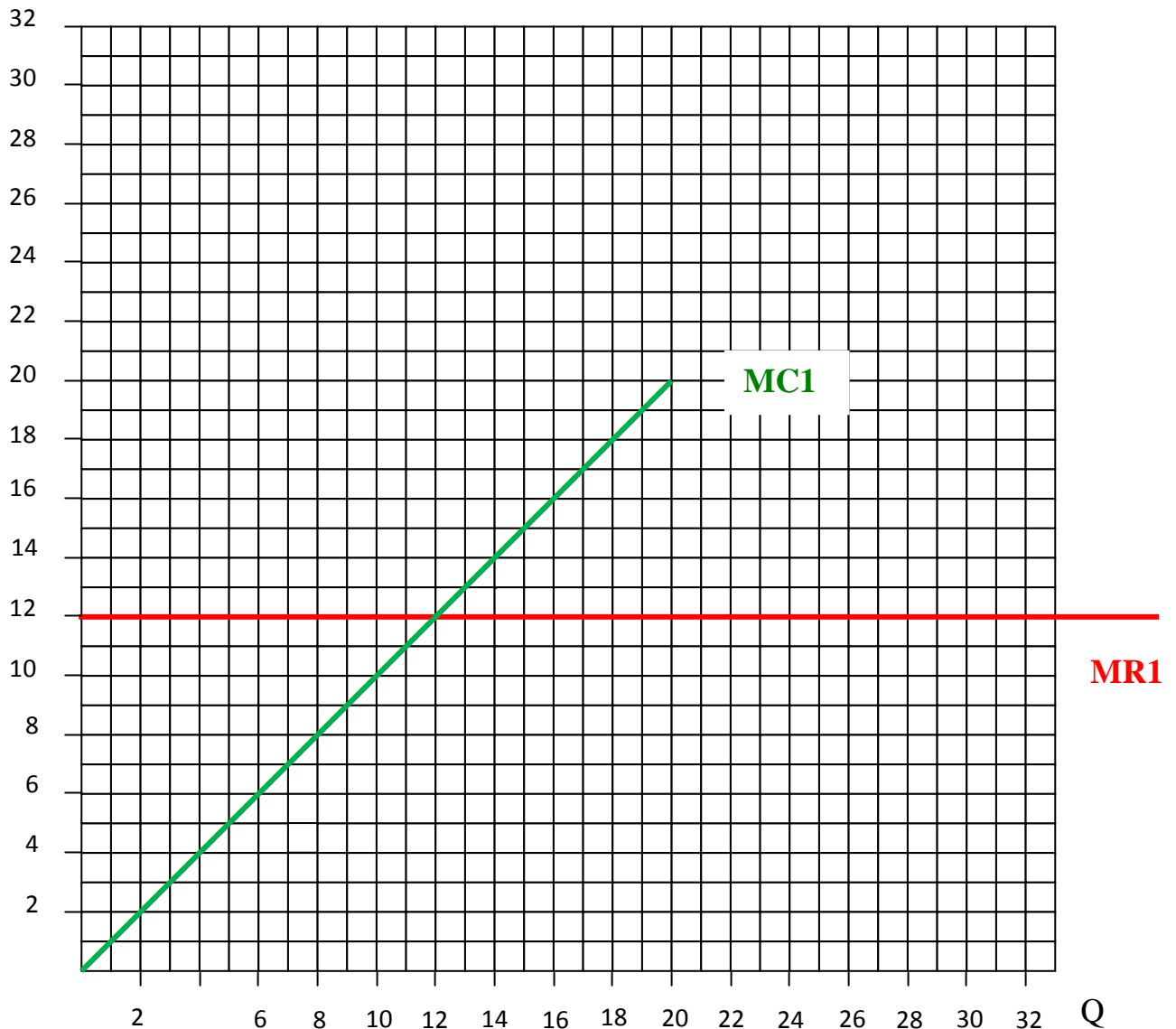# How Firms' Reaction To An Excise Tax Determines The Market Outcome

Suppose we have a firm that has the following MC and MR lines. Since MR is flat we have a perfectly competitive market and no firm can influence price.

**Figure 1**



The market price must be 12 since MR = 12. The firm has a Q = 12 since that is where MR = MC.

Then suppose that there is $2.00 excise tax placed on the product. The MC line has to shift up by$2.00 because it now costs an additional $2.00 to supply this good to the market. Recall that the firm's short run supply curve is its MC curve above the minimum of AVC. Supplying a good to the market is just not producing it. It has to be offered for sale to the consumers and now that requires an additional $2.00. So the MC line shifts up by the amount of the tax, $2.00. See the graph below.

**Figure 2**
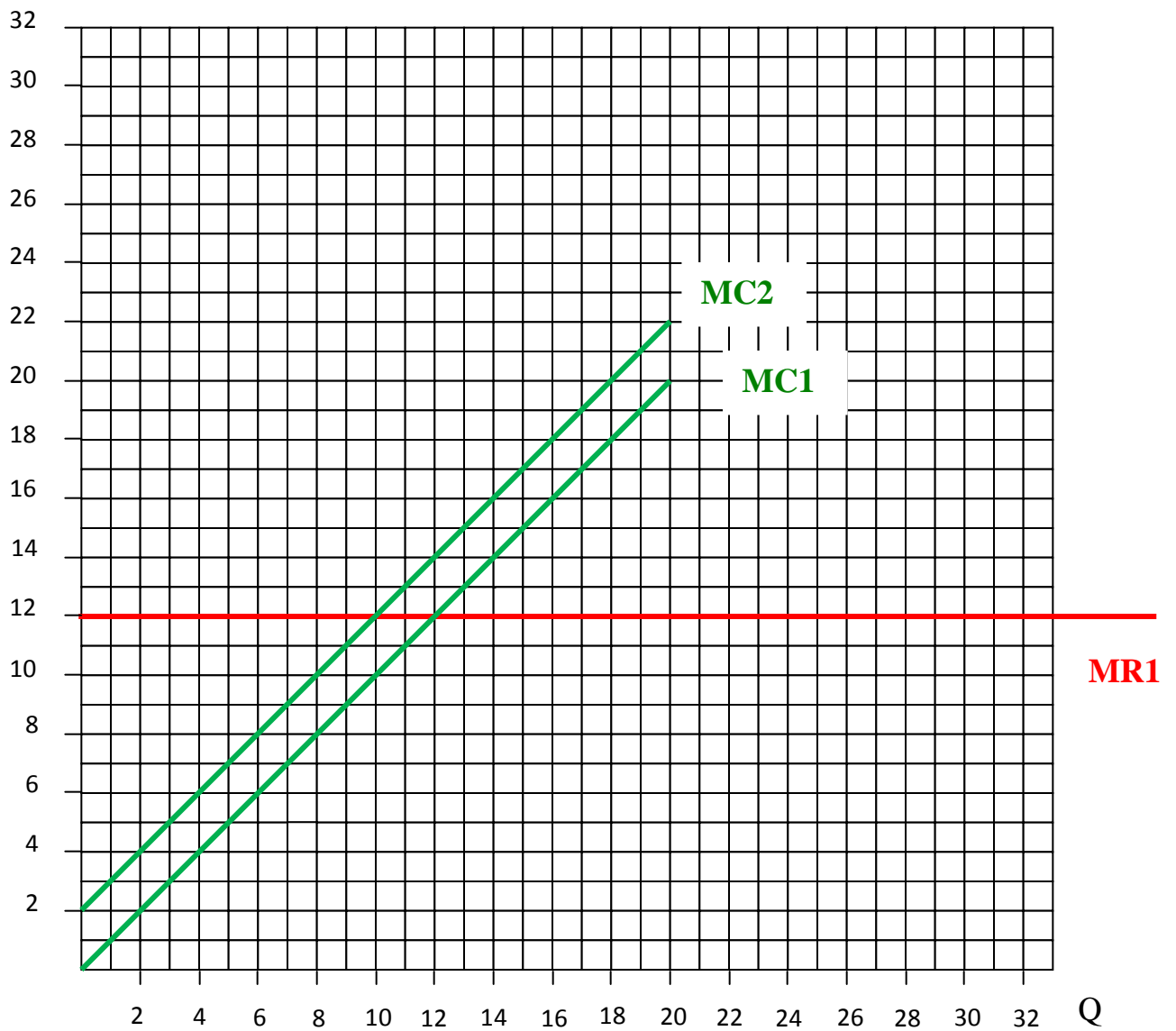
This firm will cut back its Q from 12 to 10. We can see that from the intersection of MC2 and MR1. Also, the firm cannot simply raise the price by $2.00 since it has no power over price, being a price taker.

Now suppose that we had 2 firms in the industry (a perfectly competitive industry will have many more, but we are trying to keep this simple).

Suppose that the 2 firms have the same MC lines. If we add them together we get the market supply line. So if we add MC2 from firm A to MC2 for firm B, we get the new market supply curve as a result of the tax. The table below summarizes this process.

| P | Firm A Q | Firm B Q | Market Q |
|---|---|---|---|
| 2 | 0 | 0 | 0 |
| 3 | 1 | 1 | 2 |
| 4 | 2 | 2 | 4 |
| 5 | 3 | 3 | 6 |
| 6 | 4 | 4 | 8 |
| 7 | 5 | 5 | 10 |
| 8 | 6 | 6 | 12 |
| 9 | 7 | 7 | 14 |
| 10 | 8 | 8 | 16 |
| 11 | 9 | 9 | 18 |
| 12 | 10 | 10 | 20 |
| 13 | 11 | 11 | 22 |
| 14 | 12 | 12 | 24 |
| 15 | 13 | 13 | 26 |
| 16 | 14 | 14 | 28 |
| 17 | 15 | 15 | 30 |
| 18 | 16 | 16 | 32 |
| 19 | 17 | 17 | 34 |
| 20 | 18 | 18 | 36 |
| 21 | 19 | 19 | 38 |
| 22 | 20 | 20 | 40 |

The price (P) and Market Q columns combine to make the new supply curve as a result of the tax. For example, at a price of 6, each firm supplies a Q of 4 to the market so the market quantity supplied is 8. This is S2 in the graph below. Again, S2 is the sum of the MC lines of each firm, with each firm having MC2.
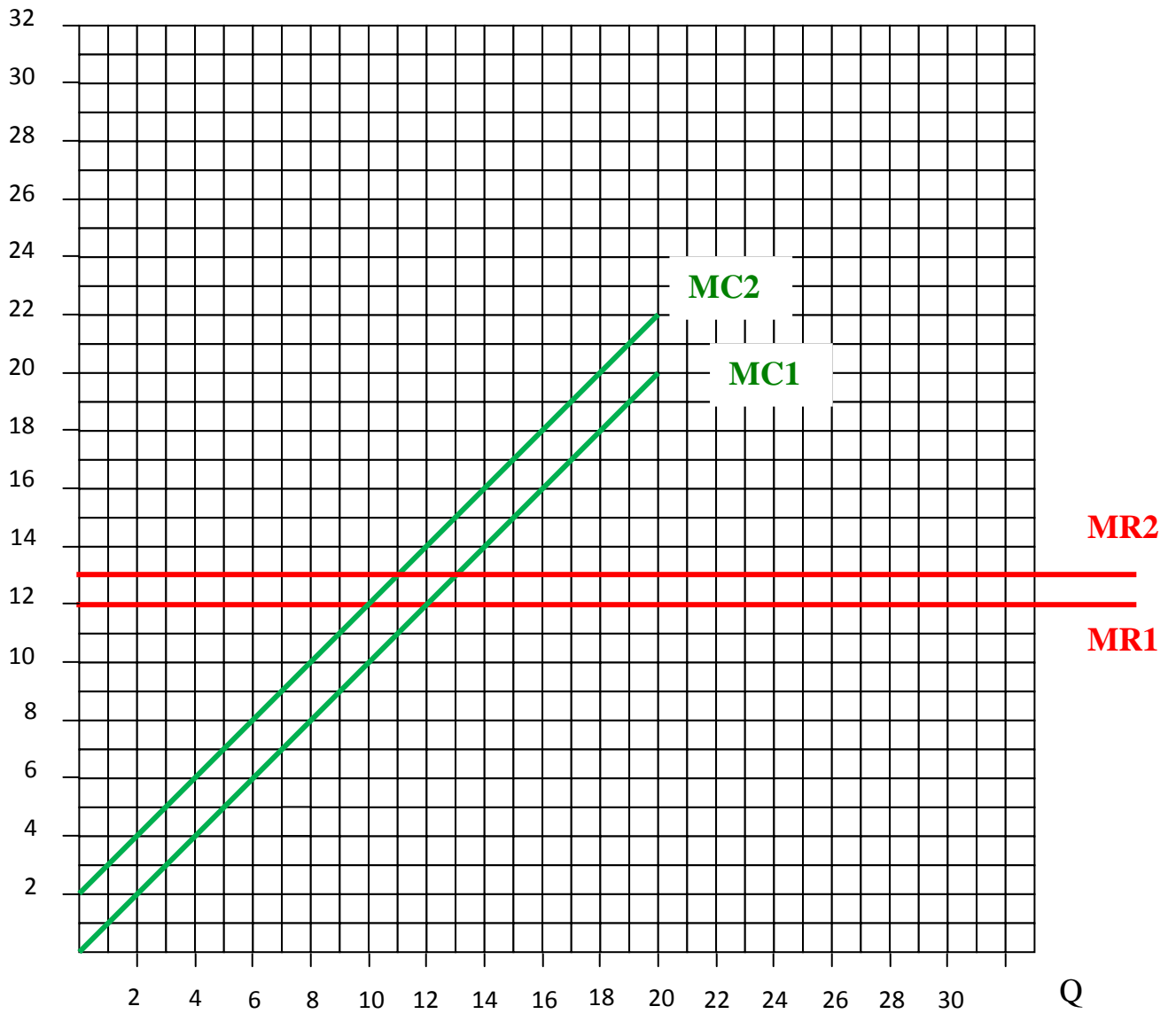
**Figure 3**
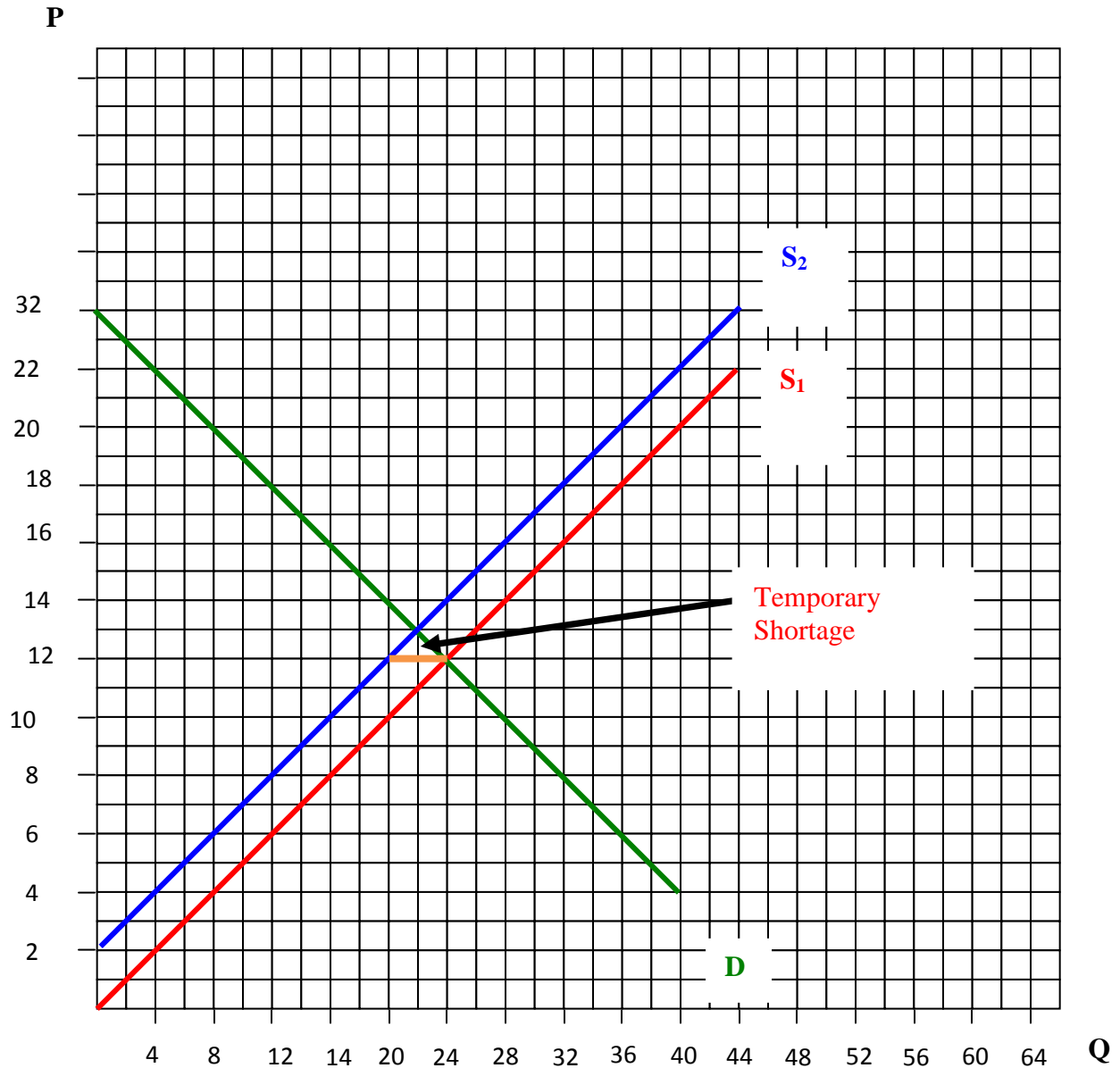


Since each firm reduced its Q by 2 at each price (see the move from MC1 to MC2 in Figure 2), we can say that the supply curve has shifted to the left by 2 (I know in class we say that the supply line shifts up by the amount of the tax-it does shift up by $2.00 here-I am attacking the problem from a different perspective here).

Notice also that the price has risen from 12 to 13. That means we have to raise the MR line in Figure 2 by $1.00. The next graph, Figure 4, shows this. The new MR line is MR2.

**Figure 4**



Notice that MC2 and MR2 intersect at Q = 11. If each of the two firms has a Q of eleven and P = MR = 13, then the market Q = 22 (2*11 = 22). That is what we see at P = 13 in Figure 3.

Also notice in Figure 3, that there is a temporary shortage when supply moves from S1 to S2. Initially, firms will keep price at 12 when they cut back on their output (from Q = 12 to Q = 10, see Figure 2). But since all firms are doing this, a shortage will at first exist. The market quantity supplied will be 20 (finding where a price of 12 hits S2) while the market quantity demanded will be 24 when P = 12. Firms will soon see that they are not producing enough to satisfy their customers and will want to raise their quantity supplied. But that requires an increase in price. Although perfectly competitive firms don't normally have power over price, they do have just a bit when there is a shortage. They know it means people will be willing to pay a bit more.

But if the firms in an industry understand basic economics, they will probably have already made the necessary increase in price before this whole scenario happens because they know it is inevitable.