

Chapter 7 Answers to Numerical Exercise: Demand Shift

Widgets are provided by a competitive constant-cost industry where each firm has fixed costs of \$30. The following chart shows the industry-wide demand curve and the marginal cost curve of a typical firm.

Industry Demand			Firm's Marginal Cost Curve		Cost Curves				Industry Supply	
New Price (with tax)	Price	Quantity	Quantity	MC	TC	VC	ATC	AVC	Industry Supply	Price
-20	\$5	1500	1	\$5	\$35	\$5	\$35	\$5	150	\$5
-5	10	1200	2	10	45	15	22.5	7.5	300	10
0	15	900	3	15	60	30	20	10	450	15
5	20	600	4	20	80	50	20	12.5	600	20
10	25	300	5	25	105	75	21	15	750	25
15	30	200	6	30	135	105	22.5	17.5	900	30
20	35	140	7	35	170	140	24.29	20	1050	35
25	40	50	8	40	210	180	26.25	22.5	1200	40

a. Assume the industry is at its long-run competitive equilibrium. What is the price of a widget?

Answer: $P = \$20$ and $Q = 4$ for each firm since this is where $P = ATC = MC$. Zero-profit condition.

b. How many firms are in the industry?

Answer: At \$20, each firm supplies 4 widgets and the total industry demand is 600, so there are $600/4 = 150$ firms in the market.

Suppose there is a SALES tax of \$15 per widget.

c. In the short run, what is the new price of widgets?

We want to find the new p and q where $Q_s = Q_d$. First, we need to calculate industry supply. To do so, we multiply individual firm q by the number of firms, or 150. Then, we need to incorporate the tax impact on demand curve. Remember, a sales tax shifts the demand curve back by the amount of the tax. So the corresponding prices are $P - tax$ (as seen above in the new price column). Now we want to find the point where demand = supply.

*(\$10, 300) is on the NEW demand schedule and is also on the original supply schedule, so this is the new P and Q . In the short-run, the firms are each supplying 2 units. At 2 units, their TC is \$45 and their new TR is $\$10 * 2 = \20 . So, the firms are earning a negative profit in the SR.*

d. In the short run, how many firms leave the industry?

Answer: 0- there is no exit in the SR. Even though they are earning negative profit, they can't shut down.

e. In the long-run what is the new price of widgets?

Answer: We know that in the LR, the firms will earn zero profit. This happens when $MC = ATC = P$. Where does this happen? This happens where $MC = ATC = P = \$20$. So, we know that in the LR, the price will rise back to its original level of \$20.

f. In the long-run, how many firms leave the industry?

At price of \$20, industry demand = 140 and each firm produces 4 widgets. So, the number of firms = $140/4 = 35$. Thus, 115 firms leave the industry.