

**Microeconomics**  
**Chapter 14 Firms in Competitive Markets (Profit, Losses, Shutdown Decision)** (Practice Problem 1)

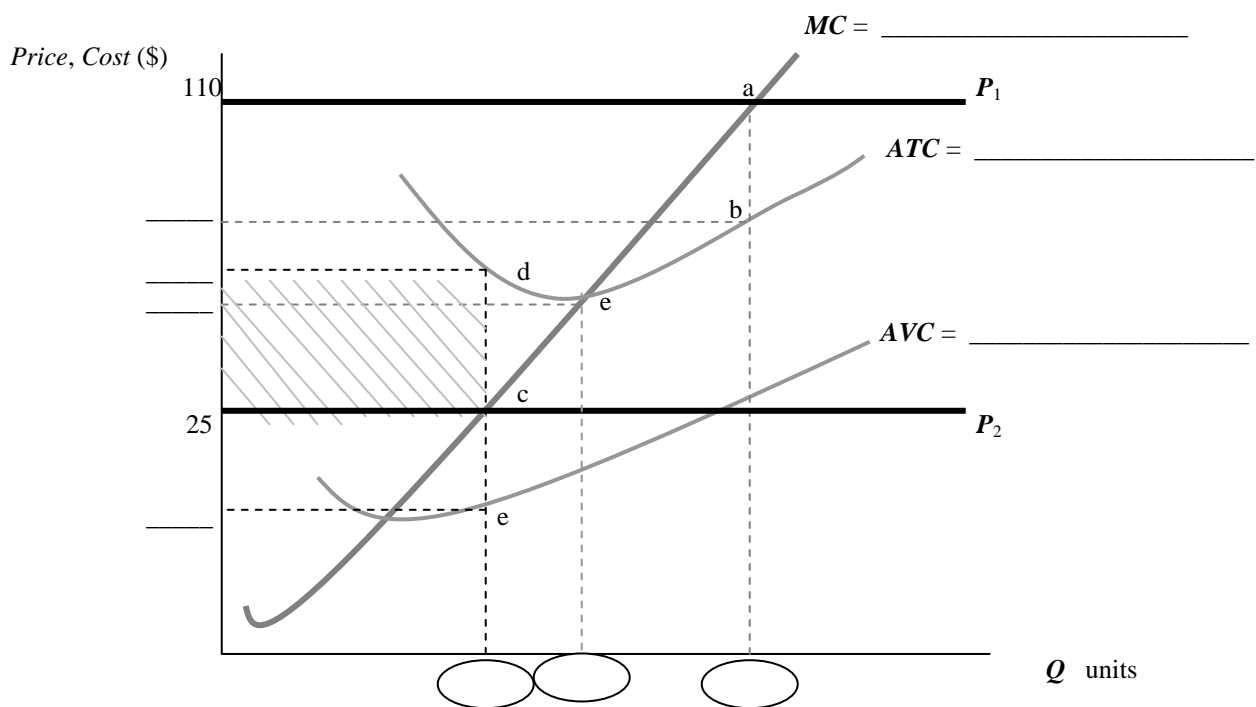
Consider a perfectly competitive firm below in Fig. 1 with the following cost curves (*not* drawn to scale):

Total Cost:  $TC = 100 + 10Q + Q^2$

Marginal Cost:  $MC = 10 + 2Q$

Initial selling price:  $P_1 = \$110$

Fig. 1. The Cost Curves of a Perfectly Competitive Firm



1. What is the firm's fixed cost,  $FC$ , (in the short run)?

$FC = \$$  \_\_\_\_\_

2. Derive the expression (equation) of the firm's average total cost,  $ATC$ , (in the short run)?  
 Write it also above on the space in the graph.

$ATC =$  \_\_\_\_\_

3. Derive the expression (equation) of the firm's average variable cost,  $AVC$ , (in the short run)?  
 Write it also above on the space in the graph.

$AVC =$  \_\_\_\_\_

4. What is the profit-maximizing level of output  $Q$  if the price were  $P_1 = \$ 110$  ?  $Q =$  \_\_\_\_\_ units  
(Note: Profit maximization for a competitive firm amounts to equating  $P = MC$  or  $MC = P$  then solving for  $Q$ )

5. What is the firm's average total cost,  $ATC$ , at the selling price  $P_1 = \$ 110$  ?  $ATC = \$$  \_\_\_\_\_  
Also write your answer on the appropriate space on the graph.

6. What is the firm's profit,  $\pi$ , if the selling price were  $P_1 = \$ 110$  ?  $\pi = \$$  \_\_\_\_\_

7. What is the firm's average total cost,  $ATC$ , if the selling price were  $P_2 = \$ 25$  ?  $ATC = \$$  \_\_\_\_\_  
Also write your answer on the appropriate space on the graph. (round off to 2 decimals)

8. What is the firm's average variable cost,  $AVC$ , if the selling price were  $P_2 = \$ 25$  ?  $AVC = \$$  \_\_\_\_\_

9. What is the firm's profit,  $\pi$ , if the selling price were  $P_2 = \$ 25$  ?  $\pi = \$$  \_\_\_\_\_

10. If the selling price is  $P_2 = \$ 25$  and the firm chooses to shut down rather than operate, what is its total loss?  
Total Loss with shutdown = \$ \_\_\_\_\_

11. If the selling price is  $P_2 = \$ 25$  and the firm continues to operate rather than shut down, what part of its fixed cost does it recover?  
Fixed Cost recovered by continuing to operate = \$ \_\_\_\_\_

12. What is the  $ATC$  at the minimum of the  $ATC$  curve where the  $MC$  curve intersects? Min  $ATC = \$$  \_\_\_\_\_