The Revenue Functions of a Monopoly

At the opposite end of the market spectrum from perfect competition is monopoly. A monopoly exists when only one firm sells the good or service. This means the monopolist faces the market demand curve since it has no competition from other firms. If the monopolist wants to sell more of its product, it will have to lower its price. As a result, the price (P) at which an extra unit of output (Q) is sold will be greater than the marginal revenue (MR) from that unit.

Student Alert: **P is greater than MR for a monopolist.**

1. Table 3-10.1 has information about the demand and revenue functions of the Moonglow Monopoly Company. Complete the table. Assume the monopoly charges each buyer the same P (i.e., there is no price discrimination). Enter the MR values at the higher of the two Q levels. For example, since total revenue (TR) increases by $37.50 when the firm increases Q from two to three units, put "+$37.50" in the MR column for Q = 3.

Table 3-10.1
The Moonglow Monopoly Company

Q	P	TR	MR	Average revenue (AR)
0	$100.00	***$0.00***	–	–
1	***$87.50***	***$87.50***	***+$87.50***	$87.50
2	***$75.00***	$150.00	***+$62.50***	***$75.00***
3	$62.50	***$187.50***	+$37.50	***$62.50***
4	***$50.00***	***$200.00***	***+$12.50***	$50.00
5	***$37.50***	$187.50	***–$12.50***	***$37.50***
6	$25.00	***$150.00***	***–$37.50***	***$25.00***
7	***$12.50***	***$87.50***	–$62.50	***$12.50***
8	***$0.00***	$0.00	***–$87.50***	***$0.00***

2. Draw the demand (D), AR, and MR curves in Figure 3-10.1. Plot the MR values at the higher of the two Q levels.

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Figure 3-10.1
Monopoly's Demand, Average Revenue, and Marginal Revenue Curves

3. Plot the firm's TR curve in Figure 3-10.2.

Figure 3-10.2
Monopoly's Total Revenue Curve

4. We see in Table 3-10.1 that the price at which the firm can sell three units is $62.50. Yet the MR from the third unit is only $37.50. How do you explain this difference?
When the firm lowers its price from $75.00 to $62.50 to increase sales from 2 units to 3 units, two things happen to total revenue:

   (1) It receives $62.50 in new total revenue from the sale of the third unit.

   (2) It has a loss in total revenue of $25.00 from the first two units this period: (2)($75.00 – $62.50) = $25.00. The marginal revenue of the third unit is the sum of these two effects = +$62.50 – $25.00 = +$37.50. Because the firm cannot sell 3 units at the same price at which it sold 2 units, the price of the third unit is greater than the marginal revenue from that unit.

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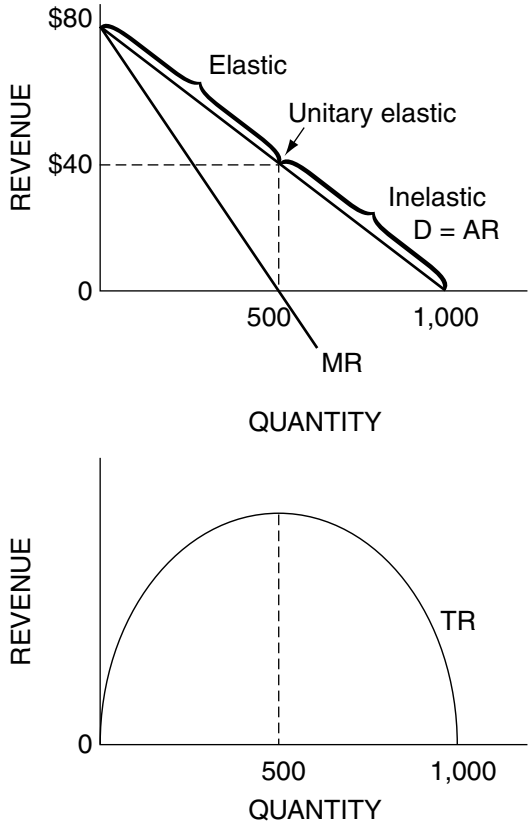
5. Why does the vertical gap between the firm's D curve and MR curve get larger as the firm sells more output?
   This is because the loss in total revenue from the first units resulting from lowering the price to sell one more unit gets larger as the firm's total output increases. In other words, the value in Part (2) of the solution to Question 4 gets bigger as the firm's output gets bigger.

Table 3-10.1 is an example of a *discrete* case because it has a small number of observations (output varies from zero to eight units). Figure 3-10.3 is an example of a *continuous* case because it is based on a large number of observations. Answer Questions 6–8 based on Figure 3-10.3.

Figure 3-10.3
A Continuous Example of a Monopoly's Revenue Curves



6. Indicate clearly in the top graph of Figure 3-10.3 the elastic, unitary elastic, and inelastic portions of the D curve. Explain your answer.
   Based on the total revenue test, we know demand is elastic if total revenue rises when price is reduced. Total revenue does not change if demand is unitary elastic. Demand is inelastic if total revenue falls when price is lowered. If the demand curve is linear and downward sloping, then the upper half of the demand curve is elastic, the midpoint is unitary elastic, and the lower half is inelastic.

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7. Marginal revenue is found using the ratio MR = ΔTR/ΔQ. This is also the formula for the slope of the TR curve. Thus, MR = slope of the TR curve.

   (A) Over what range of output is the slope of the TR curve positive? Over what range of output is the firm's MR positive?
   Over the first 499 units

   (B) Over what range of output is the firm's MR negative? Over what range of output is the slope of the TR curve negative?
   Over those units from 501 to 1,000

   (C) Over what range of output is the slope of the TR curve equal to zero? Over what range of output is the firm's MR equal to zero?
   At the 500th unit

8. What is the maximum dollar value of TR this firm can receive?
   500 × $40 = $20,000.

Bonus Question!

9. When the Galaxy Firm lowers its price from $60 to $57, the number of units it sells increases from 36 to 39. What is the value of MR? How should you interpret this value?
   As a result of selling three extra units, the firm's total revenue increases by $63 ($2,160 to $2,223). Since marginal revenue refers to the extra revenue from one more unit of output, you need to use the MR formula: MR = ΔTR/ΔQ = +$63/+3 units = +$21. The interpretation of this MR value is that the firm's total revenue increases by $21 for each of the three extra units.

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Profit Maximization by a Monopoly

The profit-maximizing monopolist works with the same key rules as any firm:

1. The optimal output level (Q*) is the one where marginal revenue equals marginal cost (MR = MC).
2. The optimal price (P*) is found on the demand curve at output Q*.
3. The firm should shut down if at Q* it finds its total revenue is less than its total variable cost (TR < TVC).

Because price (P) and MR were equal for a perfectly competitive firm, that firm could also find its Q* by setting P = MC. But that is not the case for a monopoly since P and MR will be different. The monopolist will find its profit-maximizing output (Q) where MR = MC, not where P = MC. This activity shows how a monopolist finds the output at which it will maximize its total profit and the price it should charge for that output.

Part A: Determining the Optimal Output and Price for a Monopoly

Table 3-11.1 provides some revenue, cost, and profit data for a monopoly.

1. Complete Table 3-11.1. Enter the MR and MC values at the higher of the two output levels. For example, the MR value of $300 is placed at Q = 4 rather than at Q = 3.

   Be sure to distinguish between total profit (TΠ), average profit (AΠ), and marginal profit (MΠ):

   (A) TΠ = TR – TC = (Q) (AΠ)

   (B) AΠ = AR – ATC = TΠ/Q

   (C) MΠ = MR – MC = ΔTΠ/ΔQ

Table 3-11.1
Revenue, Cost, and Profit Values for a Monopoly

Q	P	TR	TC	TΠ	AR	ATC	AΠ	MR	MC	MΠ
0	$1,350	***$0***	$100	***–$100***	–	–	–	–	–	–
1	***$1,200***	***$1,200***	***$900***	$300	$1,200	$900	***$300***	***+$1,200***	+$800	***+$400***
2	***$1,050***	$2,100	$1,600	***$500***	***$1,050***	***$800***	$250	***+$900***	***+$700***	+$200
3	$900	***$2,700***	***$2,100***	$600	***$900***	***$700***	***$200***	***+$600***	***+$500***	***+$100***
4	***$750***	***$3,000***	***$2,400***	***$600***	$750	***$600***	$150	+$300	***+$300***	***$0***
5	$600	***$3,000***	$2,800	***$200***	***$600***	***$560***	***$40***	***$0***	***+$400***	–$400
6	***$450***	$2,700	***$3,600***	***–$900***	***$450***	$600	***–$150***	***–$300***	+$800	***–$1,100***

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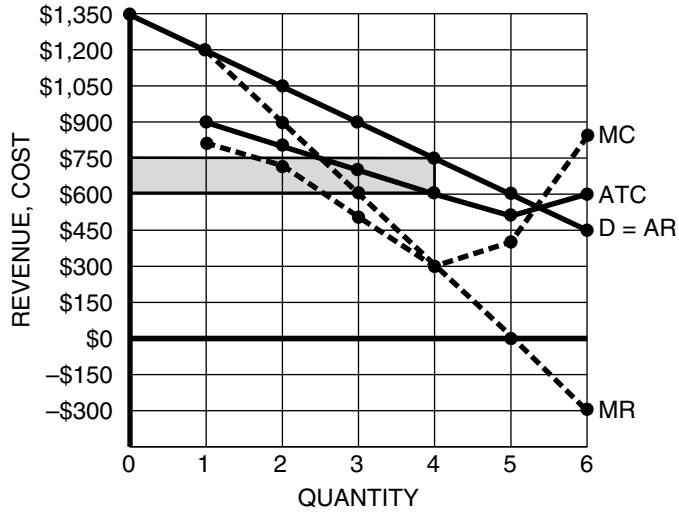
2. In Figure 3-11.1, draw the monopolist's D, AR, MR, and ATC curves using the data from Table 3-11.1. Plot the MR and MC values at the higher of the two output levels rather than at the midpoint between the two levels. Use dotted lines for the MR and MC curves in your graph. Label each curve.

Figure 3-11.1
Revenue and Cost Curves of a Monopolist



3. To maximize its total profit, this monopolist should produce ___4___ units.
The first three units have MR > MC. The fourth unit has MR = MC. Subsequent units have MR < MC and should not be produced.

4. What price should the monopolist charge for each of these units?
The highest price the firm can charge for four units is $750. This price is found on the D curve.

5. What is the total profit this firm will earn? ___***$600***___ Shade in the total profit area in Figure 3-11.1.
The AΠ for four units is $150: AΠ = AR – ATC = $750 – $600.

TΠ = (Q)(AΠ) = (4)($150) = $600.

Part B: Other Monopoly Examples

6. Suppose a monopolist can sell an extra unit of its good at a price of $50 and the MR of that unit is $44. If the MC of producing the extra unit is $46, the firm's total profit would (*increase* / ***decrease***) by ___***$2***___ if the firm sells that unit. Should the firm produce this additional unit of output? Explain your answer.
The firm should not produce the extra unit because its MR is less than its MC. This unit has a marginal profit of –$2 which means the firm's total profit would decrease by $2 if it sold that unit. The firm compares MR to MC, not P to MC, to decide if an extra unit should be produced.

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7. Figure 3-11.2 shows the MR and MC curves of a monopolist. Economists claim that the firm will maximize its total profit by producing 800 units where MR = MC. Show your understanding of this rule by circling the correct answer in each cell of Table 3-11.2.

Figure 3-11.2

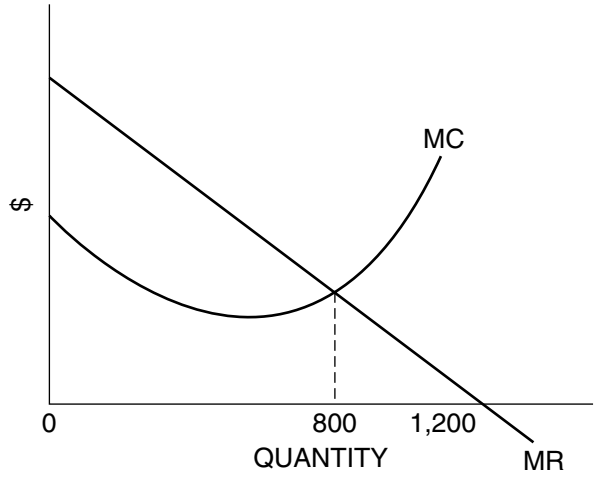

Table 3-11.2

The Logic behind the "MR = MC" Rule

Units of Q	For each extra unit of output in this range:		
1–799	MR is *(>)/ = / <)* MC.	MΠ is *(>)/ = / <)* $0.	TΠ will (***rise***)*/ fall / not change*).
800	MR is *(> /(=)/ <)* MC.	MΠ is *(> /(=)/ <)* $0.	TΠ will (*rise / fall /* ***not change***).
801–1200	MR is *(> / = /(<))* MC.	MΠ is *(> / = /(<))* $0.	TΠ will (*rise /* ***fall***)*/ not change*).

8. The firm illustrated in Figure 3-11.2 will maximize its total revenue if it produces 1,200 units. So why does it not want to produce those units between 800 and 1,200?
Each of the units between 800 and 1200 has MR < MC which means the firm's total profit will be decreased if these units are produced.

9. The monopolist's profit-maximizing output level will be in the (***elastic*** */ unitary elastic / inelastic*) range of its demand curve. Explain.
The output level where MR = MC must be in the elastic range because MC is always a positive value, which means MR must also be a positive value. MR is only positive in the elastic range of the demand curve.

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Here's a more interesting answer to Question 9. Assume the firm is producing an output level in the inelastic range. If the firm increases its price, three things will happen:

(1) Total revenue will increase because an increase in price when demand is inelastic increases total revenue.

(2) Total cost will decrease because the firm will need fewer resources since it will be selling fewer units of output because of the higher price.

(3) Total profit will increase because total revenue increases and total cost decreases when price is increased in the inelastic range of the demand curve. [See (1) and (2).]

Thus, if the firm is operating in the inelastic range of its demand curve, it should keep increasing its price (and its total profit) until it backs into the elastic range where it eventually hits the output level where MR = MC.

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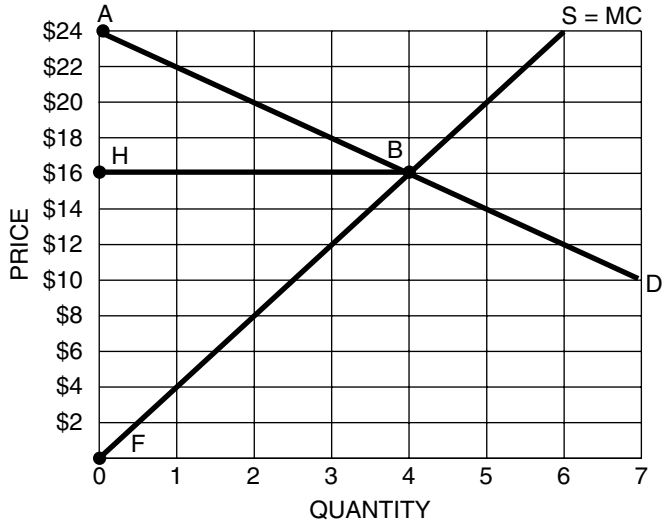
Equilibrium in a Monopolistic Market

Part A: Equilibrium in a Perfectly Competitive Market

Consider Figure 3-12.1, which shows a perfectly competitive market. The market supply curve S is the horizontal summation of the marginal cost (MC) curves of all the firms in the market. Use Figure 3-12.1 to answer the questions that follow the graph.

Figure 3-12.1
Equilibrium in a Perfectly Competitive Market



1. What is the equilibrium quantity in the market?
   4 units

2. What is the equilibrium price?
   $16

3. What area of the graph represents consumer surplus in the market? Calculate the dollar value of consumer surplus.
   CS is represented by area ABH. CS = (0.5)(4)($24 – $16) = $16.

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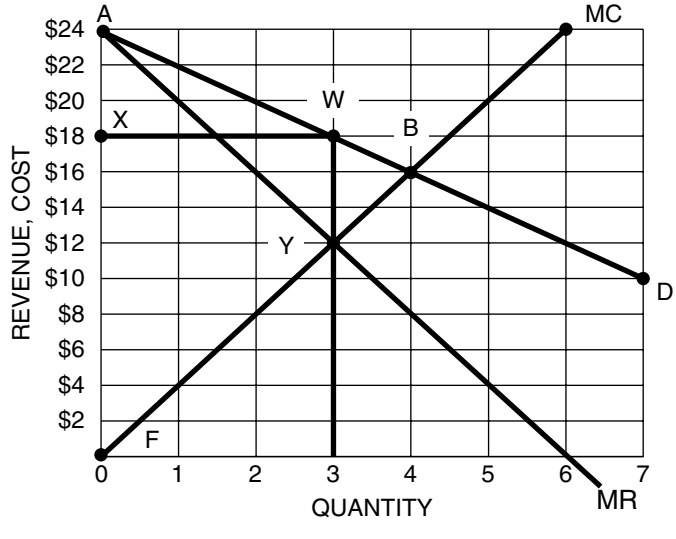
4. What area of the graph represents producer surplus in the market? Calculate the dollar value of producer surplus.
   PS is represented by area BHF. PS = (0.5)(4)($16 – $0) = $32.

5. What area of the graph represents total surplus (also called social welfare or total welfare)? Calculate the dollar value of total surplus.
   TS is represented by area ABF. TS = CS + PS = $48.

Part B: Equilibrium in a Monopolistic Market

Now consider the same demand and cost curves, but assume the market is a monopoly. Because the monopoly faces the downward sloping market demand curve, it must reduce its price to sell more output, which means price will be greater than marginal revenue (MR). We add the firm's MR curve below its demand curve in Figure 3-12.2, as well as the monopolist's MC curve. Use Figure 3-12.2 to answer the questions that follow the graph.

Figure 3-12.2
Equilibrium in a Monopolistic Market



6. What output level will the monopolist produce? Why?
   It will produce 3 units where MR = MC.

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7. What price will the monopolist charge for this output? Why?
The monopolist will charge a price of $18 because, based on the demand curve, that is the highest price consumers will pay for 3 units.

8. What area of the graph represents consumer surplus in the market? Calculate the dollar value of consumer surplus.
CS is represented by area AWX. CS = (0.5)(3)($24 – $18) = $9.

9. What area of the graph represents producer surplus? Calculate the dollar value of producer surplus.
PS is represented by area FXWY. To calculate the value of PS, break the FXWY area into a triangle and a rectangle.

PS = (0.5)(3)($12 – $0) + (3)($18 – $12) = $18 + $18 = $36.

10. What area of the graph represents total surplus? Calculate the dollar value of total surplus.
TS is represented by area AWYF. TS = CS = PS = $45.

Part C: Comparing Equilibrium in the Two Markets

11. How do the price and output of a monopolist differ from those in the perfectly competitive market?
The monopolist has a higher price and a lower output than a perfectly competitive market.

12. What is the dollar value of the portion of consumer surplus in the competitive market that is transferred to the firm's producer surplus in the monopoly situation?
Note that CS drops from $16 in perfect competition to $9 in monopoly. What happens to the $7 reduction in CS when the market becomes a monopoly?

(1) Some of it is captured by the monopoly as PS = (3)($18 – $16) = $6.

(2) The other part is lost because output was reduced by one unit because of the monopoly. This is called a deadweight loss (DWL) to society. In this example, the DWL in terms of CS is equal to $1: (0.5)(4 –3)($18 – $16) = $1.

13. How does a monopoly affect consumer surplus? Is this good or bad from the perspective of consumers?
Consumer surplus is reduced when a perfectly competitive market becomes a monopoly. This is bad news for consumers.

14. What area of Figure 3-12.2 represents the deadweight loss resulting from the market being a monopoly? Calculate the dollar value of the deadweight loss.
Deadweight loss results from the market output being reduced by 1 unit (from 4 units to 3 units) when the market changes from perfect competition to monopoly. The DWL is represented by the area BWY.

$$DWL = (0.50)(1)(\$18 – \$16) + (0.5)(1)(\$16 – \$12) = \$1 + \$2 = \$3.$$

The value of DWL also can be found as the reduction in TS when a perfectly competitive market becomes a monopoly: $\Delta TS = \$48 – \$45 = \$3.$

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Price Discrimination

When producers have market power and sell a good or service that cannot be resold, the possibility of price discrimination arises. *Price discrimination* exists when a producer charges different prices to different customers for the same item, for reasons other than differences in cost. The seller needs to be able to divide the total market for the good into separate submarkets, each with a different demand for the good. There also must be no possibility of resale of the product between the submarkets; otherwise the different submarkets will collapse into a single market.

Part A: Regular Monopoly with No Price Discrimination

Pat's Patriotic Tattoos is the only tattoo parlor in town. Pat provides only one tattoo—the American flag. There are 10 consumers in town who are willing to buy one tattoo, and they vary in their willingness to pay. One consumer is willing to pay $20 for a tattoo, another is willing to pay $18, and so forth, down to the tenth consumer who is willing to pay only $2. Table 3-13.1 shows the demand schedule for Pat's flag tattoo.

1. Complete Table 3-13.1 assuming the firm can only charge one price for its service. (There is no price discrimination yet.) If Pat wants to sell three units, she will sell all three units at a price of $16, so her TR is $48. Put each MR value at the higher of the two output levels.

Table 3-13.1
Demand Schedule for Pat's Tattoo

Price	Quantity	Total revenue (TR)	Marginal revenue (MR)
$20	1	***$20***	+$20
$18	2	***$36***	***+$16***
$16	3	$48	***+$12***
$14	4	***$56***	***+$8***
$12	5	***$60***	+$4
$10	6	***$60***	***+$0***
$8	7	***$56***	***–$4***
$6	8	***$48***	***–$8***
$4	9	$36	–$12
$2	10	***$20***	***–$16***

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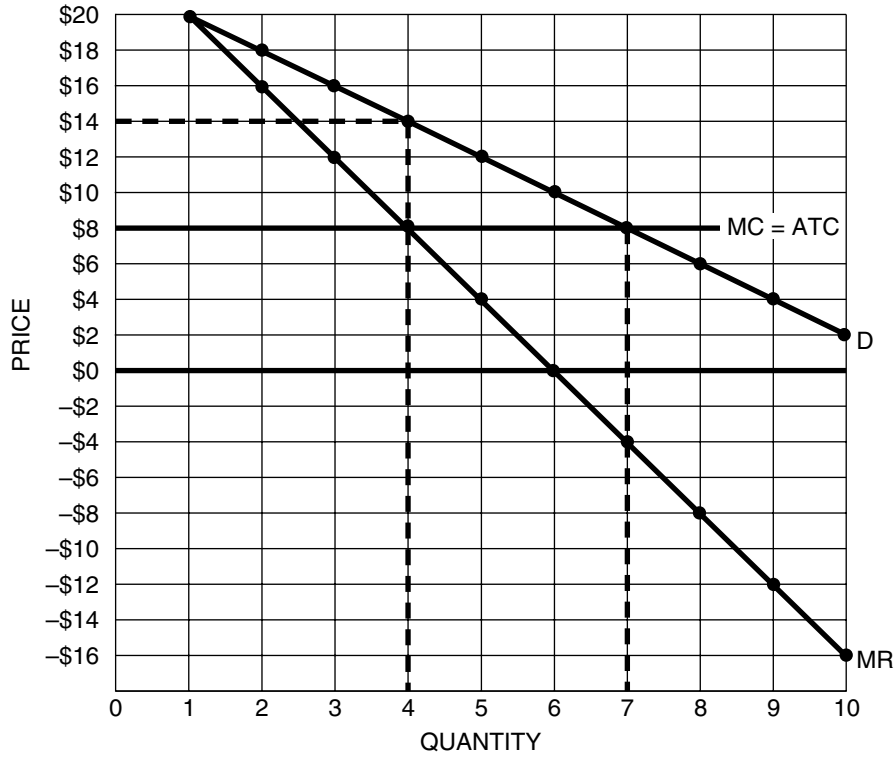
2. What is the total consumer surplus if Pat sells three units at a price of $16?
CS is the difference between the highest price a consumer is willing to pay and the price he or she actually does pay. CS= ($20 – $16) + ($18 – $16) + ($16 – $16) = $4 + $2 + $0 = $6.

3. What is the total consumer surplus if she sells five units at a price of $12?
CS = ($20 – $12) + ($18 – $12) + ($16 – $12) + ($14 – $12) + ($12 – $12)
= $8 + $6 + $4 + $2 + $0
= $20.

4. In Figure 3-13.1, draw the demand curve for Pat's tattoos.

Figure 3-13.1
Demand for Pat's Tattoos



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Part B: Perfect Price Discrimination (Also Called First-Degree Price Discrimination)

Perfect price discrimination is a monopolist's dream because it means that the firm can charge each individual consumer the highest price that he or she is willing to pay for the firm's product. As we will see in this activity, perfect price discrimination eliminates all consumer surplus and increases the monopolist's total profit above what it would if the firm sold all output at one price. For the questions in this section, assume that Pat's average total cost and marginal cost are constant and equal to $8 (ATC = MC = $8).

5. In Figure 3-13.1, draw the firm's ATC=MC curves as a horizontal line at $8.

6. If this were a perfectly competitive market, the MC curve would represent the supply of the product. If Pat produces the perfectly competitive quantity and charges the perfectly competitive price:

   (A) How many tattoos will she supply? Why?
   She will produce 7 units because that is where P = MC. In perfect competition, a firm can sell all it wants at the current price, so P and MR are the same value. Since we assume MC = $8, she will produce 7 units.

   (B) What price will she charge for each tattoo? Why?
   Her price will be $8 because she will operate where P= MC.

   (C) What is the amount of consumer surplus? Why?
   CS = ($20 – $8) + ($18 – $8) + ($16 – $8) + ($14 – $8) + ($12 – $8) + ($10 – $8) + ($8 – $8)
   = $12 + $10 + $8 + $6 +$4 + $2 + $0
   = $42.

7. If Pat produces the monopoly quantity and charges the monopoly price:

   (A) Draw her marginal revenue (MR) curve in Figure 3-13.1.

   (B) How many tattoos will she supply? Why?
   She will produce 4 units because that is where MR = MC. The monopolist compares MR to MC, not P to MC.

   (C) What price will she charge for each tattoo? Why?
   She will charge $14 for each of the 4 units because in the demand schedule we see that is the highest price consumers will pay for 4 units.

   (D) What is the amount of consumer surplus? Why?
   CS= ($20 – $14) + ($18 – $14) + ($16 – $14) + ($14 – $14) = $6 + $4 + $2 + $0 = $12.

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8. Now assume Pat knows the tastes and preferences of all consumers and the conditions necessary for first-degree price discrimination apply.

   (A) Does the MR curve for the non-discriminating monopolist still apply? Why?
   No. She is able to charge each consumer a unique price so her demand curve is also her marginal revenue curve because it shows the increase in her total revenue from each extra unit she sells.

   (B) How many tattoos will she supply? Why?
   She will supply 7 tattoos because that is where MR = MC. In this case, you also can say that is where P = MC.

   (C) Complete Table 3-13.2, which shows what price she will charge each individual consumer for her/his tattoo.

Table 3-13.2
Prices Charged by a Perfectly Discriminating Monopsonist

Consumer	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
Price	***$20***	***$18***	***$16***	***$14***	***$12***	***$10***	***$8***	***$6***	***$4***	***$2***

   (D) What is the amount of consumer surplus?
   There is no consumer surplus because Pat charged each consumer the highest price he or she was willing to pay for a tattoo.

9. In Table 3-13.3, show Pat's total profit under each of the three market structures. Remember our assumption that ATC = MC = $8.

Table 3-13.3
Profit in Each Market Structure

Type of market	Pat's total profit
Perfect competition	***$0***
Regular monopoly	***$24***
Perfect price discrimination monopoly	***$42***

Perfect competition: TΠ = TR – TC = (Q)(P) – (Q)(ATC) = (7)($8) – (7)($8) = $0.
Regular monopoly: TΠ = TR – TC = (Q)(P) – (Q)(ATC) = (4)($14) – (4)($8) = $24.
Discriminating monopoly: TΠ = TR – TC = (sum of prices) – (Q)(ATC)
= ($20 + $18 + $16 + $14 +$12 + $10 + $8) – (7)($8) = $98 – $56
= $42.

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10. How does the total profit of the perfectly discriminating monopolist compare to the consumer surplus that existed in the perfectly competitive market? [See Question 6 (C).] Why?
They are equal because the perfectly discriminating monopolist was able to capture all the consumer surplus from each individual consumer.

11. Is the total profit for a regular monopolist different from the total profit of a monopolist that is able to practice perfect price discrimination? Why?
Yes. The total profit of a nondiscriminating monopolist is smaller than that of the monopolist who can practice perfect price discrimination. The latter captures all the consumer surplus because it does not have to sell its output at one price.

12. Is the output the same for perfect competition and perfect price discrimination? Why?
Yes. In these two examples, price is equal to marginal revenue. The perfectly competitive firm can sell all the output it wants at the market price, so it has P = MR. Even though the perfectly discriminating monopolist must reduce its price to sell more output, it also has P = MR because it can charge a unique price to each consumer. Because each firm faces the same MC, the output in each market structure will be the same where P = MC.

13. Is there a deadweight loss resulting from the non-discriminating monopolist? What about from the monopolist with first-degree price discrimination?
There is a deadweight loss from the nondiscriminating monopolist because the output is less than the socially optimal output which would occur in the perfectly competitive model. There is no deadweight loss from the discriminating monopolist, however, because the output is the same as in the perfectly competitive model.

14. If an orange sells in Nebraska for $1.00 and the same quality orange sells in Florida for only $0.50, is this clear evidence of price discrimination? Why?
No. The price difference could reflect the cost of transporting the orange from Florida (where it was produced) to Nebraska.

15. What is an example of price discrimination that works in favor of students?
Students often receive a lower price for movie tickets than do "regular" people. Because it is the same service at the same cost of production, this is an example of price discrimination.

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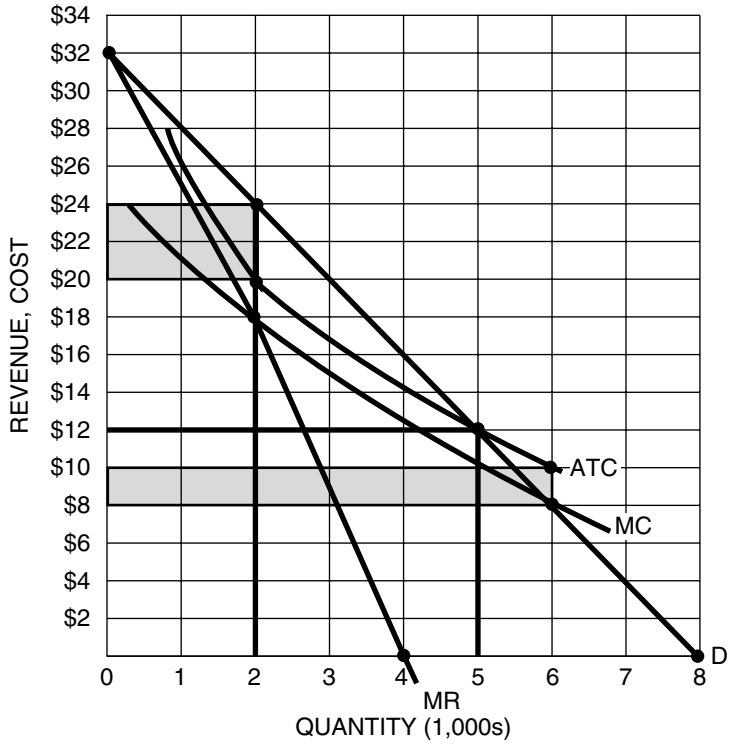
Regulating a Monopoly

There are some firms that have decreasing marginal costs over a large range of output. As long as marginal cost (MC) is below average total cost (ATC), the firm also will experience decreasing ATC. Such firms are called *natural monopolies* and are often regulated by a governmental agency that allows the firm to be the only provider of the service. This is an attempt to take advantage of the low average total cost of the firm. This activity lets you explore several regulation plans and their effects on the firm and the market.

Suppose you are the manager of a local natural monopoly. Figure 3-14.1 illustrates the revenue and cost functions of your monopoly.

Figure 3-14.1
Revenue and Cost Functions



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1. Complete Table 3-14.1, which examines three possible pricing plans for the monopoly.

Table 3-14.1
Three Pricing Regulation Plans

	Output (Q)	Price (P)	Total revenue (TR)	Total cost (TC)	Average profit (AΠ)	Total profit (TΠ)
Unregulated monopoly	***2,000***	***$24***	***$48,000***	***$40,000***	***$4***	***$8,000***
Fair return pricing	***5,000***	***$12***	***$60,000***	***$60,000***	***$0***	***$0***
Socially optimal pricing	***6,000***	***$8***	***$48,000***	***$60,000***	***–$2***	***–$12,000***

2. In Figure 3-14.1, shade in the area representing your firm's total profit under each of the three regulation plans.
For the unregulated monopoly, the shaded rectangle at 2,000 units of output shows a positive total profit of $8,000. For the fair return pricing plan, there is no area to shade because the firm breaks even. Under the socially optimal pricing scheme, the firm's loss of $12,000 is shown as the shaded rectangle at 6,000 units of output.

3. As the manager of this firm, which of the three regulation plans would you prefer? Why?
I would prefer the unregulated monopoly plan because it allows my firm to earn positive total profit.

4. As the manager of the firm, which plan would you totally oppose? Why? What could the government do to make this plan acceptable to you?
I would not accept the socially optimal pricing plan because it forces me to accept a price which is below my average total cost and make a loss. Since the goal of this plan is to have my firm produce the output level society desires, the government could give me a subsidy to keep my firm from making a loss.

5. Which plan would society like to see the government agency apply to your firm? Why?
Society would prefer the socially optimal output level. That plan has the firm producing the output level at which P = MC. This is the allocatively optimal output level society desires.

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6. Under the fair return pricing plan, does your firm earn an economic profit? Does it earn a normal profit?
No, it does not earn an economic profit; it breaks even. Yes, it does earn a normal profit because its implicit costs are included in the economic costs.

7. Each of the three plans has its own rule for deciding how many units of output your firm will provide. State those rules.

   (1) Unregulated monopoly: produce the quantity at which MR = MC.

   (2) Fair return pricing: produce the quantity at which P = ATC.

   (3) Socially optimal pricing: produce the quantity where P = MC.

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Comparing Perfect Competition and Monopoly

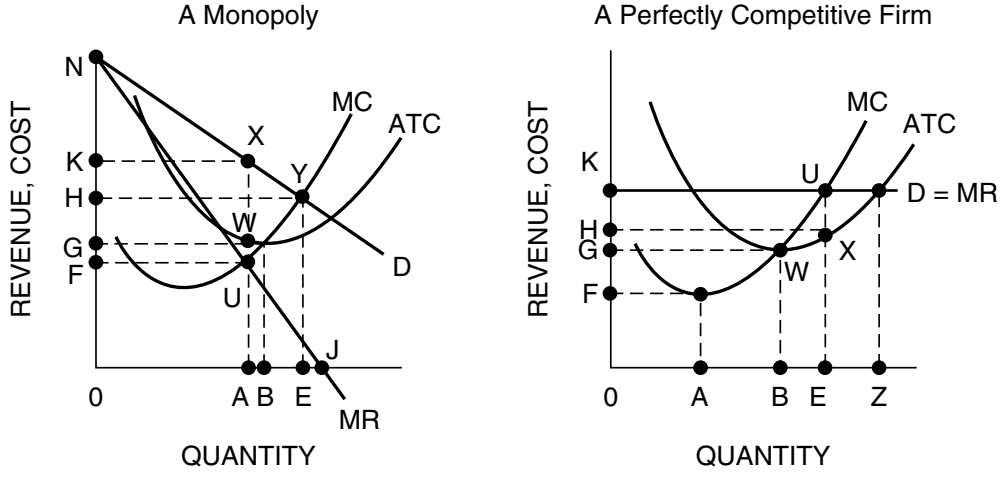
The productivity and cost curves of a firm are the same regardless of the degree of competition the firm faces in the product market. The shapes of the productivity and cost curves depend on the productivity of resources and the prices the firm pays to acquire those resources. It is on the revenue side of the firm that we find the impact of the type of product market in which the firm sells its good or service.

Part A: A Comparison of Firms

Answer the following questions based on Figure 3-15.1, which shows the revenue and cost functions of a monopoly and a perfectly competitive firm. Assume the monopoly will charge only one price for output (i.e., it does not price discriminate).

Figure 3-15.1

Revenue and Cost Functions for a Monopoly and a Perfectly Competitive Firm



Note: The values of coordinates are not the same in both graphs. For example, the value of 0K is greater in the monopoly graph than is the value of 0K in the graph of the competitive firm.

1. The monopoly will maximize its total profit by producing _____ units of output.

   (A) 0A (B) 0B (C) 0E (D) 0J

2. The perfectly competitive firm will maximize its total profit by producing _____ units of output.

   (A) 0A (B) 0B ***(C) 0E*** (D) 0Z

3. The profit-maximizing price for the monopoly is

   (A) 0F. (B) 0G. (C) 0H. ***(D) 0K.***

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4. The profit-maximizing price for the perfectly competitive firm is

   (A) 0F. (B) 0G. (C) 0H. ***(D) 0K.***

5. The maximum total profit of the monopoly is shown by the coordinates

   (A) AX. (B) UX. ***(C) GWXK.*** (D) 0AXK.

6. The maximum total profit of the perfectly competitive firm is shown by the coordinates

   (A) EU. (B) UX. (C) 0EUK. ***(D) HXUK.***

7. The maximum average profit of the perfectly competitive firm is at output

   (A) 0A. ***(B) 0B.*** (C) 0E. (D) 0Z.

8. The marginal profit of the monopoly is $0 at output

   (A) 0A. (B) 0B. (C) 0E. (D) 0J.

9. The marginal profit of the perfectly competitive firm is $0 at output

   (A) 0A. (B) 0B. ***(C) 0E.*** (D) 0Z.

10. The marginal profit of the perfectly competitive firm is maximized at output

    (A) 0A. (B) 0B. (C) 0E. (D) 0Z.

11. At output 0A, the total cost of the monopoly is shown by the coordinates

    (A) AU. (B) AW. (C) 0AUF. ***(D) 0AWG.***

12. The monopolist will maximize its total revenue at output

    (A) 0A. (B) 0B. (C) 0E. ***(D) 0J.***

13. What price will the perfectly competitive firm charge when it is in long-run equilibrium?

    (A) 0F ***(B) 0G*** (C) 0H (D) 0K

14. What area represents consumer surplus when the monopoly maximizes its total profit?

    (A) KXN (B) 0AXN (C) GWXN (D) HYN

15. The profit-maximizing output of the monopoly is _____ the output society would like the firm to produce.

    (A) greater than (B) equal to ***(C) less than***

16. The profit-maximizing output of the perfectly competitive firm is _____ the output society would like the firm to produce.

    (A) greater than ***(B) equal to*** (C) less than

17. Is the perfectly competitive firm in a position of long-run equilibrium?

    (A) Yes ***(B) No*** (C) We need more information.

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18. Which firm will operate at the minimum point of its ATC curve in long-run equilibrium?

(A) Only the perfectly competitive firm

(B) Only the monopolistic firm

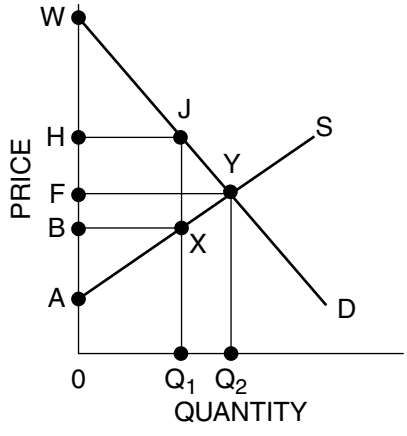
(C) Both firms

(D) Neither firm

Part B: A Comparison of Markets

Figure 3-15.2 shows a perfectly competitive market with demand curve D and supply curve S. The equilibrium output is Q_2, and the equilibrium price is 0F. If the market were to become a monopoly, the firm would restrict output to some smaller output such as Q_1. Answer the questions below Figure 3-15.2.

Figure 3-15.2
Comparing Perfect Competition and Monopoly



19. Complete Table 3-15.1 with the coordinates of the variables under each type of market.

Table 3-15.1
Comparing Perfect Competition and Monopoly

Market type	Consumer surplus	Producer surplus	Total surplus*
Perfect competition	***FYW***	***AFY***	***AWY***
Monopoly	***HWJ***	***AHJX***	***AWJX***
*Total surplus is also called total welfare and social welfare.			

20. Explain what the triangle JXY represents.

This shows the deadweight loss to society from the perfectly competitive market becoming a monopoly. Society loses the total surplus from those units between Q_1 and Q_2 because those units will not be produced if the market is a monopoly.

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