Managerial Economics & Business Strategy

Chapter 11
Pricing Strategies for Firms with Market Power

McGraw-Hill/Irwin

Overview

I. Basic Pricing Strategies

- Monopoly & Monopolistic Competition
- Cournot Oligopoly

II. Extracting Consumer Surplus

- Price Discrimination
- Block Pricing
- Two-Part Pricing
- Commodity Bundling

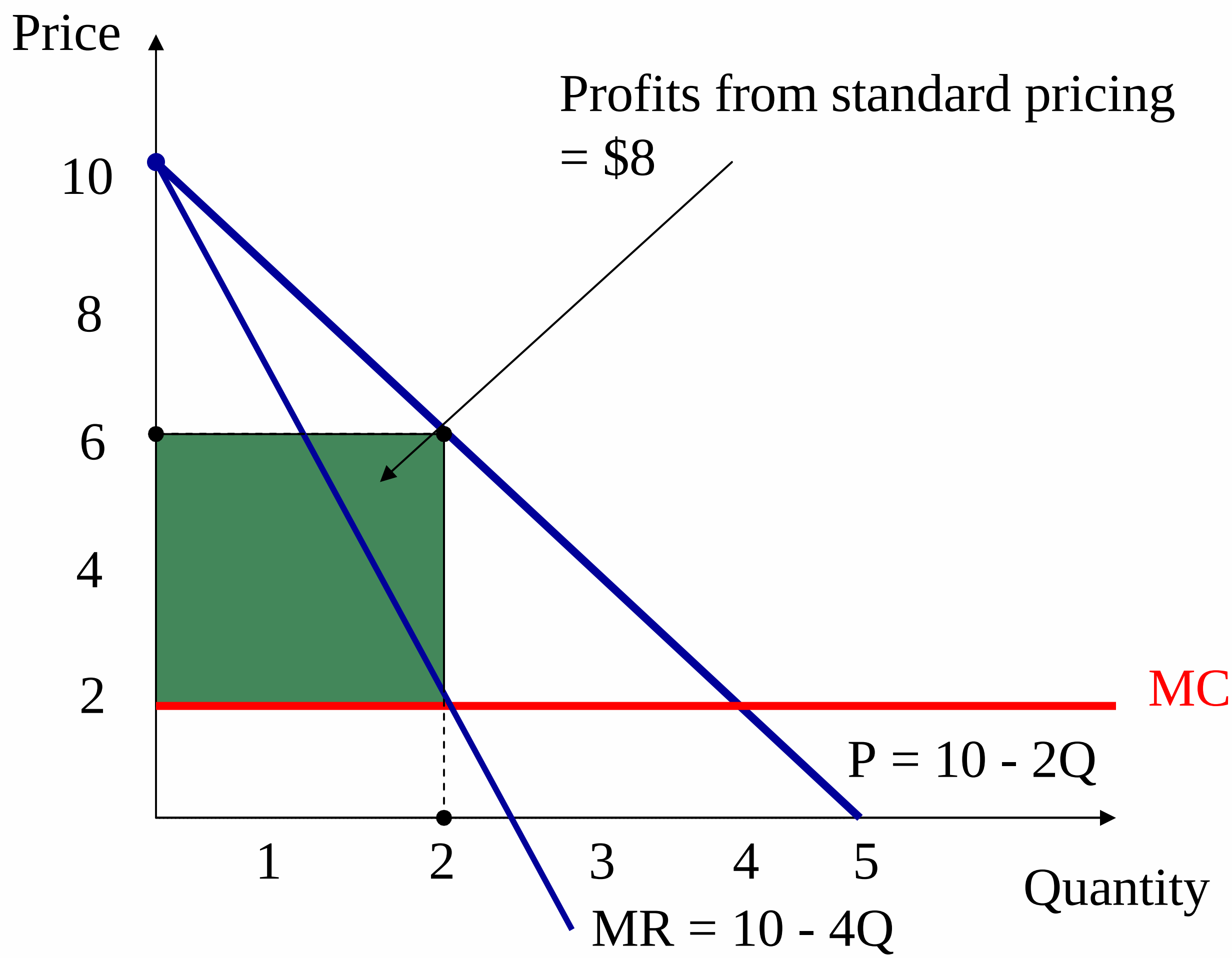
III. Pricing for Special Cost and Demand Structures

- Peak-Load Pricing
- Cross Subsidies
- Transfer Pricing

IV. Pricing in Markets with Intense Price Competition

- Price Matching
- Brand Loyalty
- Randomized Pricing

Standard Pricing and Profits for Firms with Market Power



An Algebraic Example

- $P = 10 - 2Q$
- $C(Q) = 2Q$
- If the firm must charge a single price to all consumers, the profit-maximizing price is obtained by setting MR = MC.
- $10 - 4Q = 2$, so $Q^* = 2$.
- $P^* = 10 - 2(2) = 6$.
- Profits = $(6)(2) - 2(2) = \$8$.

A Simple Markup Rule

- Suppose the elasticity of demand for the firm's product is E_F.
- Since $MR = P[1 + E_F]/ E_F$.
- Setting MR = MC and simplifying yields this simple pricing formula:

$$P = [E_F/(1+ E_F)] \times MC.$$

- The optimal price is a simple markup over relevant costs!
  - More elastic the demand, lower markup.
  - Less elastic the demand, higher markup.

An Example

- Elasticity of demand for Kodak film is -2.
- $P = [E_F/(1+ E_F)] \times MC$
- $P = [-2/(1 - 2)] \times MC$
- $P = 2 \times MC$
- Price is twice marginal cost.
- Fifty percent of Kodak's price is margin above manufacturing costs.

Markup Rule for Cournot Oligopoly

- Homogeneous product Cournot oligopoly.
- N = total number of firms in the industry.
- Market elasticity of demand E_M .
- Elasticity of individual firm's demand is given by $E_F = N \times E_M$.
- Since $P = [E_F/(1+ E_F)] \times MC$,
- Then, $P = [NE_M/(1+ NE_M)] \times MC$.
- The greater the number of firms, the lower the profit-maximizing markup factor.

An Example

- Homogeneous product Cournot industry, 3 firms.
- MC = \$10.
- Elasticity of market demand = - ½.
- Determine the profit-maximizing price?
- $E_F = N\ E_M = 3 \times (-1/2) = -1.5$.
- $P = [E_F/(1+ E_F)] \times MC$.
- $P = [-1.5/(1- 1.5] \times \$10$.
- $P = 3 \times \$10 = \$30$.

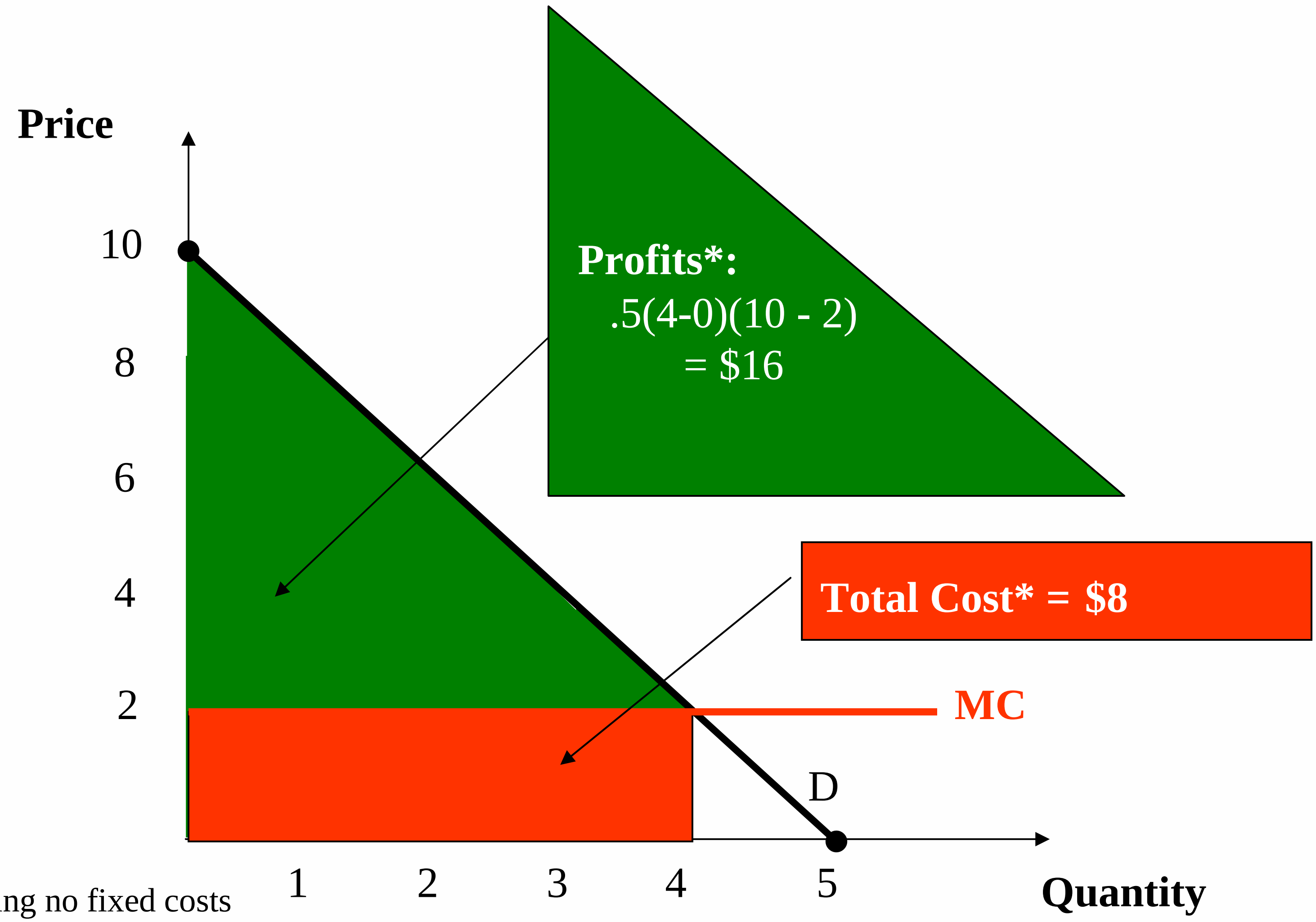
Extracting Consumer Surplus: Moving From Single Price Markets

- Most models examined to this point involve a “single” equilibrium price.
- In reality, there are many different prices being charged in the market.
- Price discrimination is the practice of charging different prices to consumer for the same good to achieve higher prices.
- The three basic forms of price discrimination are:
  - First-degree (or perfect) price discrimination.
  - Second-degree price discrimination.
  - Third-degree price discrimiation.

First-Degree or Perfect Price Discrimination

- Practice of charging each consumer the maximum amount he or she will pay for each incremental unit.
- Permits a firm to extract all surplus from consumers.

Perfect Price Discrimination



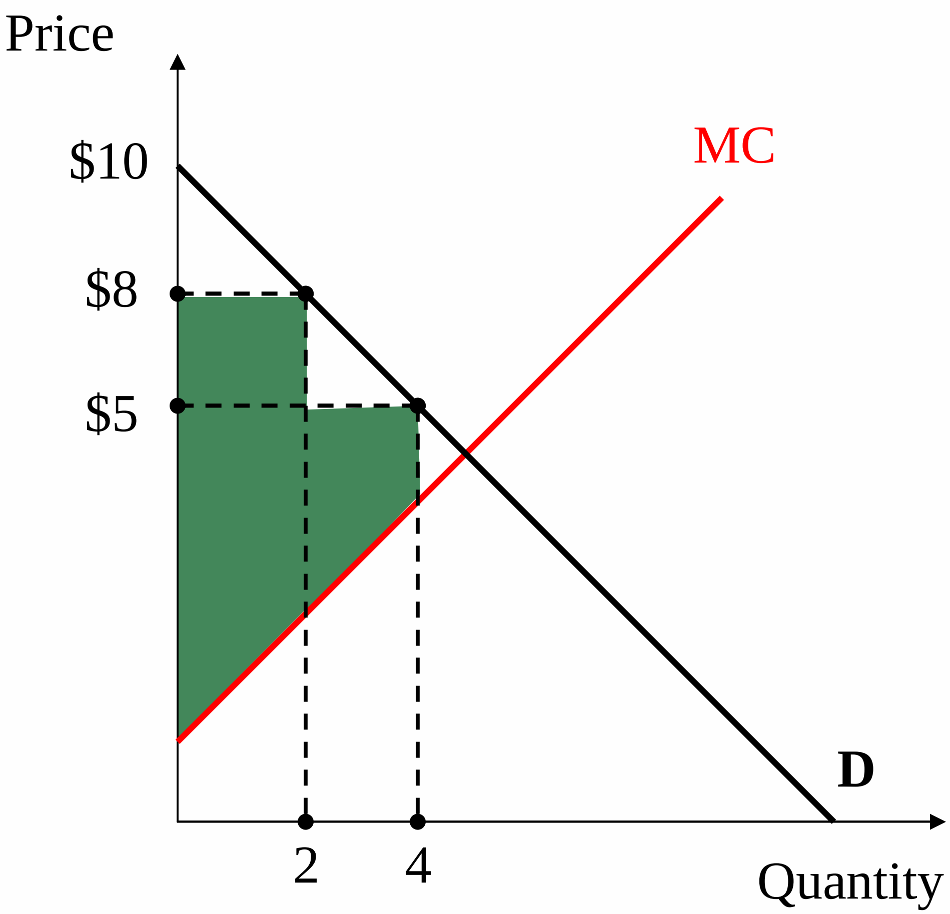
* Assuming no fixed costs

Caveats:

- In practice, transactions costs and information constraints make this difficult to implement perfectly (but car dealers and some professionals come close).
- Price discrimination won't work if consumers can resell the good.

Second-Degree Price Discrimination

- The practice of posting a discrete schedule of declining prices for different quantities.
- Eliminates the information constraint present in first-degree price discrimination.
- Example: Electric utilities



Third-Degree Price Discrimination

- The practice of charging different groups of consumers different prices for the same product.
- Group must have observable characteristics for third-degree price discrimination to work.
- Examples include student discounts, senior citizen's discounts, regional & international pricing.

Implementing Third-Degree Price Discrimination

- Suppose the total demand for a product is comprised of two groups with different elasticities, $E_1 < E_2$.
- Notice that group 1 is more price sensitive than group 2.
- Profit-maximizing prices?
- $P_1 = [E_1/(1+ E_1)] \times MC$
- $P_2 = [E_2/(1+ E_2)] \times MC$

An Example

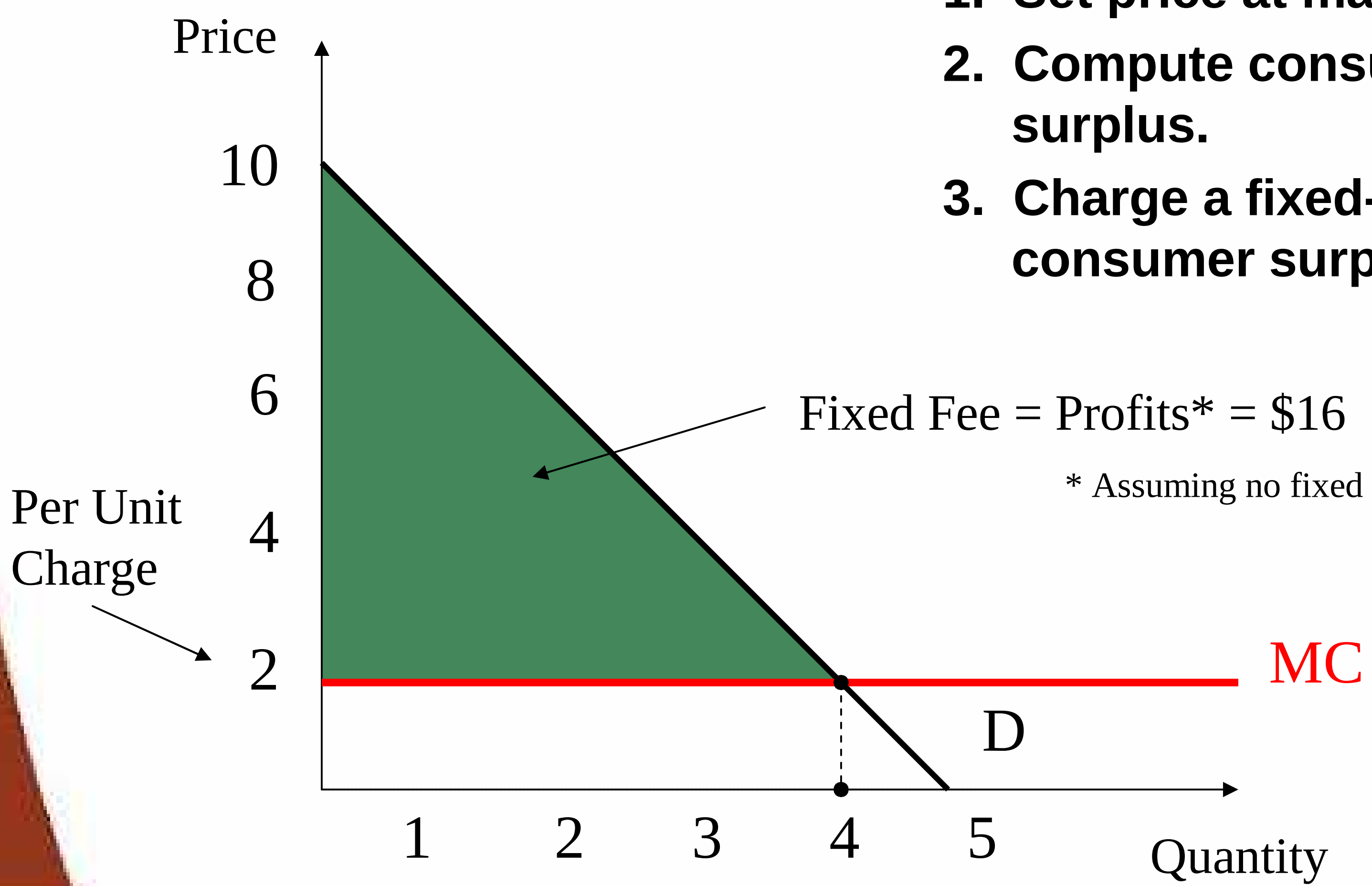
- Suppose the elasticity of demand for Kodak film in the US is $E_U = -1.5$, and the elasticity of demand in Japan is $E_J = -2.5$.
- Marginal cost of manufacturing film is $3.
- $P_U = [E_U/(1+ E_U)] \times MC = [-1.5/(1 - 1.5)] \times \$3 = \$9$
- $P_J = [E_J/(1+ E_J)] \times MC = [-2.5/(1 - 2.5)] \times \$3 = \$5$
- Kodak's optimal third-degree pricing strategy is to charge a higher price in the US, where demand is less elastic.

Two-Part Pricing

- When it isn’t feasible to charge different prices for different units sold, but demand information is known, two-part pricing may permit you to extract all surplus from consumers.
- Two-part pricing consists of a fixed fee and a per unit charge.
  - Example: Athletic club memberships.

How Two-Part Pricing Works

1. **Set price at marginal cost.**
2. **Compute consumer surplus.**
3. **Charge a fixed-fee equal to consumer surplus.**



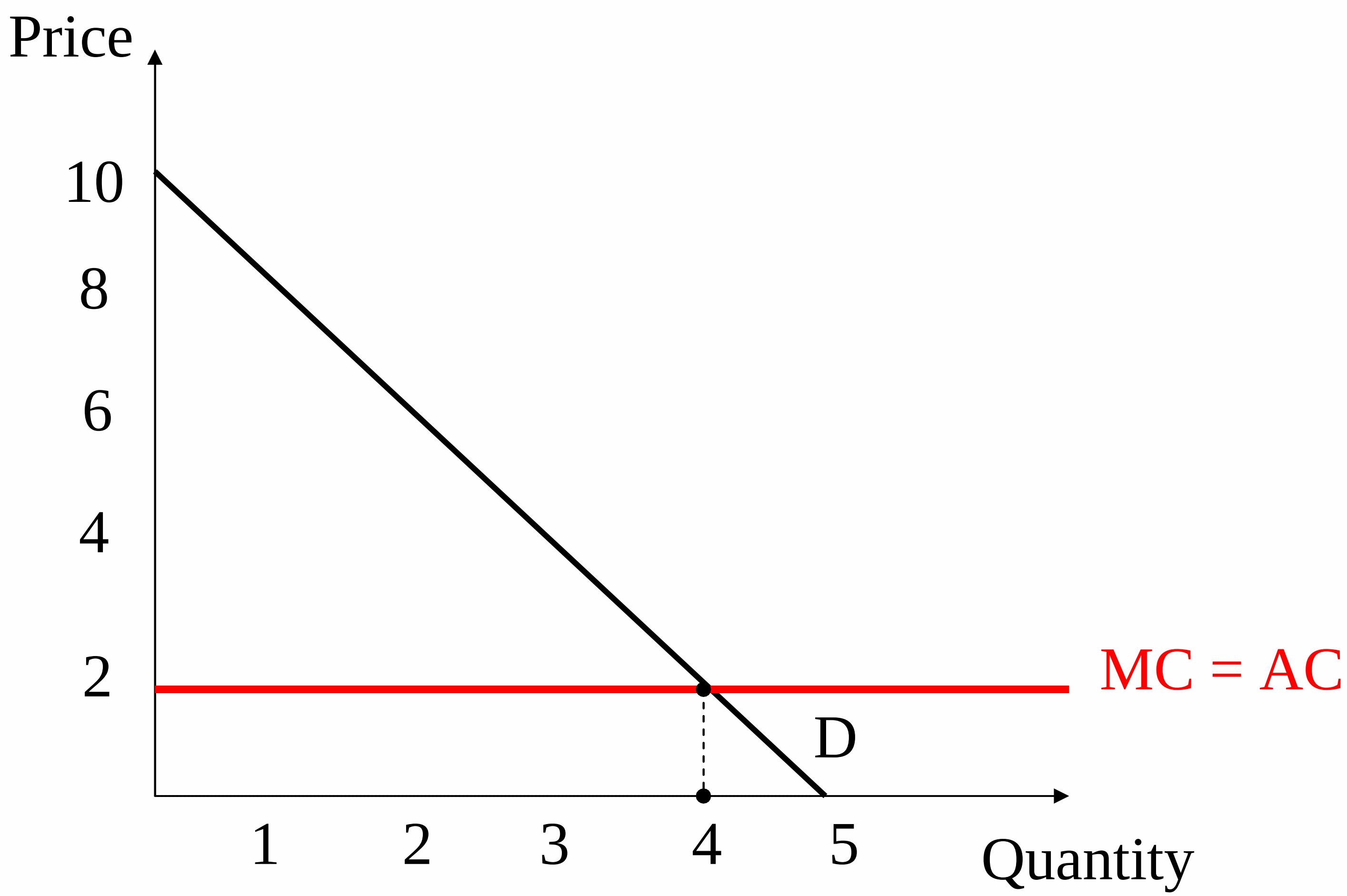
Block Pricing

- The practice of packaging multiple units of an identical product together and selling them as one package.
- Examples
  - Paper.
  - Six-packs of soda.
  - Different sized of cans of green beans.

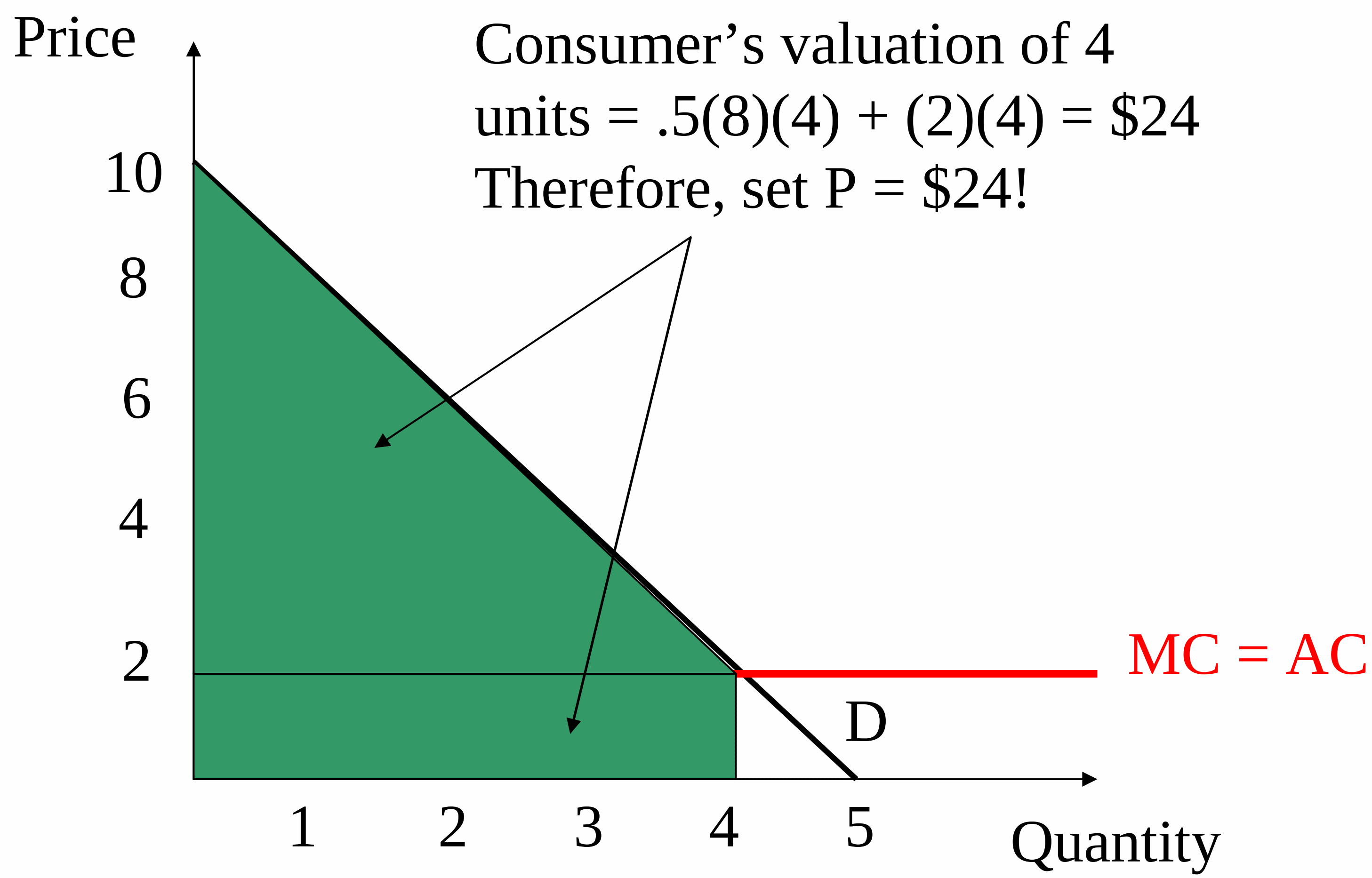
An Algebraic Example

- Typical consumer's demand is $P = 10 - 2Q$
- $C(Q) = 2Q$
- Optimal number of units in a package?
- Optimal package price?

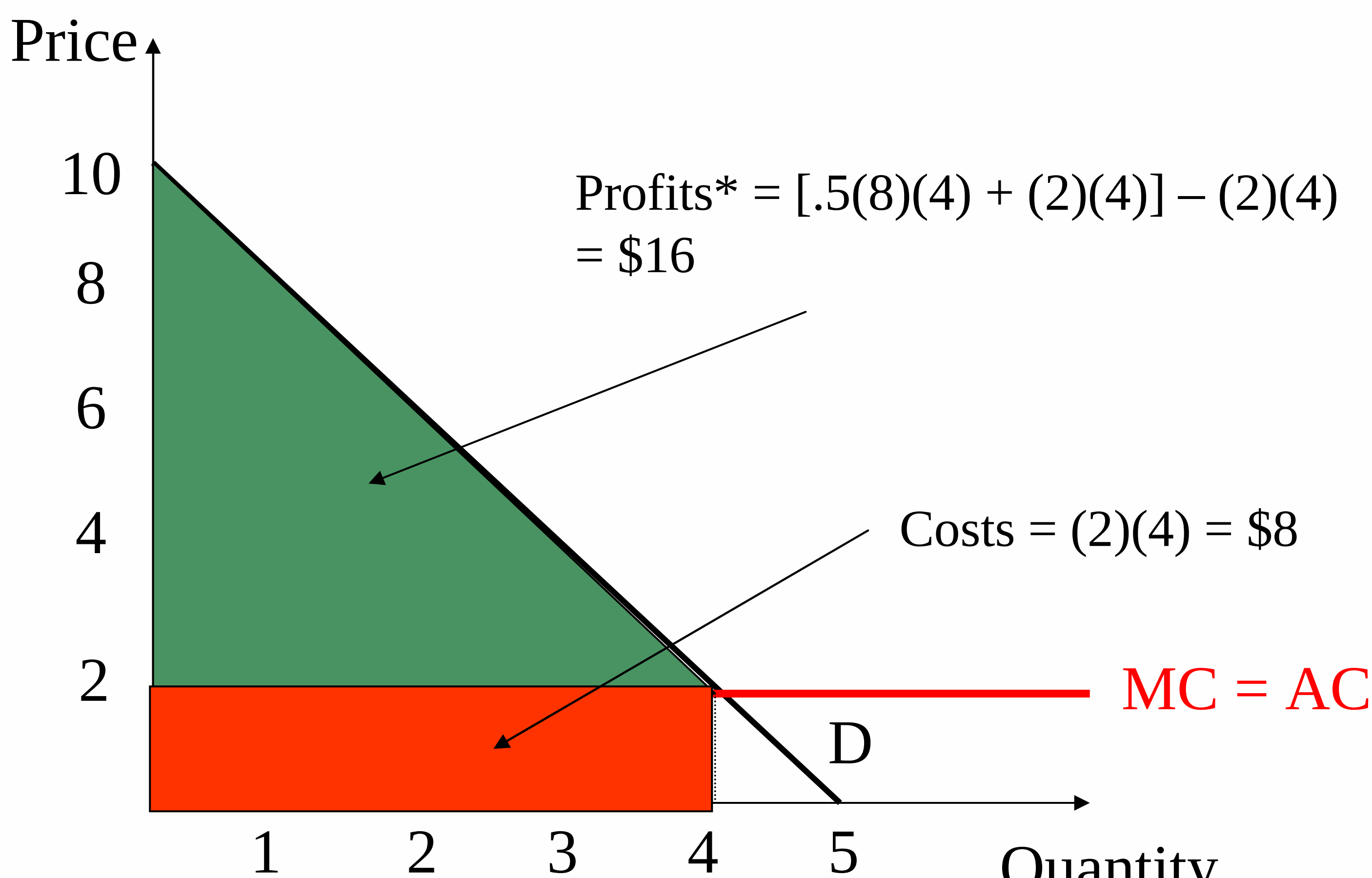
Optimal Quantity To Package: 4 Units



Optimal Price for the Package: $24



Costs and Profits with Block Pricing



* Assuming no fixed costs

Commodity Bundling

- The practice of bundling two or more products together and charging one price for the bundle.
- Examples
  - Vacation packages.
  - Computers and software.
  - Film and developing.

An Example that Illustrates Kodak's Moment

- Total market size for film and developing is 4 million consumers.
- Four types of consumers
  - 25% will use only Kodak film (F).
  - 25% will use only Kodak developing (D).
  - 25% will use only Kodak film and use only Kodak developing (FD).
  - 25% have no preference (N).
- Zero costs (for simplicity).
- Maximum price each type of consumer will pay is as follows:

Reservation Prices for Kodak Film and Developing by Type of Consumer

Type	Film	Developing
F	**$8**	**$3**
FD	**$8**	**$4**
D	**$4**	**$6**
N	**$3**	**$2**

Optimal Film Price?

Type	Film	Developing
F	$8	$3
FD	$8	$4
D	$4	$6
N	$3	$2

Optimal Price is $8; only types F and FD buy resulting in profits of $8 x 2 million = $16 Million.

At a price of $4, only types F, FD, and D will buy (profits of $12 Million).

At a price of $3, all will types will buy (profits of $12 Million).

Optimal Price for Developing?

Type	Film	Developing
F	**$8**	**$3**
FD	**$8**	**$4**
D	**$4**	**$6**
N	**$3**	**$2**

At a price of $6, only "D" type buys (profits of $6 Million).

At a price of $4, only "D" and "FD" types buy (profits of $8 Million).

At a price of $2, all types buy (profits of $8 Million).

Optimal Price is $3, to earn profits of $3 x 3 million = $9 Million.

Total Profits by Pricing Each Item Separately?

Type	Film	Developing
F	**$8**	**$3**
FD	**$8**	**$4**
D	**$4**	**$6**
N	**$3**	**$2**

Total Profit = Film Profits + Development Profits
= $16 Million + $9 Million = $25 Million

Surprisingly, the firm can earn even greater profits by bundling!

Pricing a “Bundle” of Film and Developing

Consumer Valuations of a Bundle

Type	Film	Developing	Value of Bundle
F	$8	$3	$11
FD	$8	$4	$12
D	$4	$6	$10
N	$3	$2	$5

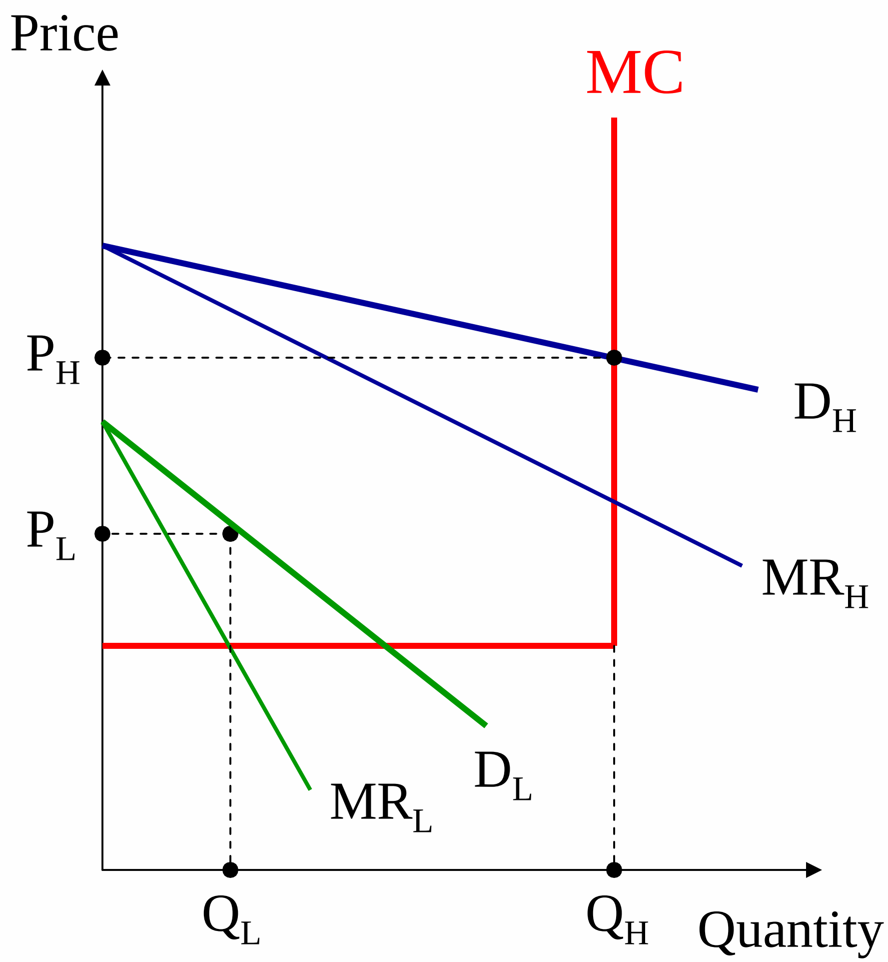
What's the Optimal Price for a Bundle?

Type	Film	Developing	Value of Bundle
F	$8	$3	$11
FD	$8	$4	$12
D	$4	$6	$10
N	$3	$2	$5

Optimal Bundle Price = $10 (for profits of $30 million)

Peak-Load Pricing

- When demand during peak times is higher than the capacity of the firm, the firm should engage in *peak-load pricing.*
- Charge a higher price (P_H) during peak times (D_H).
- Charge a lower price (P_L) during off-peak times (D_L).



Cross-Subsidies

- Prices charged for one product are subsidized by the sale of another product.
- May be profitable when there are significant demand complementarities effects.
- Examples
  - Browser and server software.
  - Drinks and meals at restaurants.

Double Marginalization

- Consider a large firm with two divisions:
  - the *upstream division* is the sole provider of a key input.
  - the *downstream division* uses the input produced by the upstream division to produce the final output.
- Incentives to maximize divisional profits leads the upstream manager to produce where $MR_U = MC_U$.
  - Implication: $P_U > MC_U$.
- Similarly, when the downstream division has market power and has an incentive to maximize divisional profits, the manager will produce where $MR_D = MC_D$.
  - Implication: $P_D > MC_D$.
- Thus, both divisions mark price up over marginal cost resulting in in a phenomenon called *double marginalization*.
  - Result: less than optimal overall profits for the firm.

Transfer Pricing

- To overcome double marginalization, the internal price at which an upstream division sells inputs to a downstream division should be set in order to maximize the overall firm profits.
- To achieve this goal, the upstream division produces such that its marginal cost, MC_u, equals the net marginal revenue to the downstream division (NMR_d):

$$NMR_d = MR_d - MC_d = MC_u$$

Upstream Division's Problem

- Demand for the final product P = 10 - 2Q.
- C(Q) = 2Q.
- Suppose the upstream manager sets MR = MC to maximize profits.
- 10 - 4Q = 2, so Q* = 2.
- P* = 10 - 2(2) = $6, so upstream manager charges the downstream division $6 per unit.

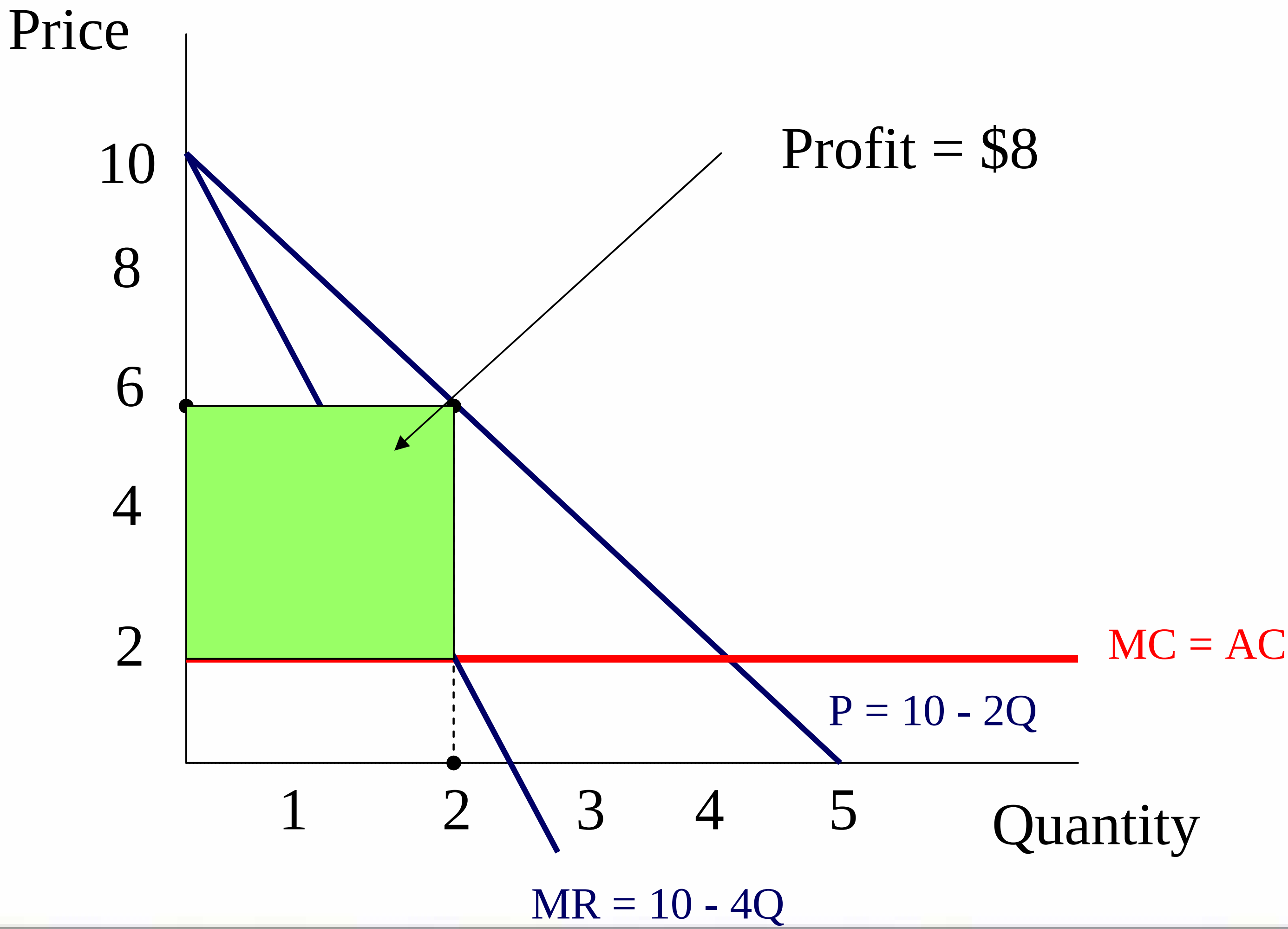
Downstream Division's Problem

- Demand for the final product $P = 10 - 2Q$.
- Downstream division's marginal cost is the \$6 charged by the upstream division.
- Downstream division sets MR = MC to maximize profits.
- $10 - 4Q = 6$, so $Q^* = 1$.
- $P^* = 10 - 2(1) = \$8$, so downstream division charges \$8 per unit.

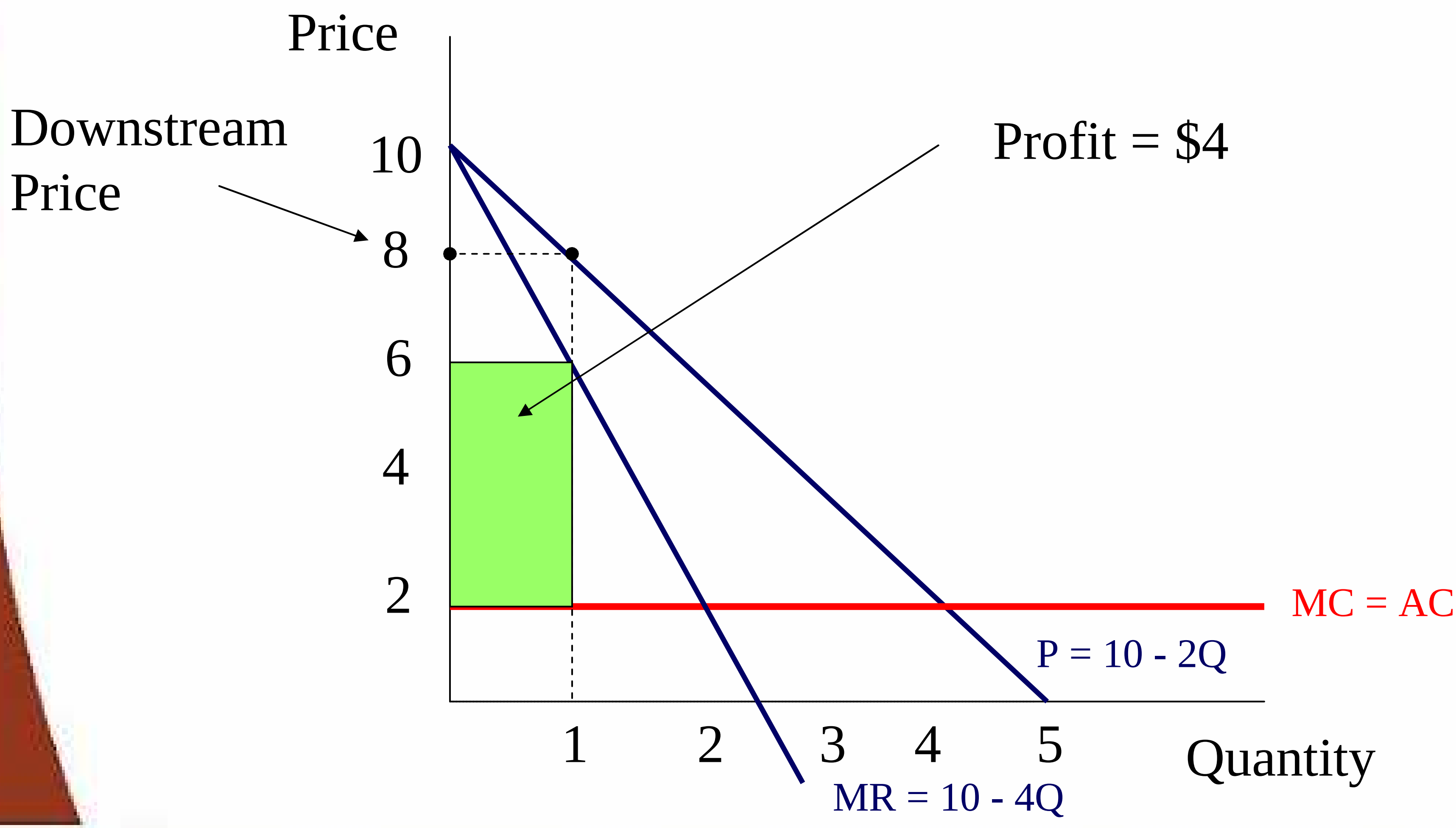
Analysis

- This pricing strategy by the upstream division results in less than optimal profits!
- The upstream division needs the price to be \$6 and the quantity sold to be 2 units in order to maximize profits. Unfortunately,
- The downstream division sets price at \$8, which is too high; only 1 unit is sold at that price.
  - Downstream division profits are $\$8 \times 1 - 6(1) = \$2$.
- The upstream division's profits are $\$6 \times 1 - 2(1) = \$4$ instead of the monopoly profits of $\$6 \times 2 - 2(2) = \$8$.
- Overall firm profit is $\$4 + \$2 = \$6$.

Upstream Division's "Monopoly Profits"



Upstream Firm's Profits when Downstream Marks Price Up to $8



Solutions for the Overall Firm?

- Provide upstream manager with an incentive to set the optimal transfer price of \$2 (upstream division's marginal cost).
- Overall profit with optimal transfer price:

$$\pi = \$6 \times 2 - \$2 \times 2 = \$8$$

Pricing in Markets with Intense Price Competition

- Price Matching
  - Advertising a price and a promise to match any lower price offered by a competitor.
  - No firm has an incentive to lower their prices.
  - Each firm charges the monopoly price and shares the market.
- Induce brand loyalty
  - Some consumers will remain “loyal” to a firm; even in the face of price cuts.
  - Advertising campaigns and “frequent-user” style programs can help firms induce loyal among consumers.
- Randomized Pricing
  - A strategy of constantly changing prices.
  - Decreases consumers’ incentive to shop around as they cannot learn from experience which firm charges the lowest price.
  - Reduces the ability of rival firms to undercut a firm’s prices.

Conclusion

- First degree price discrimination, block pricing, and two part pricing permit a firm to extract all consumer surplus.
- Commodity bundling, second-degree and third degree price discrimination permit a firm to extract some (but not all) consumer surplus.
- Simple markup rules are the easiest to implement, but leave consumers with the most surplus and may result in double-marginalization.
- Different strategies require different information.