A Firm Faces The Demand Schedule Q = 400 2p P2.What Price Does It Need To Charge To Sell 100 Units?

A Firm Faces The Demand Schedule Q = 400 - 2p. What Price Does It Need To Charge To Sell 100 Units?

Understanding how a firm determines the optimal price to sell a specific quantity of goods is fundamental in economics and business strategy. When faced with a demand schedule such as Q = 400 - 2p, a firm must analyze how different prices influence the quantity demanded and identify the price point that results in the desired sales volume. This article explores the process of calculating the necessary price to sell 100 units based on the given demand schedule, providing a comprehensive guide for students, entrepreneurs, and business analysts alike.

Understanding the Demand Schedule: Q = 400 - 2p

What Does the Demand Schedule Represent?

The demand schedule Q = 400 - 2p is a linear demand equation where:

- Q represents the quantity demanded at a given price p.
- p represents the unit price of the product.

This equation signifies that as the price increases, the quantity demanded decreases, following the law of demand. Conversely, lowering the price tends to increase the quantity consumers are willing to purchase.

Interpreting the Components of the Demand Equation

- Intercept (400): When the price (p) is zero, the maximum quantity demanded would be 400 units.
- Slope (-2): For every $1 increase in price, the quantity demanded decreases by 2 units.

This linear relationship allows for straightforward calculations to determine the price needed for a specific quantity demanded.

Calculating the Price to Sell 100 Units

Step 1: Set Q to 100

Given the demand schedule:

Q = 400 - 2p

We want to find the price (p) when Q = 100.

Substituting Q = 100:

100 = 400 - 2p

Step 2: Rearrange the Equation to Solve for p

To isolate p:

2p = 400 - 100

2p = 300

p = 300 / 2

p = 150

Step 3: Interpret the Result

The firm must charge a price of $150 per unit to sell exactly 100 units of the product.

Implications for Business Decision-Making

Pricing Strategy Insights

- The calculated price ensures the firm meets its sales target of 100 units.
- Understanding the demand schedule helps in setting prices that align with sales goals without overpricing or underpricing.

Profit Optimization Considerations

While setting a price to sell 100 units is straightforward, firms should also consider:

- Cost of Production: Is $150 above the unit cost? If not, profits may be minimal or negative.
- Market Conditions: Are competitors pricing similarly? Is the demand elastic or inelastic at this price?
- Long-term Goals: Will pricing at $150 sustain the desired market share and profitability?

Additional Factors in Pricing Decisions

Elasticity of Demand

Demand elasticity measures how sensitive the quantity demanded is to price changes. In this case, the slope is -2, indicating:

- For each 1% change in price, the quantity demanded changes by approximately 2%, suggesting a relatively elastic demand.

Understanding elasticity helps firms anticipate how adjusting prices might impact sales volume and revenue.

Cost-Plus Pricing vs. Demand-Based Pricing

- Cost-Plus Pricing: Adding a markup over the unit cost.
- Demand-Based Pricing: Setting prices based on the demand schedule and sales objectives.

In scenarios where demand is known and predictable, demand-based pricing, as demonstrated above, is often more strategic.

Practical Example: Applying the Calculation

Suppose the firm has a unit cost of $100. To sell 100 units, the price must be set at $150, which yields:

- Revenue = Price × Quantity = $150 × 100 = $15,000
- Profit = Revenue - Total Cost = $15,000 - ($100 × 100) = $15,000 - $10,000 = $5,000

This example shows that setting the price at $150 not only meets sales goals but also yields a profit of $5,000, assuming costs are fixed and constant.

Conclusion

Determining the appropriate price to sell a specific quantity is crucial for effective sales and profit management. By analyzing the demand schedule Q = 400 - 2p, the firm can conclude that to sell 100

units, it needs to charge $150 per unit. This calculation provides a clear example of how mathematical models in economics inform practical business decisions.

Understanding demand functions, their components, and how to manipulate them equips businesses with the tools necessary to optimize pricing strategies, forecast revenue, and enhance overall profitability. Whether managing a startup or a large corporation, mastering these concepts is essential for sustained success in competitive markets.

Keywords for SEO Optimization: demand schedule, pricing strategy, demand curve, linear demand equation, how to find price from demand, sell 100 units, demand elasticity, profit optimization, economic demand analysis, business pricing decisions

Frequently Asked Questions

What is the demand schedule equation for the firm?

The demand schedule is given by Q = 400 - 2p, where Q is the quantity demanded and p is the price.

How do you determine the price needed to sell 100 units?

Set Q = 100 in the demand equation and solve for p: 100 = 400 - 2p, then p = (400 - 100) / 2 = 150.

What price should the firm charge to sell exactly 100 units?

The firm should charge a price of $150 per unit to sell 100 units.

What does the demand schedule tell us about the relationship between price and quantity?

It indicates a negative linear relationship: as price increases, quantity demanded decreases, and vice versa.

If the firm wants to sell more than 100 units, how should it adjust the price?

To sell more than 100 units, the firm should lower the price below $150, based on the demand schedule.

Additional Resources

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Understanding how a firm's pricing strategy interacts with consumer demand is fundamental in economics and business management. When a company knows its demand schedule—the relationship between the price of its product and the quantity consumers are willing to purchase—it can determine the optimal price point to maximize revenue or profit. In this article, we examine a specific demand schedule, Q = 400 - 2p, and explore what price the firm must set to sell exactly 100 units. We will delve into the mathematical underpinnings, interpret the results, and discuss broader implications for business decision-making.

Deciphering the Demand Schedule: The Equation Q = 400 - 2p

Before calculating the specific price needed for a targeted sales volume, it’s essential to understand the demand function itself.

What Does the Equation Represent?

- Q (Quantity Demanded): The number of units consumers are willing to purchase at a given price.
- p (Price): The selling price per unit.
- The equation Q = 400 - 2p: Describes a linear demand curve, indicating that as the price increases, the quantity demanded decreases.

This is a typical demand function where the slope (coefficient of p) is negative, reflecting the law of demand: higher prices generally lead to lower quantities demanded, and vice versa.

Interpreting the Demand Function

- When p = 0, demand Q = 400 units.
- When demand drops to zero, solving for p gives the maximum price consumers are willing to pay:

400 - 2p = 0 → p = 200

- The demand curve is downward sloping, with a slope of -2, indicating that for each dollar increase in price, demand drops by 2 units.

Calculating the Price to Sell 100 Units

The core question: What price (p) must the firm charge to sell exactly 100 units?

Step-by-Step Calculation

Given the demand equation:

$Q = 400 - 2p$

Set $Q = 100$ and solve for p:

1. Substitute $Q = 100$ into the demand equation:

$100 = 400 - 2p$

2. Rearrange to isolate p:

$2p = 400 - 100$

$2p = 300$

3. Divide both sides by 2:

$p = 300 / 2$

$p = 150$

Result: To sell 100 units, the firm needs to set the price at $150 per unit.

Implications of the Result

- Pricing Strategy: The firm should price its product at $150 to achieve the sales volume of 100 units.
- Demand Sensitivity: The calculation confirms the linear nature of the demand curve; a $150 price point corresponds directly with the desired quantity.
- Revenue Consideration: At this price, the firm's revenue can be calculated as:

Revenue = Price × Quantity = $150 × 100 = $15,000

This figure is crucial for assessing whether the sales volume and revenue align with the firm's profit goals, considering costs.

Broader Context: Marginal Revenue and Profit Optimization

While the calculation above determines the price for a specific quantity, businesses often aim to maximize profits, which involves analyzing marginal revenue (MR), marginal cost (MC), and other factors.

Understanding Marginal Revenue (MR)

- Definition: The additional revenue generated from selling one more unit.
- For a linear demand curve: MR has the same intercept as the demand curve but twice the slope, making it steeper and more negative.

Given demand: $Q = 400 - 2p$, rewrite as:

$p = (400 - Q) / 2$

Deriving MR:

- Total Revenue (TR) = $p \times Q = [(400 - Q)/2] \times Q = (400Q - Q^2)/2$
- MR is the derivative of TR with respect to Q:

$MR = d(TR)/dQ = (400 - 2Q)/2 = 200 - Q$

Interpretation: MR decreases linearly with Q, crossing zero when $Q = 200$.

Profit Maximization Point

- To maximize profit, the firm sets MR = MC (marginal cost).
- Without specific cost data, we cannot pinpoint the profit-maximizing quantity, but knowing how MR behaves helps in strategic pricing.

Additional Considerations for Business Decision-Making

While the mathematical calculation provides a clear price point for selling 100 units, real-world scenarios require broader analysis.

Cost Structures and Break-Even Analysis

- Fixed costs: Expenses that do not change with sales volume.
- Variable costs: Costs that vary with each unit produced.
- Break-even price: The price at which total revenue equals total costs, ensuring no profit or loss.

Understanding these costs helps determine if the $150 price to sell 100 units is profitable.

Market Conditions and Consumer Behavior

- Price elasticity of demand: Measures responsiveness of demand to price changes.

- Given the demand function, elasticity at any point can be calculated:

Elasticity (E) = (dQ/dp) × (p/Q) = (-2) × (p/Q)

- At p = $150 and Q = 100:

E = (-2) × (150/100) = -3

- Interpretation: Demand is elastic at this point (|E| > 1), meaning consumers are sensitive to price changes. Small decreases in price could lead to larger increases in quantity demanded.

Strategic Pricing and Competitive Landscape

- The firm might consider whether setting a lower price could increase total revenue, especially if demand is elastic.
- Alternatively, if the firm has market power or a unique product, it may charge higher prices, accepting lower sales volumes.

Conclusion: From Mathematics to Market Strategy

The demand schedule Q = 400 - 2p provides a straightforward framework for determining the necessary price to sell a specific quantity—here, 100 units. Through simple algebra, we find that setting the price at $150 will achieve this sales volume. However, translating this into strategic business decisions involves understanding market elasticity, cost structures, and profit objectives.

In real-world applications, firms should leverage such demand analyses alongside cost data and market insights to craft pricing strategies that optimize profitability. While the calculation is mathematically simple, its implications are profound, guiding firms toward informed, data-driven decisions that balance customer demand with financial sustainability.

In summary:

- To sell 100 units, set the price at $150.
- Demand elasticity at this point suggests customers are responsive to price changes.
- Optimal profit strategies require integrating this demand insight with cost considerations.

By blending economic theory with practical business acumen, companies can navigate complex markets and make pricing decisions that support their growth and profitability in an increasingly competitive landscape.

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