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STUDY GUIDE
for
AP

MICROECONOMICS

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AP Microeconomics Study Guide

Section I: Multiple Choice

60 Questions | 1 Hour 10 Minutes | 66.65% of Exam Score

Questions require the use of economics content knowledge and reasoning across the range of course topics and skills in skill categories 1, 2, and 3.

Section II: Free Response

3 Questions | 1 Hour (includes a 10-minute reading period) | 33.35% of Exam Score

- 1 long free-response question (50% of section score).
- 2 short free-response questions (each worth 25% of section score).
- Students will be asked to:
- Make assertions about economic concepts, principles, models, outcomes, and/or effects
    - Explain economic concepts, principles, models, outcomes, and/or effects
    - Perform numerical analysis
    - Create graphs or visual representations

Unit Review (material sourced mainly from apcentral.collegeboard.org)

Unit 1: Basic Economics Concepts (12-15% of the exam)

Scarcity

Economic trade-offs arise from the lack of sufficient resources (scarcity) to meet society's wants and needs.
- Most factors of production (such as land, labor, and capital) are scarce, but some factors of production (such as established knowledge) may not be scarce due to their non-rival nature.

Resource Allocation and Economic Systems

Resource allocation involves answering three basic questions: What goods and services to produce? How to produce those goods and services? And who consumes those goods and services?
- Resource allocation is significantly influenced by the economic system adopted by society, such as command economy, market economy, or mixed economy. Each system involves a particular set of institutional arrangements and a coordinating mechanism for allocating scarce resources and distributing output.

Production Possibilities Curve

The PPC is a model used to show the trade-offs associated with allocating resources.

- The PPC can be used to illustrate the concepts of scarcity, opportunity cost, efficiency, underutilized resources, and economic growth or contraction.
- The shape of the PPC depends on whether opportunity costs are constant, increasing, or decreasing.
- The PPC can shift due to changes in factors of production as well as changes in productivity/technology.
- Economic growth results in an outward shift of the PPC.

Comparative Advantage and Trade

Absolute advantage describes a situation in which an individual, business, or country can produce more of a good or service than any other producer with the same quantity of resources.

- Comparative advantage describes a situation in which an individual, business, or country can produce a good or service at a lower opportunity cost than another producer.
- Production specialization according to comparative advantage, not absolute advantage, results in exchange opportunities that lead to consumption possibilities beyond the PPC.
- Comparative advantage and opportunity costs determine the terms of trade for exchange under which mutually beneficial trade can occur.

Cost-Benefit Analysis

Rational agents consider opportunity costs, whether implicit or explicit, when calculating the total economic costs of any decision.

- Total benefits form the metric "utility" for consumers and total revenue for firms.
- Total net benefits, the difference between total benefits and total costs, are maximized at the optimal choice.
- Some decisions permit rational agents to look at only marginal benefit and marginal cost.
- Other decisions cannot be broken down into increments in this way and must be evaluated by looking at total benefits and total costs.

Marginal Analysis and Consumer Choice

Consumers face constraints and have to make optimal decisions accounting for these constraints.

- In a model of rational consumer choice, consumers are assumed to make choices so as to maximize their total utility.
- Consumers experience diminishing marginal utility in the consumption of goods and services.
- Consumers allocate their limited income to purchase the combination of goods that maximizes their utility by equating/comparing the marginal utility of the last dollar spent on each good.
    - *Indifference curves are beyond the scope of the course and the AP Exam, but equating the ratios of marginal utility to price is within the scope.
- Marginal analysis involves comparing the additional benefit of increasing a given activity with the additional cost. Comparing marginal benefit (MB) with marginal cost (MC) helps individuals (firms) decide whether to increase, decrease, or maintain their consumption (production) levels.
- The optimal quantity at any point in time does not depend on fixed costs (sunk costs) or fixed benefits that have already been determined by past choices. The optimal quantity is achieved when marginal benefit is equal to marginal cost or where total benefit is maximized.

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Unit 2: Supply and Demand (20-25% of the exam)

Demand

A well-defined system of property rights is necessary for the market system to function well.

- Economic agents respond to incentives.
- Individuals often respond to incentives, such as those presented by prices, but also face constraints, such as income, time, and legal and regulatory frameworks.
- The law of demand suggests that a change in the own-price causes a change in quantity demanded in the opposite direction and a movement along a demand (marginal benefit) curve.
- The conceptual relationship between price and quantity stated by the law of demand leads to downward-sloping demand curves explained by the income effect and substitution effect and/or by diminishing marginal utility.
- The market demand curve (schedule) is derived from the summation of individual demand curves (schedules).
- Changes in the determinants of consumer demand can cause the demand curve to shift.

Supply

A change in own-price causes a change in quantity supplied in the same direction and a movement along a supply curve.

- The market supply curve (schedule) is derived from the summation of individual supply curves (schedules). The market supply curve is upward-sloping.
- Changes in the determinants of supply can cause the supply curve to shift.

Price Elasticity of Demand

Economists use the concept of elasticity to measure the magnitude of percentage changes in quantity owing to any given changes in the own-price, income, and prices of related goods.
- Price elasticity of demand is measured by the percentage change in quantity demanded divided by the percentage change in price or the responsiveness of the quantity demanded to changes in price.
- Elasticity varies along a linear demand curve, meaning slope is not elasticity.
- Ranges of values of elasticity of demand are described as elastic or inelastic with the separating benchmark being a magnitude of 1, where the change in the price and the change in the quantity demanded are proportional.
    - a. When the magnitude of the value of elasticity is greater than 1, the demand is described as being elastic with respect to that price in the range of the given change.
    - b. When the magnitude of the value of elasticity is less than 1, the demand is described as being inelastic with respect to that price in the range of the given change.

- ○ c. When the magnitude of the value of elasticity is equal to 1, the demand is described as being unit elastic with respect to that price in the range of the given change.
- The price elasticity of demand depends on certain factors such as the availability of substitutes.
- The impact of a given price change on total revenue or total expenditure will depend on whether demand is elastic, inelastic, or unit elastic.

Price Elasticity of Supply

Price elasticity of supply is measured by the percentage change in quantity supplied divided by the percentage change in price, or the responsiveness of the quantity supplied to changes in price.

- Ranges of values of elasticity of supply are described as elastic or inelastic with the separating benchmark being a magnitude of 1, where the change in the price and the change in the quantity supplied are proportional.
    - ○ a. When the magnitude of the value of elasticity is greater than 1, the supply is described as being elastic with respect to that price in the range of the given change.
    - ○ b. When the magnitude of the value of elasticity is less than 1, the supply is described as being inelastic with respect to that price in the range of the given change.
    - ○ c. When the magnitude of the value of elasticity is equal to 1, the supply is described as being unit elastic with respect to that price in the range of the given change.

The price elasticity of supply depends on certain factors such as the price of alternative inputs.

Other Elasticities

Elasticity can be measured for any determinant of demand or supply, not just the price.

- Income elasticity of demand is measured by the percentage change in the quantity demanded divided by the percentage change in consumers' income. Economists use the income elasticity of demand to determine whether a good is normal or inferior.
- Cross-price elasticity of demand is measured by the percentage change in the quantity demanded of one good divided by the percentage change in the price of another good. Economists use the cross-price elasticity of demand to determine whether goods are substitutes, complements, or not related.

Market Equilibrium and Consumer and Producer Surplus

The supply-demand model is a tool for understanding what factors influence prices and quantities and why prices and quantities might differ across markets or change over time.

- In a perfectly competitive market, equilibrium is achieved (and markets clear with no shortages or surpluses) when the price of a good or service brings the quantity supplied and quantity demanded into balance, in the sense that buyers wish to purchase the same quantity that sellers wish to provide.
- Equilibrium price provides information to economic decision-makers to guide resource allocation.
- Economists use consumer surplus and producer surplus to measure the benefits markets create to buyers and sellers and understand market efficiency.
- Market equilibrium maximizes total economic surplus in the absence of market failures, meaning that perfectly competitive markets are efficient.

Market Disequilibrium and Changes in Equilibrium

Whenever markets experience imbalances— creating disequilibrium prices and quantities, surpluses, and shortages—market forces drive price and quantity toward equilibrium.

- Factors that shift the market demand and market supply curves cause price, quantity, consumer surplus, producer surplus, and total economic surplus (within that market) to change. The impact of the change depends on the price elasticities of demand and supply

The Effects of Government Intervention in Markets

Some government policies, such as price floors, price ceilings, and other forms of price and quantity regulation, affect incentives and outcomes in all market structures.

- Governments use taxes and subsidies to change incentives in ways that influence consumer and producer behavior, shifting the supply and demand curves accordingly.
- Taxes and subsidies affect government revenues or costs.
- Government intervention in a market producing the efficient quantity through taxes, subsidies, price controls, or quantity controls can only decrease allocative efficiency.
- Deadweight loss represents the losses to buyers and sellers as a result of government intervention in an efficient market.
- The incidence of taxes and subsidies imposed on goods traded in perfectly competitive markets depends on the elasticity of supply and demand.

International Trade and Public Policy

Equilibria in competitive markets may be altered by the decision to open an economy to trade with other countries; equilibrium price can be higher or lower than under autarky, and the gap between domestic supply and demand is filled by trade.

- Opening an economy to trade with other countries affects consumer surplus, producer surplus, and total economic surplus.
- Tariffs, which governments sometimes use to influence international trade, affect domestic price, quantity, government revenue, and consumer surplus and total economic surplus.
- Quotas can be used to alter quantities produced and therefore affect price, consumer surplus, and total economic surplus.
    - *The graphing of quotas is beyond the scope of the course and the AP Exam, but understanding how quotas affect quantities produced is within the scope.

Unit 3: Production, Cost, and the Perfect Competition Model (22-25% of the exam)

The Production Function

The production function explains the relationship between inputs and outputs both in the short run and the long run.

- Marginal product and average product change as input usage changes, and hence, total product changes.
- Diminishing marginal returns occur as the firm employs more of one input, holding other inputs constant, to produce a product (output) in the short run.

Short-Run Production Costs

Fixed costs and variable costs determine the total cost.

- Marginal cost, average (fixed, variable, and total) cost, total cost, and total variable cost change as total output changes, but total fixed cost remains constant at all output levels, including zero output.
- Production functions with diminishing marginal returns yield an upward-sloping marginal cost curve.
- Specialization and the division of labor reduce marginal costs for firms.
- Cost curves can shift in response to changes in input costs and productivity

Long-Run Production Costs

In the long run, firms can adjust all their inputs, and as a result, all costs become variable.

- The relationship between inputs and outputs in the long run is described by the scale of production — increasing, decreasing, or constant returns to scale.
- The long-run average total cost is characterized by economies of scale, diseconomies of scale, or constant returns to scale (efficient scale).
- The minimum efficient scale plays a role in determining the concentration of firms in a market and the market structure.

Types of Profit

Firms respond to economic profit (loss) rather than accounting profit.

- Accounting profit fails to account for implicit costs (such as cost of financial capital, compensation for risk, or an entrepreneur's time), which, if fully compensated, result in normal profit.
- Firms are assumed to produce output to maximize their profits by comparing marginal revenue and marginal cost.

Firms' Short-Run Decisions to Produce and Long-Run Decisions to Enter or Exit a Market

In the short run, firms decide to operate (i.e., produce positive output) or shut down (i.e., produce zero output) by comparing total revenue to total variable cost or price to average variable cost (AVC).

- In the absence of barriers to entry or exit, in the long run (i.e., once factors that are fixed in the short run become variable), firms enter a market in which there are profit-making opportunities and exit a market when they anticipate economic losses.

Perfect Competition

A perfectly competitive market is efficient. Firms in perfectly competitive markets face no barriers to entry and have no market power.

- In perfectly competitive markets, prices communicate to consumers and producers the magnitude of others' marginal costs of production and marginal benefits of consumption and provide incentives to act on that information (i.e., price equals marginal cost in an efficient market).
- In perfectly competitive markets, firms can sell all their outputs at a constant price determined by the market.
- At a competitive market equilibrium, firms are price takers and select output to maximize profit by producing the level of output where the marginal cost equals marginal revenue (at the price).

- At a competitive market equilibrium, the price of a product equals both the private marginal benefit received by the last unit consumed and the private marginal cost incurred to produce the last unit, thus achieving allocative efficiency.
- In a short-run competitive equilibrium, price can either be above or below its long-run competitive level resulting in profits or losses, motivating entry or exit of firms and moving prices and quantities toward long-run equilibrium.
- In a long-run perfectly competitive equilibrium, productive efficiency implies all operating firms produce at efficient scale, price equals marginal cost and minimum average total cost, and firms earn zero economic profit.
- Firms may be in a constant cost, increasing cost, or decreasing cost industry. Long-run prices depend on the portion of the long-run cost curves on which firms operate.
- A perfectly competitive market in long-run equilibrium is allocatively and productively efficient.

Unit 4: Imperfect Competition (15-22% of the exam)

Introduction to Imperfectly Competitive Markets

Imperfectly competitive markets include monopoly, oligopoly, and monopolistic competition in product markets and monopsony in factor markets.

- In imperfectly competitive output markets and assuming all else is constant, a firm must lower price to sell additional units.
- In imperfectly competitive markets, consumers and producers respond to prices that are above the marginal costs of production and/or marginal benefits of consumption (i.e., price is greater than marginal cost in an inefficient market).
- Incentives to enter an industry may be mitigated by barriers to entry. Barriers to entry—such as high fixed/start-up costs, legal barriers to entry, and exclusive ownership of key resources—can sustain imperfectly competitive market structures.

Monopoly

A monopoly exists because of barriers to entry.

- In a monopoly, equilibrium (profit-maximizing) quantity is determined by equating marginal revenue (MR) to marginal cost (MC). The price charged is greater than the marginal cost.
- In a natural monopoly, long-run economies of scale for a single firm exist throughout the entire effective demand of its product.

Price Discrimination

A firm with market power can engage in price discrimination to increase its profits or capture additional consumer surplus under certain conditions.

- With perfect price discrimination, a monopolist produces the quantity where price equals marginal cost (just as a competitive market would) but extracts all economic surplus associated with its product and eliminates all deadweight loss.

Monopolistic Competition

In a market with monopolistic competition, firms producing differentiated products may earn positive, negative, or zero economic profit in the short run.

- Firms typically use advertising as a means of differentiating their product. Free entry and exit drive profits to zero in the long run.
- The output level, however, is smaller than the output level needed to minimize average total costs, creating excess capacity.
- The price is greater than marginal cost, creating allocative inefficiency

Oligopoly and Game Theory

An oligopoly is an inefficient market structure with high barriers to entry, where there are few firms acting interdependently.

- Firms in an oligopoly have an incentive to collude and form cartels.
- A game is a situation in which a number of individuals take actions, and the payoff for each individual depends directly on both the individual's own choice and the choices of others.
- A strategy is a complete plan of actions for playing a game; the normal form model of a game shows the payoffs that result from each collection of strategies (one for each player).
- A player has a dominant strategy when the payoff to a particular action is always higher independent of the action taken by the other player. Dominant strategies can be eliminated from each player's action set and can sometimes lead to an equilibrium outcome (see Nash equilibrium on next page).

A Nash equilibrium is a condition describing the set of actions in which no player can increase his or her payoff by unilaterally taking another action, given the other players' actions.

- *Dominant strategies and Nash equilibrium with more than two players or more than two actions per player, mixed-strategy equilibria, extensive form games, and normal form games with more than two players or more than two actions per player are beyond the scope of the course and the AP Exam.

Oligopolists have difficulty achieving the monopoly outcome for reasons similar to those that prevent players from achieving a cooperative outcome in the Prisoner's Dilemma; nevertheless,

prices are generally higher and quantities lower with oligopoly (or duopoly) than with perfect competition.

Unit 5: Factor Markets (10-13% of the exam)

Introduction to Factor Markets

Factors of production (labor, capital, and land) respond to factor prices (wages, interest, and rent), and employers' (firms') decision to hire is based on the productivity of the factors, output price, and cost of the factor.

- The quantity of labor demanded is negatively related to the wage rate, while the quantity of labor supplied is positively related to the wage rate in a given labor market, other things constant.

Changes in Factor Demand and Factor Supply

Changes in the determinants of labor demand, such as the output price and the productivity of the worker, cause the labor demand curve to shift.

- Changes in the determinants of labor supply (such as immigration, education, working conditions, age distribution, availability of alternative options, preferences for leisure, and cultural expectations) cause the labor supply curve to shift.

Profit-Maximizing Behavior in Perfectly Competitive Factor Markets

In a perfectly competitive labor market, the wage is set by the market and each firm hires the quantity of workers, where the marginal factor (resource) cost (wage) equals the marginal revenue product of labor.

- A typical firm may be a perfect competitor in the labor market even if it is an imperfect competitor in its output markets.
- A typical firm hires labor in a perfectly competitive labor market as long as the marginal revenue product of labor is greater than the market wage.
- To minimize costs or maximize profits, firms allocate inputs such that the last dollar spent on each input yields the same amount of marginal product.
- Marginal revenue product of a factor of production is the change in total revenue divided by the change in that factor of production, which is also equal to the marginal physical product of that factor multiplied by the marginal revenue ($MRP = MP \times MR$).
- Firms in a perfectly competitive output market will have a marginal revenue product of labor that is equal to the value of the marginal product of labor ($VMPL = MPL \times P$) because marginal revenue for each unit of output is equal to price.

Monopsonistic Markets

In a monopsonistic labor market, a typical firm hires additional labor as long as the marginal revenue product is greater than the marginal factor (resource) cost (the wage of a new unit of labor plus the wage increase given to all existing labor).

- When a typical firm hires additional workers in a monopsonistic labor market, the marginal factor (resource) cost is greater than the supply price of labor.

Unit 6: Market Failure and Role of Government (8-13% of the exam)

Socially Efficient and Inefficient Market Outcomes

Perfectly competitive markets allocate resources efficiently, but imperfect competition often results in market inefficiencies.

- The optimal quantity of a good occurs where the marginal benefit of consuming the last unit equals the marginal cost of producing that last unit, thus maximizing total economic surplus.
- The market equilibrium quantity is equal to the socially optimal quantity only when all social benefits and costs are internalized by individuals in the market. Total economic surplus is maximized at that quantity.
- Rational agents can pursue private actions to exploit or exercise market characteristics known as market power and make optimal decisions by equating private marginal benefits and private marginal costs that can result in market inefficiencies.
- Policymakers use cost-benefit analysis to evaluate different actions to reduce or eliminate market inefficiencies. Market inefficiencies can be eliminated by designing policies that equate marginal social benefit with marginal social cost.
- Equilibrium allocations can deviate from efficient allocations due to situations such as monopoly; oligopoly; monopolistic competition; negative and positive externalities in production or consumption; asymmetric information; and insufficient production of public goods. Producing any non-efficient quantity results in deadweight loss.

Externalities

The socially optimal quantity of a good occurs where the marginal social benefit of consuming the last unit equals the marginal social cost of producing that last unit, thus maximizing total economic surplus.

- Externalities are either positive or negative and arise from lack of well-defined property rights and/or high transaction costs.

- In the presence of externalities, rational agents respond to private costs and benefits and not to external costs and benefits.
- Rational agents have the incentive to free ride when a good is non-excludable.
- Policies that address positive or negative externalities include taxes/subsidies, environmental regulation, public provision, the assignment of property rights, and the reassignment of property rights through private transactions.

Public and Private Goods

Private goods are rival and excludable, and public goods are non-rival and non-excludable.

- Due to the free rider problem, private individuals usually lack the incentive to produce public goods, leaving government as the only producer.
- Governments sometimes choose to produce private goods, such as educational services, and to allow free access to them.
- Some natural resources are, by their nature, non-excludable and rival and therefore open access. Private individuals inefficiently overconsume such resources.

The Effects of Government Intervention in Different Market Structures

Government intervention in imperfect markets can increase efficiency if the policy correctly addresses the incentives that led to the market failure.

- Government can use price regulation to address inefficiency due to monopoly.
- A natural monopoly will require a lump sum subsidy to produce at the allocatively efficient quantity.
- Governments use antitrust policy in an attempt to make markets more competitive.

Inequality

Income levels and poverty rates vary greatly both across and within groups (e.g., age, gender, race) and countries.

- The Lorenz curve and Gini coefficient are used to represent the degree of inequality in distributions and to compare distributions across different countries, policies, or time periods. (You do not need to draw a Lorenz curve on this exam)
- Each factor of production receives the value of its marginal product, which can contribute to income inequality.
- Sources of income and wealth inequality include differences in tax structures (progressive and regressive tax structures), human capital, social capital, inheritance, effects of discrimination, access to financial markets, mobility, and bargaining power within economic and social units (firms, labor unions, and families).

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Multiple Choice Strategies/Tips

- Keep an eye on the clock - the MC section accounts for 2/3 of the exam score, so doing well and finishing is important.
- If you're unsure, see if you can eliminate answer choices based on logic to make educated guesses.
- Brush up on your math skills since you will not be able to use a calculator, so make sure you're confident in your basic math skill abilities.
- Know your formulas! They will definitely come in handy.
- Drawing your own graphs on scrap paper or on the side may help you understand and answer the questions.
- Know your curves and what makes them shift.
- Check your work!

Free Response Strategies/Tips

- Make sure you answer all parts of the questions – see the task verbs below to know what they're expecting from you and to make sure you are properly answering the prompts.
- The long question is worth the same amount of points as both short questions combined; make sure to answer the long one first!
- Explain your reasoning clearly in each part.
- Get comfortable drawing and shifting curves, and make sure you label everything properly.
- Handle your calculations with care and write out all your steps, so you can figure out where/if you made an error.
- Get comfortable interpreting charts and tables, and being able to use the data in formulas, graphs, and charts. At least one of the questions will usually give you a chart/table of some sort.
- If the exam is on paper, mark up the charts, tables, and information that they give you, or re-write them in your own words (i.e. Q = __,P =__, etc.), so that it is easier for you to interpret/manipulate the information.
- Keep your eye on the clock, and stay on top of timing.
- Check your work!

The following task verbs are commonly used in the free-response questions.

Identify. What? Which? Will? and other interrogatory words: Identify or provide information about a specified topic, without elaboration or explanation.

Explain: Provide information about how or why a relationship, pattern, position, situation, or outcome occurs using evidence and/or reasoning. Graphs and symbols are acceptable as part of the explanation.

Calculate: Perform mathematical steps to arrive at a final answer. Showing work is required.

Draw a correctly-labeled graph: Create a graph or visual representation that illustrates or explains relationships or phenomena. Labels are required.

Show/Label/Plot/Indicate: Show, label, plot, or indicate an economic scenario on a graph or visual representation created by the student. Clearly labeling all axes and curves and showing directional changes where relevant is required.

<u>Microeconomics Formulas/Concepts to Know</u>

*Quantity can also mean output

1. TFC + TVC = TC (Total fixed cost + Total variable cost = Total cost)
2. TFC / Q = AFC (Total fixed cost / Quantity = Average fixed cost)
3. TVC / Q = AVC (Total variable cost / Quantity = Average variable cost)
4. AFC + AVC = ATC (Average fixed cost + Average variable cost = Average Total Cost)
5. TC / Q = ATC (Total cost / Quantity = Average total cost)
6. Δ TC / Δ Q = MC (Change in total cost / Change in quantity = Marginal cost)
7. TR / Q = AR or P (Total revenue / Quantity = Average revenue or Price)
8. $\sum$ MP = TP (Sum of marginal product = Total product = Output)
9. P x Q = TR (Price x Quantity = Total revenue)
10. Δ TR / Δ Q = MR (Change in total revenue / Change in quantity = Marginal revenue)
11. Δ TP / Δ L = MP_L (Change in total product (production) / Change in labor = Marginal Product of Labor)
12. TP / L = APL (Total product / Labor = Average Product of Labor)
13. AR < AVC : Shutdown (Average revenue < Average variable cost)
14. P = ATC : Fair-Return Regulation (0 Economic Profit or Normal Profit)
15. P = MC : Socially-Optimum Price Regulation (Allocative Efficiency)
16. P > MC : Underallocation of Resources
17. P < MC : Overallocation of Resources
18. MP x P = Marginal Revenue Product (MRP)
19. TR – TC = Profit (Total revenue – Total cost = Profit)
20. P > ATC : Economic Profit
21. P < ATC : Economic Loss
22. MR < 0 : Demand is inelastic (TR is declining)
23. MR > 0 : Demand is elastic (TR is rising)
24. MR = 0 : Demand is unit elastic (TR is at a maximum)
25. Δ TR / Δ Input = Marginal Revenue Product (MRP)
26. Δ TC / Δ Input = Marginal Resource Cost (MRC)
27. P = Min ATC : Productive Efficiency

28. ed < 1 : Demand is inelastic
29. ed > 1 : Demand is elastic
30. ed = 1 : Demand is unit elastic
31. Δ Price = Movement Along the Curve
32. Δ Non-Price Determinant = Shift of the Curve
33. P Increases, TR increases : Demand is inelastic
34. P increases, TR decreases : Demand is elastic
35. P decreases, TR decreases : Demand is inelastic
36. P decreases, TR increases : Demand is elastic

See also:
https://www.reviewecon.com/microeconomics-graphs
http://jb-hdnp.org/Sarver/AP_Economics/Nat_Exam_Review/formulachart.pdf