

AP MICROECONOMICS**UNIT 2**

Supply and Demand



20–25%
AP EXAM WEIGHTING



~13–15
CLASS PERIODS



Remember to go to [AP Classroom](#) to assign students the online **Personal Progress Check** for this unit.

Whether assigned as homework or completed in class, the **Personal Progress Check** provides each student with immediate feedback related to this unit's topics and skills.

Personal Progress Check 2

Multiple-choice: ~25 questions

Free-response: 2 questions

- Short
- Short

Supply and Demand



Developing Understanding

BIG IDEA 1

Scarcity and Markets **MKT**

- What determines the market price for a good or service?
- What causes market prices to change?

BIG IDEA 4

Market Inefficiency and Public Policy **POL**

- How does government policy affect market outcomes?

This unit will provide the basis for understanding how markets work by introducing the supply and demand model. Students will build on the concepts of scarcity and choice that were introduced in the first unit and explore the factors that influence consumer and producer behavior. They will learn how the interaction of consumers and producers in competitive markets determines market prices and results in the most efficient allocation of scarce resources. At the end of the unit, students will also begin exploring the effects of government policy on market outcomes, laying the groundwork for additional analysis in the last unit of the course.

Building Course Skills

2.A 3.A 3.C 4.A 4.C

It is important for students to continue to build on their graphing skills in this unit. Many students lose points on the AP Exam for not properly labeling axes and curves on graphs and for not properly demonstrating the effects of changes on graphs. It can help to model the appropriate setup of graphs, stressing the importance of proper labeling, and to provide opportunities for guided practice drawing and manipulating graphs.

Help students to see from the beginning of the course how graphs can be used as tools for making sense of economic situations and predicting and explaining economic outcomes. These are important skills in this unit in the context of learning about supply and demand. Even if a graph is not asked for on the exam, drawing one may help to answer a given question or explain a situation.

Preparing for the AP Exam

On the AP Exam, students frequently have difficulty answering questions that require them to analyze numbers and do calculations that are relevant to the content

of this unit (e.g., calculating and interpreting measures of elasticity and calculating areas of consumer surplus, producer surplus, and deadweight loss).

Students may apply the wrong formula or mathematical process, such as when they incorrectly calculate the elasticity of demand as the change in quantity divided by the change in price, when they should instead calculate the percentage change in quantity divided by the percentage change in price. Providing students with opportunities to practice carrying out these calculations and emphasizing the importance of showing their work can help identify these types of mistakes and correct them before the AP Exam.

In other cases, though, calculation errors reveal a lack of understanding of the underlying concept, which manifests itself in an incorrect calculation. For example, students might know how to calculate the area of a triangle when asked to calculate consumer or producer surplus from a given graph but then they calculate the area of the wrong triangle. Analyzing numbers and doing calculations in this course require an understanding of the content itself.

UNIT AT A GLANCE

Enduring Understanding	Topic	Suggested Skills	Class Periods
			~13–15 CLASS PERIODS
MKT-3	2.1 Demand	4.A Draw an accurately labeled graph or visual to represent an economic model or market.	.5
	2.2 Supply	4.A Draw an accurately labeled graph or visual to represent an economic model or market.	.5
	2.3 Price Elasticity of Demand	3.C Determine the effect(s) of a change in an economic situation using quantitative data or calculations.	1
	2.4 Price Elasticity of Supply	3.C Determine the effect(s) of a change in an economic situation using quantitative data or calculations.	.5
	2.5 Other Elasticities	3.C Determine the effect(s) of a change in an economic situation using quantitative data or calculations.	.5
MKT-4	2.6 Market Equilibrium and Consumer and Producer Surplus	2.A Using economic concepts, principles, or models, explain how a specific economic outcome occurs or what action should be taken in order to achieve a specific economic outcome.	2
	2.7 Market Disequilibrium and Changes in Equilibrium	3.A Determine the outcome of an economic situation using economic concepts, principles, or models.	1
POL-1	2.8 The Effects of Government Intervention in Markets	4.C Demonstrate the effect of a change in an economic situation on an accurately labeled graph or visual.	2
	2.9 International Trade and Public Policy	4.C Demonstrate the effect of a change in an economic situation on an accurately labeled graph or visual.	1
Go to AP Classroom to assign the Personal Progress Check for Unit 2. Review the results in class to identify and address any student misunderstandings.			

1. Complementary Goods

Goods that are consumed together, such as cars and gasoline or peanut butter and jelly.

2. Consumer(s)

People who buy goods and services. Often a household is considered to be a fundamental unit of consumption.

3. Consumer Surplus

The difference between the equilibrium price in the market and the price consumers are actually willing to pay for a good or service. On a graph, consumer surplus is represented as the area beneath the demand curve, above the price paid, and to the left of the quantity purchased.

4. Cross-Price Elasticity

The percentage change in the quantity demanded for one good divided by the percentage change in the price of a related good. Cross-price elasticity determines whether goods are complements (if negative) or substitutes (if positive).

5. Deadweight Loss

The loss of consumer and producer surplus that occurs when a quantity other than the equilibrium quantity prevails in the market. Deadweight loss results from over- or underproduction of a good and is associated with allocative inefficiency.

6. Demand

The willingness and ability of consumers to buy goods and services at the various prices that exist in the market within a specified time frame. Describes the inverse relationship between the quantity demanded and the price that is often expressed as a graphical curve or a tabular schedule.

7. Demand Curve

A downward-sloping curve that illustrates consumers' demand for goods and services at various prices.

8. Determinants of Demand

The factors that cause demand to either increase or decrease. The determinants of demand include: market size, expected prices, related prices, income, and tastes.

9. Determinants of Supply

The factors that cause supply to either increase or decrease. The determinants of supply include: technology, related prices, input prices, competition, government taxes and subsidies, and expected prices.

10. Diminishing Marginal Utility

Each additional unit of a good or service that is consumed gives less additional satisfaction or utility than the previous unit that was consumed. One of the reasons why price and quantity demanded have an inverse relationship.

11. Effective Price Ceiling

A price ceiling is a legal maximum price set below the equilibrium price. This results in the quantity demanded exceeding the quantity supplied at the ceiling price. Hence a shortage exists in the market.

12. Effective Price Floor

A price floor is a legal minimum price set above the equilibrium price. This results in the quantity supplied exceeding the quantity demanded at the floor price. Hence a surplus exists in the market.

13. Elasticity

The sensitivity of quantity changes relative to changes in other factors, often prices.

14. Elastic

Describes a rate of change in quantity that is greater (in percentage terms) than the rate of change in price.

15. Equilibrium

The condition that exists in the market when a single price and quantity result from the intersection of supply and demand. The natural price-quantity combination at which neither a shortage nor a surplus exists.

16. Excise Tax

A per-unit tax on the production of a good or service. Excise taxes tend to reduce supply, decreasing quantity of a good that is sold and increasing the price that buyers pay.

17. Income Effect

Consumers' buying power changes inversely to changes in price. This is one reason for the inverse relationship expressed in the law of demand. Consumers buy fewer units at higher prices because their same nominal income has less purchasing power.

18. Income Elasticity of Demand

The percentage change in the quantity demanded divided by the percentage change in consumers' income. Measures whether and how much buying increases (typically) or decreases (unusual in cases of less-desirable goods) when income rises. Income elasticity of demand determines whether goods are normal (if positive) or inferior (if negative).

19. Inelastic

Describes a rate of change in quantity that is less (in percentage terms) than the rate of change in price.

20. Inferior Good

A good whose demand varies inversely with consumers' incomes.

21. Law of Demand

The price and quantity demanded of a good are inversely related because of income effect, substitution effect, and diminishing marginal benefits.

22. Law of Increasing Marginal Cost

The cost of producing each additional unit of a good or service incurs a greater cost than the previous unit. Results from the need to use resources that are less and less well-suited to production of that good as quantity produced increases.

23. Law of Supply

The price and quantity supplied of a good are directly related. Higher prices induce increased production quantities.

24. Marginal Utility

The additional satisfaction or usefulness a consumer gets from consuming an additional unit of a good or service. Change in total utility divided by change in quantity consumed.

25. Normal Good

A good whose demand varies directly with consumers' incomes.

26. Price Ceiling

A maximum price for a good or service that cannot be legally exceeded. See Effective Price Ceiling.

27. Price Elasticity of Demand

The responsiveness of quantity changes relative to price changes; the percentage change of quantity demanded divided by the percentage change in price.

28. Price Elasticity of Supply

The percentage change in quantity supplied divided by the percentage change in the price of a good or service.

29. Price Floor

A minimum price for a good or service that cannot be legally undermined. See Effective Price Floor.

30. Producer(s)

People who make and sell goods and services; suppliers.

31. Producer Surplus

The difference between the market equilibrium price and the price producers would willingly accept for a good or service. On a graph, producer surplus is represented by the area beneath the price received, above the supply (or marginal cost) curve, and to the left of quantity sold.

32. Quantity Demanded

The amount of a good or service that consumers are willing and able to buy at a given price in a specified period of time.

33. Quantity Supplied

The amount of a good or service that producers are willing and able to sell at a given price in a specified period of time.

34. Shortage

The condition that exists when the quantity demanded exceeds the quantity supplied. Indication of price being lower than equilibrium level.

35. Substitute Goods

Goods which are used in place of each other. For example, margarine is a substitute for butter.

36. Substitution Effect

The tendency of consumers to substitute lower-priced items for higher-priced items. A reason why the law of demand is true; consumers purchase fewer units at higher prices because substitutes (whose prices are unchanged) seem relatively cheaper.

37. Supply

The willingness and ability of producers to offer a good or service for sale at the various prices which exist in the market within a certain time frame. The positive or direct relationship between quantity supplied and price that is often displayed on a graphical curve or in a tabular schedule.

38. Supply Curve

An upward-sloping curve that illustrates producers' willingness and ability to bring units of a good or service to market during a particular time period.

39. Surplus

The condition that exists when the quantity supplied exceeds the quantity demanded. Indication of price being higher than equilibrium level.

40. Total Revenue

The price of a good or service multiplied by the quantity sold. Total receipts a firm takes in from selling its finished goods and services.

41. Total Revenue Test

A test for price elasticity of demand. If price changes vary directly with total revenue, then the demand is inelastic. If price changes vary inversely with total revenue, then the demand is elastic. If price changes do not cause a change in total revenue, then demand is unit elastic.

42. Unit Elastic

Describes percentage change in quantity that is equal to percentage change in price.

43. Utility

The want-satisfying power that goods and services provide. The amount of usefulness or satisfaction that a consumer gets from consuming a good or service.

44. Utility Maximization

Economists assume that consumers always try to maximize their total utility. With a budget, consumers seek combinations of the goods they buy which yield the greatest overall level of satisfaction.

45. Utility Maximization Rule

A formula that illustrates the combination of two goods that maximize a consumer's utility. The formula is $MU_x/P_x = MU_y/P_y$. It can be extended to any number of goods and implies that customers do best when they try to ensure that the last dollar they spend on each type of good they purchase yields the same level of added satisfaction.

SUGGESTED SKILL

 *Graphing and Visuals*

4.A

Draw an accurately labeled graph or visual to represent an economic model or market.



AVAILABLE RESOURCES

- External Resource > [Davidson Next AP Macroeconomics Course—Supply & Demand](#)
- Classroom Resources > [Markets—Lesson: A Comparison of Graphs from Microeconomics and Macroeconomics](#)

TOPIC 2.1

Demand

Required Course Content

ENDURING UNDERSTANDING

MKT-3

Individuals and firms respond to incentives and face constraints.

LEARNING OBJECTIVE

MKT-3.A

- Define (using graphs as appropriate) key terms and factors related to consumer decision making and the law of demand.
- Explain (using graphs as appropriate) the relationship between price and quantity demanded and how buyers respond to incentives and constraints.

ESSENTIAL KNOWLEDGE

MKT-3.A.1

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

MKT-3.A.2

Economic agents respond to incentives.

MKT-3.A.3

Individuals often respond to incentives, such as those presented by prices, but also face constraints, such as income, time, and legal and regulatory frameworks.

MKT-3.A.4

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.

MKT-3.A.5

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.

MKT-3.A.6

The market demand curve (schedule) is derived from the summation of individual demand curves (schedules).

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LEARNING OBJECTIVE

MKT-3.B

Explain (using graphs as appropriate) buyers' responses to changes in incentives and constraints.

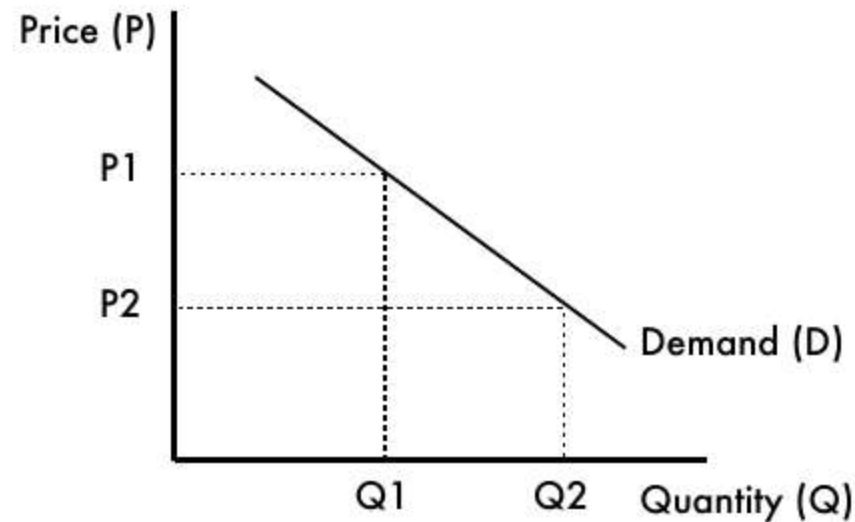
ESSENTIAL KNOWLEDGE

MKT-3.B.1

Changes in the determinants of consumer demand can cause the demand curve to shift.

Demand is the willingness and ability of consumers to buy various quantities of a good or service at various prices in a given time period.

The relationship between the price of a good or service and the quantity consumers are willing to buy is inverse. This is the law of demand. The higher the price, the lower the quantity demanded, and the lower the price, the higher the quantity demanded.

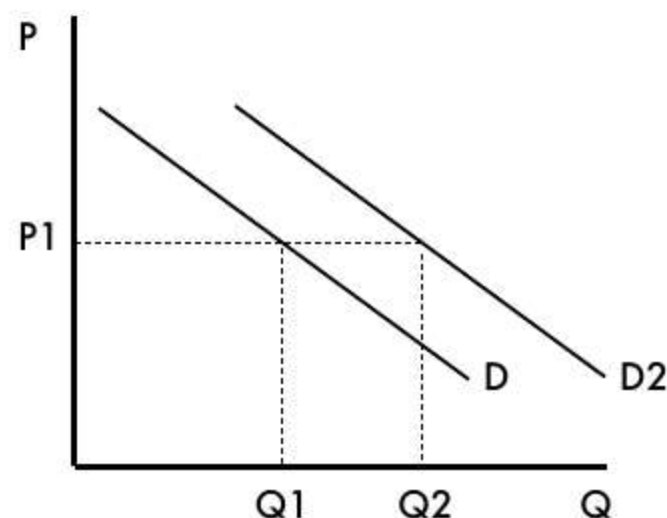


The graph above is called a demand curve. As the price varies, the quantity demanded varies inversely according to the law of demand. The higher price (P_1) corresponds to the lower quantity (Q_1) while the lower price (P_2) corresponds to the higher quantity (Q_2).

Changes in price cause changes in the quantity demanded but do not affect the demand curve.

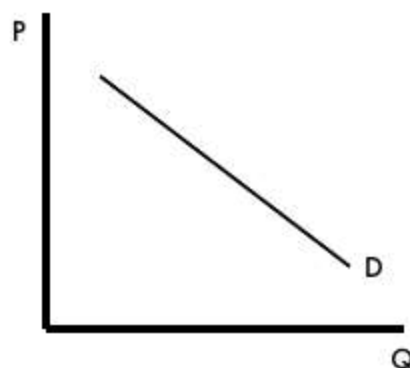
Sometimes things other than price can shift the demand curve resulting in a different set of quantities at each price. Examples include, changes in consumers incomes, changes in the number of consumers, changes in the price of related goods, changes in consumers' tastes and preferences, and expectations of the future.

When these change, the demand curve can either increase by shifting to the right or decrease by shifting to the left. For example, if consumers' incomes increase, then they are able to purchase a greater quantity of a good or service at each and every price. The result is the demand curve shifts right (D to D_2) and the quantity demanded increases from Q_1 to Q_2 at the original price P_1 .



-
1. Define demand.
 2. Explain the law of demand.
 3. In the space provided, draw a correctly labeled graph of a demand curve.
 4. How does an increase in the price of apples affect the quantity of apples demanded.
 5. Does an increase or decrease in the price of apples shift the demand curve for apples?
 6. An increase in consumers' income would have what effect on the demand for apples?
 7. A decrease in the price of plane tickets would have what effect on the demand for hotel rooms in tourist destinations?
 8. An influx of immigrants would have what effect on the demand for housing in a city?
 9. Increased popularity of bananas would have what effect on the demand for bananas?
 10. If consumers expect the price of cars to go up next year, then how does that affect the demand for cars right now?

1. Define demand. *Demand is the willingness and ability of consumers to buy various quantities of a good or service at various prices in a given time period.*
2. Explain the law of demand. *The relationship between the price of a good or service and the quantity consumers are willing to buy is inverse.*
3. In the space provided, draw a correctly labeled graph of a demand curve.



4. How does an increase in the price of apples affect the quantity of apples demanded?
An increase in the price of apples decreases the quantity of apples demanded.
5. Does an increase or decrease in the price of apples shift the demand curve for apples?
No, changes in the price of apples affects the quantity demanded; not the demand curve
6. An increase in consumers' income would have what effect on the demand for apples?
Increased income increases the demand for apples.
7. A decrease in the price of plane tickets would have what effect on the demand for hotel rooms in tourist destinations?
Decreases in the price of plane tickets increases the demand for hotels in tourist destinations.
8. An influx of immigrants would have what effect on the demand for housing in a city?
An influx of immigrants increases the demand for housing in a city.
9. Increased popularity of bananas would have what effect on the demand for bananas?
Increased popularity increases the demand for bananas.
10. If consumers expect the price of cars to go up next year, then how does that affect the demand for cars right now?
Consumers have more demand for cars now expecting the price of cars to go up next year.

SUGGESTED SKILL

 *Graphing and Visuals*

4.A

Draw an accurately labeled graph or visual to represent an economic model or market.



AVAILABLE RESOURCES

- External Resource > [Davidson Next AP Macroeconomics Course—Supply & Demand](#)
- Classroom Resources > [Markets—Lesson: A Comparison of Graphs from Microeconomics and Macroeconomics](#)

TOPIC 2.2

Supply

Required Course Content

ENDURING UNDERSTANDING

MKT-3

Individuals and firms respond to incentives and face constraints.

LEARNING OBJECTIVE

MKT-3.C

- Define (using graphs as appropriate) the law of supply.
- Explain (using graphs as appropriate) the relationship between price and quantity supplied.

MKT-3.D

Explain (using graphs as appropriate) producers' (sellers') responses to changes in incentives and technology.

ESSENTIAL KNOWLEDGE

MKT-3.C.1

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

MKT-3.C.2

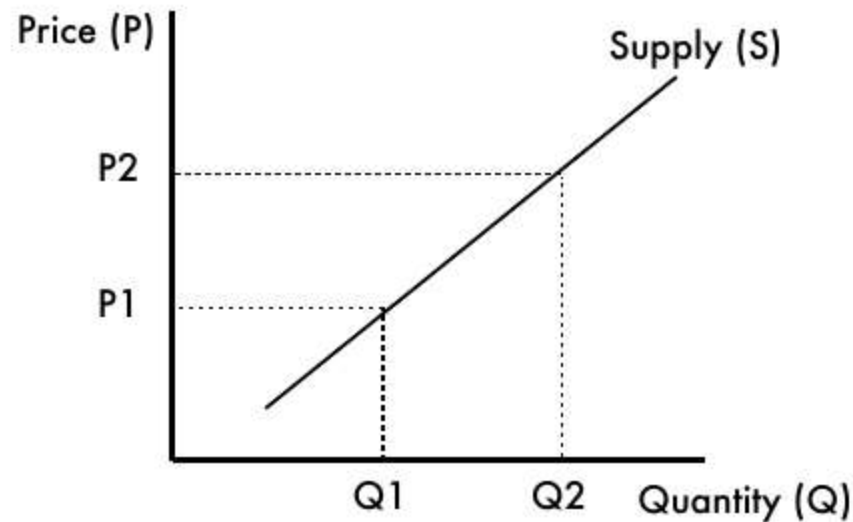
The market supply curve (schedule) is derived from the summation of individual supply curves (schedules). The market supply curve is upward-sloping.

MKT-3.D.1

Changes in the determinants of supply can cause the supply curve to shift.

Supply is the willingness and ability of producers to sell various quantities of a good or service at various prices in a given time period.

The relationship between the price of a good or service and the quantity producers are willing to sell is direct. This is the law of supply. The higher the price, the higher the quantity supplied, and the lower the price, the lower the quantity supplied.

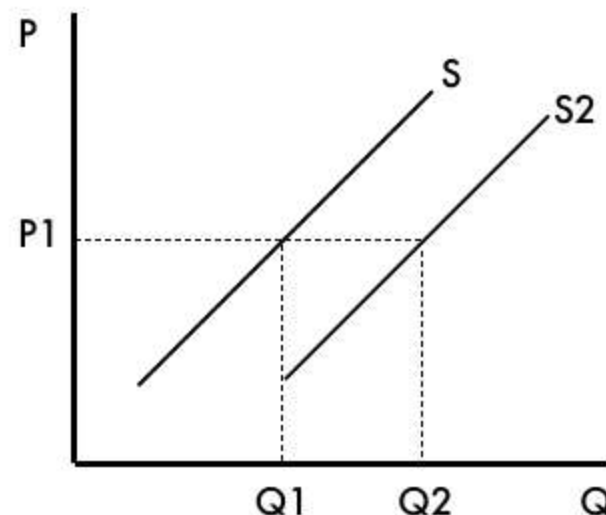


The graph above is called a supply curve. As the price varies, the quantity supplied varies directly according to the law of supply. The lower price (P_1) corresponds to the lower quantity (Q_1) while the higher price (P_2) corresponds to the higher quantity (Q_2).

Changes in price cause changes in the quantity supplied but do not affect the supply curve.

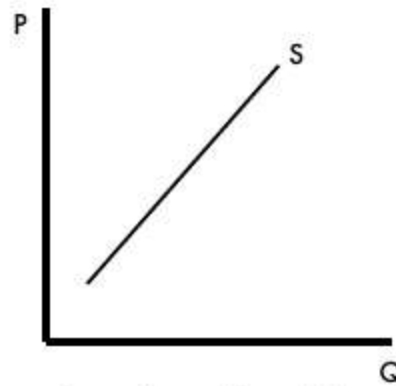
Sometimes things other than price can shift the supply curve resulting in a different set of quantities at each price. Examples include, changes in producers' costs of production (wages, raw materials, rent, utilities), changes in competition, taxes, regulation, and expectations of the future.

When these change, the supply curve can either increase by shifting to the right or decrease by shifting to the left. For example, if the cost of inputs decrease, then producers are able to offer for sale a greater quantity of a good or service at each and every price. The result is the supply curve shifts right (S to S_2) and the quantity supplied increases from Q_1 to Q_2 at the original price P_1 .



-
1. Define supply.
 2. Explain the law of supply.
 3. In the space provided, draw a correctly labeled graph of a supply curve.
 4. How does an increase in the price of apples affect the quantity of apples supplied.
 5. Does an increase or decrease in the price of apples shift the supply curve for apples?
 6. An increase in wages paid to apple harvesters would have what effect on the supply of apples?
 7. A decrease in the number of airlines would have what effect on the supply of tickets for air travel?
 8. An increase in regulations for home builders would have what effect on the supply of housing in a city?
 9. An increase in consumers' income would have what effect on the supply of chicken?
 10. If producers expect the price of cars to go up next year, then how does that affect the supply of cars right now?

1. Define supply. *Supply is the willingness and ability of producers to sell various quantities of a good or service at various prices in a given time period.*
2. Explain the law of supply. *The relationship between the price of a good or service and the quantity producers are willing to sell is direct*
3. In the space provided, draw a correctly labeled graph of a supply curve.



4. How does an increase in the price of apples affect the quantity of apples supplied.
the quantity supplied increases
5. Does an increase or decrease in the price of apples shift the supply curve for apples?
No, the change in price only affects the quantity supplied; not the supply curve.
6. An increase in wages paid to apple harvesters would have what effect on the supply of apples?
Wages are a production cost for apple farmers, so the supply of apples decreases.
7. A decrease in the number of airlines would have what effect on the supply of tickets for air travel?
Decreased competition in the airline industry decreases the supply of tickets.
8. An increase in regulations for home builders would have what effect on the supply of housing in a city?
Increased regulation increases costs of production and diverts resources to comply with regulations thus reducing the supply of housing.
9. An increase in consumers' income would have what effect on the supply of chicken?
Changes in consumer income affect demand and not supply.
10. If producers expect the price of cars to go up next year, then how does that affect the supply of cars right now?
Car producers will supply less now, so that they can supply more when prices rise.

TOPIC 2.3

Price Elasticity of Demand

SUGGESTED SKILL

 Manipulation

3.C

Determine the effect(s) of a change in an economic situation using quantitative data or calculations.

Required Course Content

ENDURING UNDERSTANDING

MKT-3

Individuals and firms respond to incentives and face constraints.

LEARNING OBJECTIVE

MKT-3.E

- Define measures of elasticity.
- Explain (using graphs where appropriate) measures of elasticity and the impact of a given price change on total revenue or total expenditure.
- Calculate (using data from a graph or a table as appropriate) measures of elasticity.

ESSENTIAL KNOWLEDGE

MKT-3.E.1

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.

MKT-3.E.2

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.

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LEARNING OBJECTIVE**MKT-3.E**

- Define measures of elasticity.
- Explain (using graphs where appropriate) measures of elasticity and the impact of a given price change on total revenue or total expenditure.
- Calculate (using data from a graph or a table as appropriate) measures of elasticity.

ESSENTIAL KNOWLEDGE**MKT-3.E.3**

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.

- 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.
- 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.
- 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.

MKT-3.E.4

The price elasticity of demand depends on certain factors such as the availability of substitutes.

MKT-3.E.5

The impact of a given price change on total revenue or total expenditure will depend on whether demand is elastic, inelastic, or unit elastic.

A. In general, elasticity measures the sensitivity of quantity changes to price changes. If the quantity change is relatively large compared to the price change, the change can be described as relatively elastic.

1. If the quantity change is proportional to the price change, it can be described as unit elastic.
2. If the quantity change is relatively small compared to the price change, it can be described as inelastic.

B. Price elasticity of demand shows the response of quantity demanded to a change in price. Price elasticity is calculated by dividing the rate of change in quantity demanded by the rate of change in price.

$$Ed = \% \text{ change in } Qd / \% \text{ change in } P$$

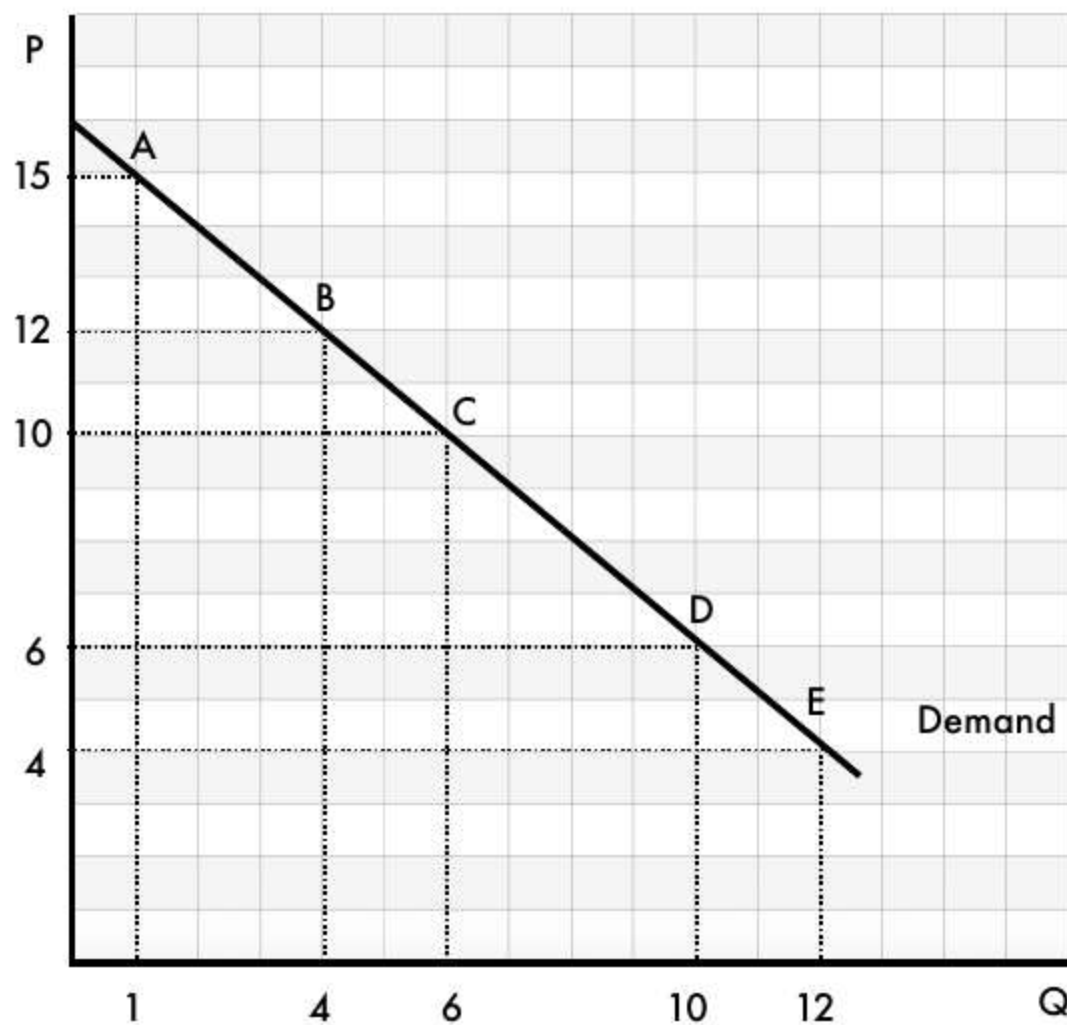
1. If $Ed = 0$, then demand is perfectly inelastic
2. If $Ed < 1$, then demand is inelastic.
3. If $Ed = 1$, then demand is unit elastic.
4. If $Ed > 1$, then demand is elastic.
5. If $Ed = \text{Undefined}$, then demand is perfectly elastic

C. Another way to determine price elasticity of demand is the total revenue test. First, calculate total revenue by multiplying price by quantity ($P \times Q$). Compare the change in price to the change in total revenue. If the price and total revenue change in the same direction, then demand is inelastic. If the price changes but total revenue remains constant, then demand is unit elastic. Finally, if price changes, but total revenue moves in the opposite direction, then demand is elastic.

D. The factors that determine price elasticity of demand are whether or not the good is a necessity or a luxury, the availability of substitutes, the amount of time the consumer has available to make a buying decision, and the portion of the consumer's income the purchase would require.

1. If the good or service is a necessity, then demand tends to be inelastic.
Luxury goods tend to have elastic demand.
Addictive or habit-forming goods tend to have inelastic demand.
2. If no close substitutes exist, demand is inelastic. If ready substitutes are available, demand is elastic.
3. If ample time to make a decision exists, then demand is elastic. If a purchasing decision must be made immediately, then demand is inelastic.
4. A good or service that requires a significant portion of a consumer's income to purchase tends to have elastic demand, but a good or service that requires only a small portion of income tends to have inelastic demand.
5. It's important to note that the slope of the demand curve and elasticity are not the same thing. Elasticity varies along a linear demand curve.

1. Define:
- elastic demand
 - inelastic demand
 - price elasticity of demand
 - unit elasticity



Refer to the diagram above, calculate price elasticity of demand for the following changes and determine whether demand is elastic, unit elastic, or inelastic for each (show your work):

2. A to B using the total revenue test
3. B to C using price elasticity of demand formula
4. C to D using price elasticity of demand formula
5. D to E using price elasticity of demand formula

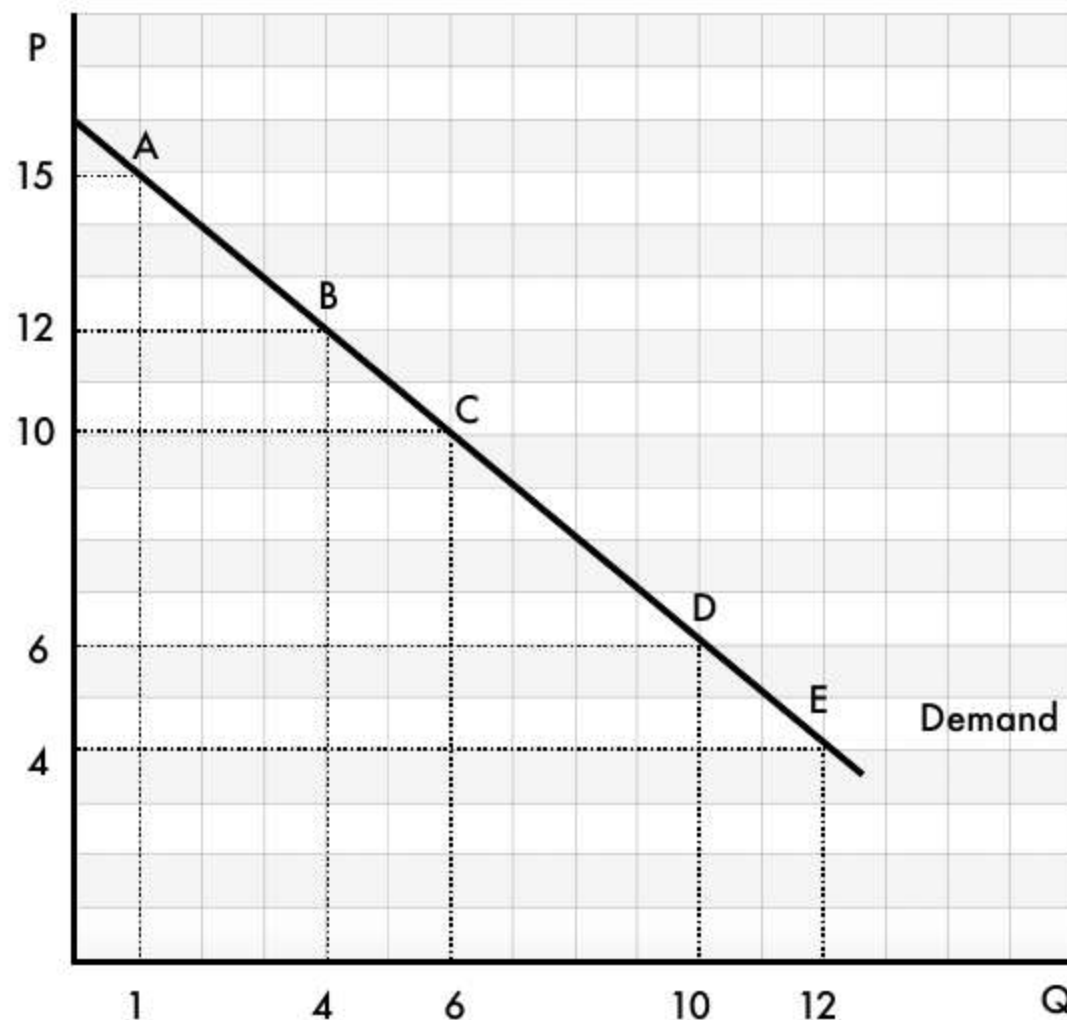
1. Define:

elastic demand - the rate of change in quantity demanded > the rate of change in price

inelastic demand - the rate of change in quantity demanded < the rate of change in price

price elasticity of demand - sensitivity of quantity demanded to changes in price

unit elasticity - the rate of change in quantity demanded = the rate of change in price



Refer to the diagram above, calculate price elasticity of demand for the following changes and determine whether demand is elastic, unit elastic, or inelastic for each (show your work):

2. A to B using the total revenue test ... Total Revenue = $P \times Q$
 $(\$15 \times 1) = \15 , $(\$12 \times 4) = \48 ; If total revenue increases when price decreases, then demand is elastic.
3. B to C using price elasticity of demand formula ... $E_d = |\% \Delta Q_d / \% \Delta P|$
 $|[(6-4)/4] / [(10-12)/12]| = |.5 / -.167| = |-2.99| = 2.99$, $2.99 > 1$, so demand is elastic
4. C to D using price elasticity of demand formula
 $|[(10-6)/6] / [(6-10)/6]| = |.4285... / -.333...| = |-1.29|$, $1.29 > 1$, so demand is elastic
5. D to E using price elasticity of demand formula
 $|[(12-10) / 10] / [(4-6) / 6]| = |.2 / -.333| = |-0.6|$, $0.6 < 1$, so demand is inelastic

TOPIC 2.4

Price Elasticity
of Supply

SUGGESTED SKILL

 Manipulation

3.C

Determine the effect(s) of a change in an economic situation using quantitative data or calculations.

Required Course Content

ENDURING UNDERSTANDING

MKT-3

Individuals and firms respond to incentives and face constraints.

LEARNING OBJECTIVE

MKT-3.E

- Define measures of elasticity.
- Explain (using graphs where appropriate) measures of elasticity and the impact of a given price change on total revenue or total expenditure.
- Calculate (using data from a graph or a table as appropriate) measures of elasticity.

ESSENTIAL KNOWLEDGE

MKT-3.E.6

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.

MKT-3.E.7

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.

- 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.
- 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.
- 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.

MKT-3.E.8

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

A. Price elasticity of supply is the relative response of the quantity supplied to a change in price.

$$E_s = \% \text{ change in } Q_s / \% \text{ change in } P$$

The determinant of price elasticity of supply is the time available for the product to be produced and sold. If production is time-consuming, then price elasticity of supply is inelastic. If producers are able to respond quickly to price changes, then price elasticity of supply is elastic.

1. If $E_s > 1$, then supply is elastic. Example: plastic toys.
2. If $E_s < 1$, then supply is inelastic. Example: fine wine.
3. If $E_s = 0$, then supply is perfectly inelastic. Example: seating at a one night concert
4. If $E_s = \text{Undefined}$, then supply is perfectly elastic. Example: seawater and sunshine

1. Define:

Elastic supply

Inelastic supply

Price elasticity of supply

Refer to the following table for questions 2 - 5.

Price in \$	Quantity Supplied
5	45
4	45
3	45
2	35
1	20
0.50	5

- Using the price elasticity of supply formula, determine the elasticity of supply as the price increases from \$0.50 to \$1 (show your work).
- Using the price elasticity of supply formula, determine the elasticity of supply as the price increases from \$1 to \$2 (show your work).
- Using the price elasticity of supply formula, determine the elasticity of supply as the price increases from \$3 to \$4 (show your work).
- Plot the supply curve based on the supply schedule above, describe the slope of the supply curve between \$3.00 and \$5.00

1. Define

Elastic supply - the rate of change in quantity supplied > the rate of change in price

Inelastic supply - the rate of change in quantity supplied < the rate of change in price

Price elasticity of supply - sensitivity of quantity supplied to changes in price

Refer to the following table for questions 2 - 5.

Price in \$	Quantity Supplied
5	45
4	45
3	45
2	35
1	20
0.50	5

2. Using the price elasticity of supply formula, determine the elasticity of supply as the price increases from \$0.50 to \$1 (show your work). $E_s = \% \Delta Q_s / \% \Delta P$

$$E_s = [(20 - 5) / 5] / [(1 - 0.50) / 0.50] = 3 / 1 = 3, \text{ so supply is elastic}$$

3. Using the price elasticity of supply formula, determine the elasticity of supply as the price increases from \$1 to \$2 (show your work).

$$E_s = [(35 - 20) / 20] / [(2 - 1) / 1] = .75 / 1 = .75, \text{ so supply is inelastic}$$

4. Using the price elasticity of supply formula, determine the elasticity of supply as the price increases from \$3 to \$4 (show your work).

$$E_s = [(45 - 45) / 45] / [(4 - 3) / 3] = 0 / .333 = 0, \text{ so supply is PERFECTLY inelastic}$$

5. Plot the supply curve based on the supply schedule above, describe the slope of the supply curve between \$3.00 and \$5.00

SUGGESTED SKILL

 Manipulation

Determine the effect(s) of a change in an economic situation using quantitative data or calculations.

TOPIC 2.5

Other Elasticities

Required Course Content

ENDURING UNDERSTANDING

MKT-3

Individuals and firms respond to incentives and face constraints.

LEARNING OBJECTIVE

MKT-3.E

- Define measures of elasticity.
- Explain (using graphs where appropriate) measures of elasticity and the impact of a given price change on total revenue or total expenditure.
- Calculate (using data from a graph or a table as appropriate) measures of elasticity.

ESSENTIAL KNOWLEDGE

MKT-3.E.9

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

MKT-3.E.10

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.

MKT-3.E.11

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.

A. Income elasticity of demand measures the responsiveness of quantity demanded to a change in income and is what determines whether or not goods are normal or inferior.

Goods are normal if an increase in income results in increased demand for the good.

Goods are inferior if an increase in income results in decreased demand for the good.

$$E_i = \% \text{ change in } Q_d / \% \text{ change in income}$$

1. If $1 > E_i \geq 0$, then the good is a normal necessity.

2. If $E_i > 1$, then the good is a normal luxury

3. If $E_i < 0$, then the good is inferior.

B. Cross price elasticity of demand determines whether goods are complements or substitutes. It is the relative change in the quantity demanded of one good (x) in response to the change in price of a related good (y).

Substitutes can be used in lieu of another good or service, so when the price of a substitute increases, then demand for the other good increases as consumers switch over to the cheaper alternative.

Goods and services that are used in conjunction with each other are considered complements. When the price of one complement increases, then demand for the other complement decreases and vice versa.

$$E_{xy} = \% \text{ change in } Q_{dx} / \% \text{ Change in } P_y$$

1. If $E_{xy} = 0$, then the goods or services are unrelated

2. If $E_{xy} > 0$, then the good or service is a substitute.

3. If $E_{xy} < 0$, then the good or service is a complement.

-
1. Define the following:
 cross-price elasticity of demand

 income elasticity of demand
 2. If the price of apples increases, and as a result the demand for pears increase, then we can conclude that ceteris paribus apples and pears are
 - a. Complementary goods
 - b. Inferior goods
 - c. Normal goods
 - d. Substitute goods
 3. If the demand for ramen increases as income decreases, then ceteris paribus we can conclude that ramen is
 - a. A complementary good
 - b. An inferior good
 - c. A normal good
 - d. A substitute good
 4. Assume the quantity of electric bikes demanded increases from 100 to 125, when the price of gasoline increases from \$3.00 per gallon to \$4.00 per gallon. Calculate the cross-price elasticity of demand between electric bikes and gasoline and indicate whether they are complements or substitutes (show your work).
 5. Assume the quantity of electric bikes increases from 100 to 125 when income increases from \$50,000 to \$52,500. Calculate the income elasticity of demand for electric bikes and determine if they are a normal or inferior good (show your work).

1. Define the following:

cross-price elasticity of demand

%change in quantity demanded of good x / % change in price for good y. Determines whether goods are substitutes, complements, or unrelated

income elasticity of demand

%change in quantity demanded of good / % change in consumers' income. Determines whether goods are normal or inferior

2. If the price of apples increases, and as a result the demand for pears increase, then we can conclude that ceteris paribus apples and pears are

- ~~a. Complementary goods~~
- ~~b. Inferior goods~~
- ~~c. Normal goods~~
- d. Substitute goods

3. If the demand for ramen increases as income decreases, then ceteris paribus we can conclude that ramen is

- ~~a. A complementary good~~
- b. An inferior good
- ~~c. A normal good~~
- ~~d. A substitute good~~

4. Assume the quantity of electric bikes demanded increases from 100 to 125, when the price of gasoline increases from \$3.00 per gallon to \$4.00 per gallon. Calculate the cross-price elasticity of demand between electric bikes and gasoline and indicate whether they are complements or substitutes (show your work).

$$[(125 - 100) / 100] / [(\$4 - \$3) / \$3] = .25 / .33 = 25/33 > 0, \text{ so substitutes}$$

5. Assume the quantity of electric bikes increases from 100 to 125 when income increases from \$50,000 to \$52,500. Calculate the income elasticity of demand for electric bikes and determine if they are a normal or inferior good (show your work).

$$[(125 - 100) / 100] / [(\$52,500 - \$50,000) / \$50,000] = 25\% / 5\% = 5, \text{ so normal good}$$

6. Assume that a 2 percent increase in the price of bologna causes a 5 percent decrease in the quantity demanded of cheese. What is the cross-price elasticity of demand between these goods, and how are these goods related?
- (A) Cross-price elasticity of demand equals -0.4 , and these goods are complements.
 - (B) Cross-price elasticity of demand equals $+0.4$, and these goods are substitutes.
 - (C) Cross-price elasticity of demand equals -2.5 , and these goods are complements.
 - (D) Cross-price elasticity of demand equals $+2.5$, and these goods are substitutes.
 - (E) Cross-price elasticity of demand equals -0.4 , and these goods are substitutes.

TOPIC 2.6

Market Equilibrium and Consumer and Producer Surplus

SUGGESTED SKILL

 Interpretation

2.A

Using economic concepts, principles, or models, explain how a specific economic outcome occurs or what action should be taken in order to achieve a specific economic outcome.

Required Course Content

ENDURING UNDERSTANDING

MKT-4

Although equilibria are stable, an economy can move from one equilibrium to another if market conditions change.

LEARNING OBJECTIVE

MKT-4.A

- Define (using graphs as appropriate) market equilibrium, consumer surplus, and producer surplus.
- Explain (using graphs as appropriate) how equilibrium price, quantity, consumer surplus, and producer surplus for a good or service are determined.
- Calculate (using data from a graph or table as appropriate) areas of consumer surplus and producer surplus at equilibrium.

ESSENTIAL KNOWLEDGE

MKT-4.A.1

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.

MKT-4.A.2

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.

MKT-4.A.3

Equilibrium price provides information to economic decision-makers to guide resource allocation.

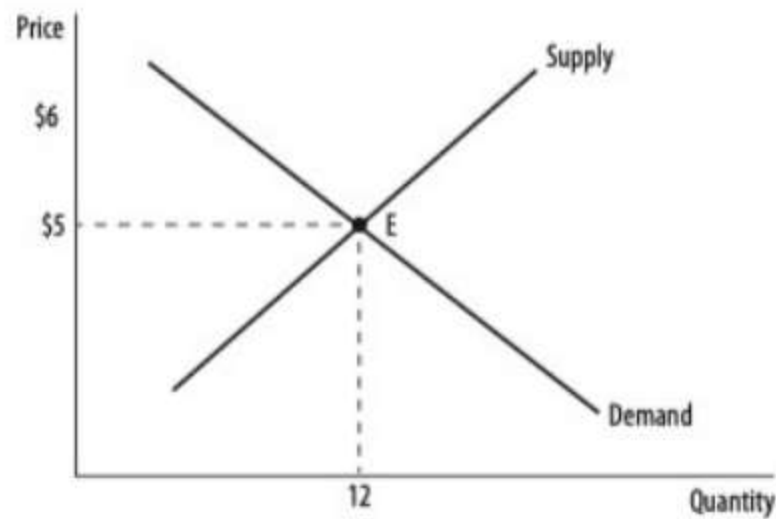
MKT-4.A.4

Economists use consumer surplus and producer surplus to measure the benefits markets create to buyers and sellers and understand market efficiency.

MKT-4.A.5

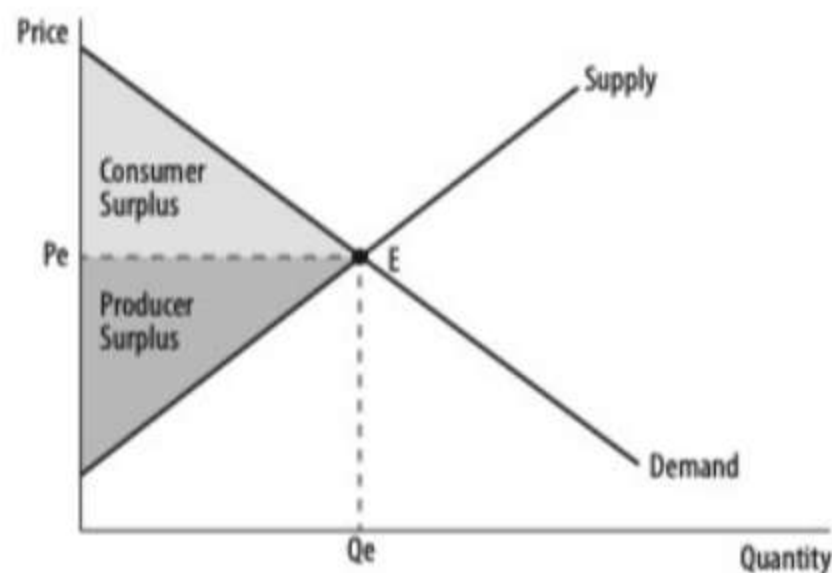
Market equilibrium maximizes total economic surplus in the absence of market failures, meaning that perfectly competitive markets are efficient.

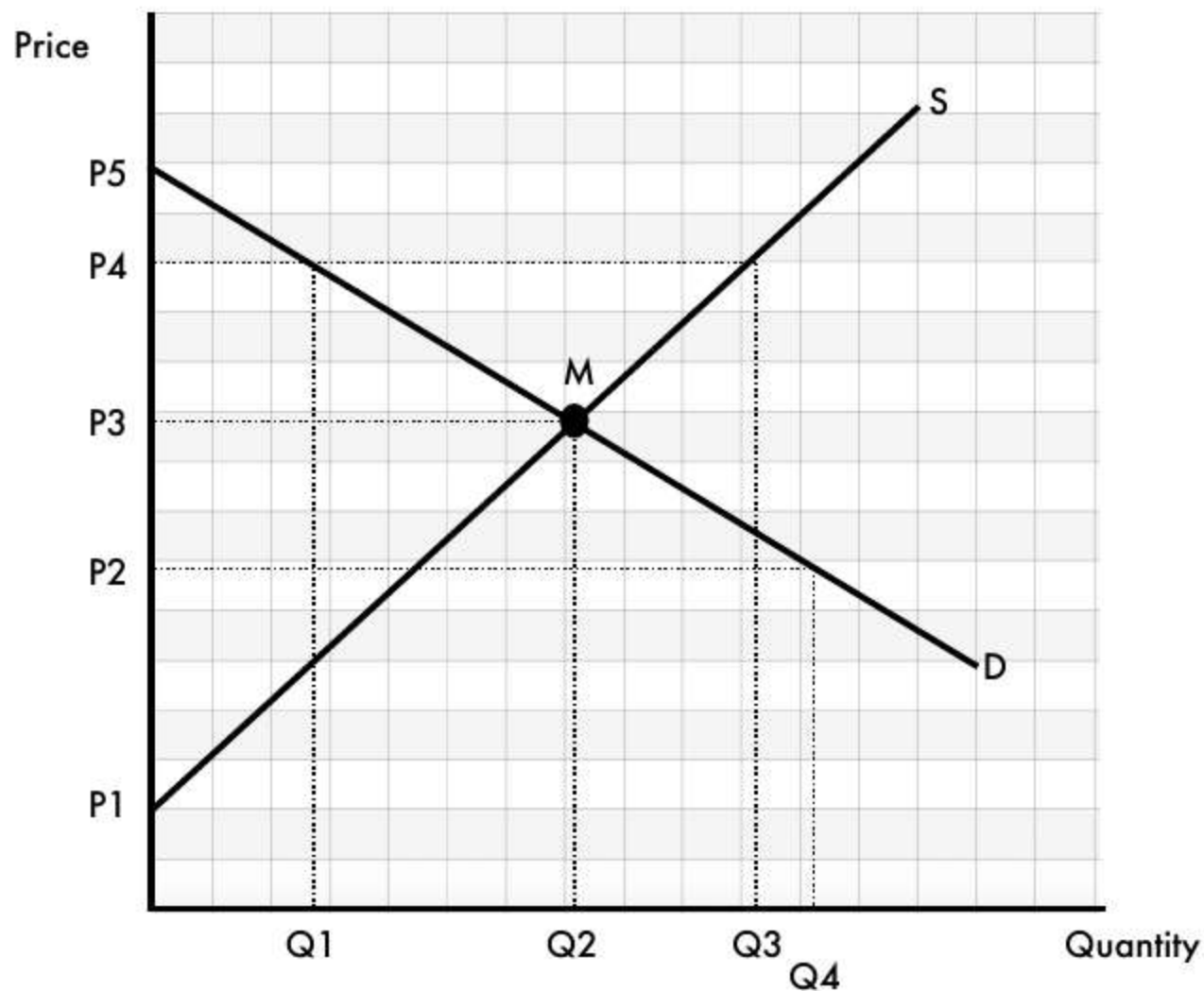
- A. The market is in equilibrium at the point (E) where supply and demand intersect—where quantity supplied equals quantity demanded. Equilibrium is the unique price-quantity combination at which the market “clears,” meaning there is no surplus or shortage.



B. Consumer and Producer Surplus

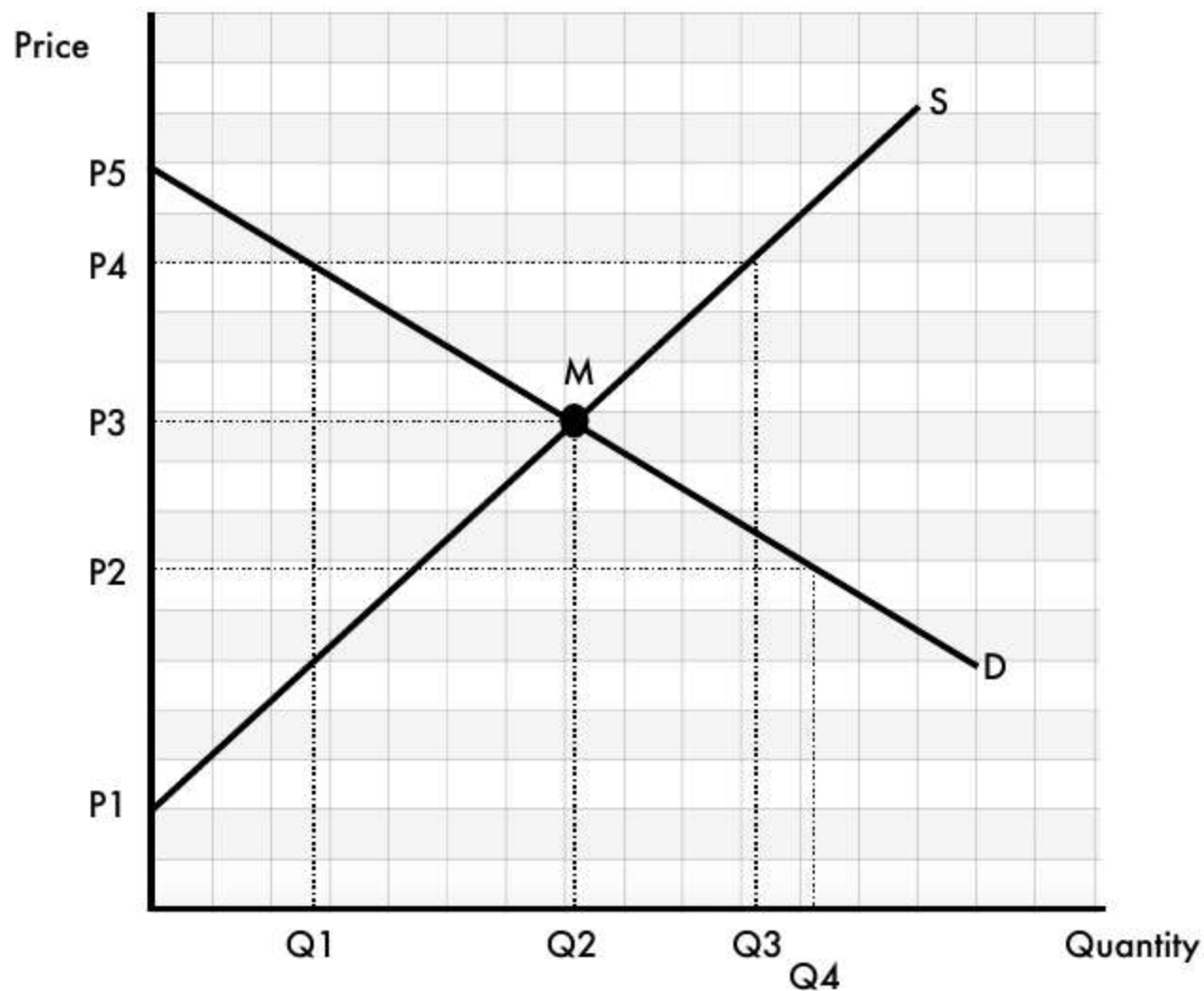
1. Consumer surplus is the difference between the price a consumer is willing to pay and the prevailing market price. Consumer surplus can always be found below the demand curve, above the price paid and to the left of quantity purchased.
2. Producer surplus is the difference between the price a producer is willing to accept and the prevailing market price. Producer surplus can always be found above the supply (or marginal cost) curve, below the price received, and to the left of quantity sold.
3. Total economic surplus, the sum of consumer and producer surpluses, is maximized at the equilibrium price and quantity.





Refer to the supply and demand diagram above:

1. Identify the market equilibrium price
2. Identify the market equilibrium quantity
3. Identify the area of total surplus when the market is in equilibrium
4. Identify the area of consumer surplus when the market is in equilibrium
5. Identify the area of producer surplus when the market is in equilibrium



Refer to the supply and demand diagram above:

1. Identify the market equilibrium price - $P3$
2. Identify the market equilibrium quantity - $Q2$
3. Identify the area of total surplus when the market is in equilibrium - $\Delta P1, M, P5$
4. Identify the area of consumer surplus when the market is in equilibrium - $\Delta P3, M, P5$
5. Identify the area of producer surplus when the market is in equilibrium - $\Delta P1, M, P3$

SUGGESTED SKILL

 Manipulation

3.A

Determine the outcome of an economic situation using economic concepts, principles, or models.



AVAILABLE RESOURCES

- External Resource > [Davidson Next AP Macroeconomics Course—Supply & Demand](#)
- Classroom Resources > [Markets—Lesson: A Comparison of Graphs from Microeconomics and Macroeconomics](#)

TOPIC 2.7

Market Disequilibrium and Changes in Equilibrium

Required Course Content

ENDURING UNDERSTANDING

MKT-4

Although equilibria are stable, an economy can move from one equilibrium to another if market conditions change.

LEARNING OBJECTIVE

MKT-4.B

- Define a surplus and shortage.
- Explain (using graphs where appropriate) how changes in underlying conditions and shocks to a competitive market can alter price, quantity, consumer surplus, and producer surplus.
- Calculate (using data from a graph or table as appropriate) changes in price, quantity, consumer surplus, and producer surplus in response to changes in market conditions or market disequilibrium.

ESSENTIAL KNOWLEDGE

MKT-4.B.1

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

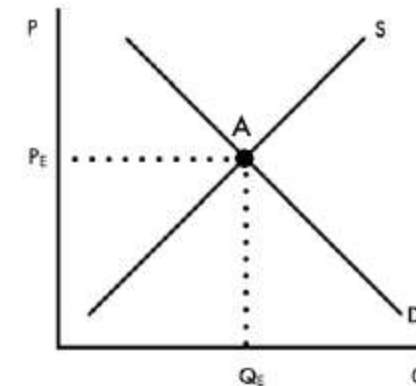
MKT-4.B.2

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.

Topic 2.7 Market Disequilibrium, and Changes in Equilibrium

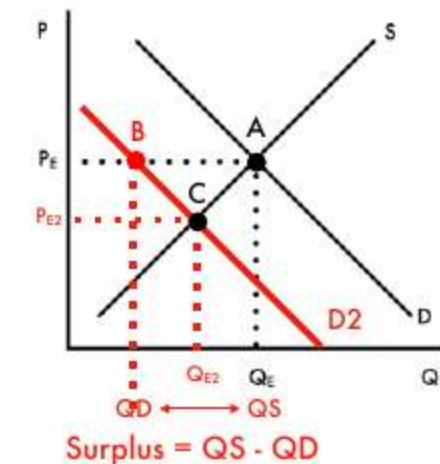
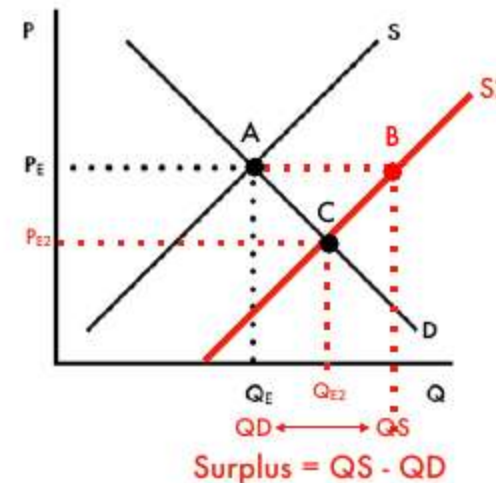
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Market Equilibrium - the condition where the quantity supplied equals the quantity demanded at the equilibrium quantity (Q_E) and the equilibrium price (P_E). Market equilibrium results when supply (S) equals/intersects demand (D). The equilibrium price (P_E) is often referred to as the market clearing price because there is neither too much (surplus) or too little (shortage) of a good or service.



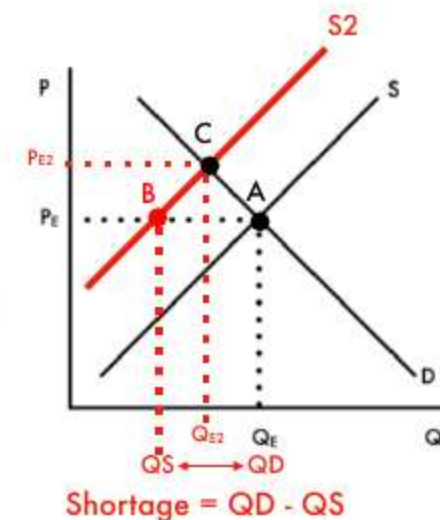
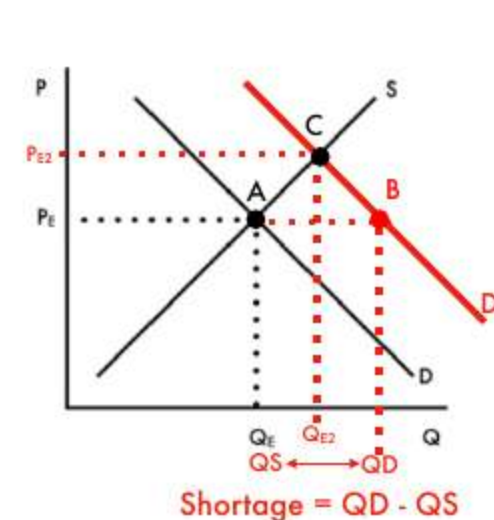
Surplus/Excess Supply - the disequilibrium condition where the quantity demanded (Q_D) is less than the quantity supplied (Q_S) at the current price (P_E). Temporary surpluses result from either increased supply (S to S_2) or decreased demand (D to D_2). Market forces resolve temporary surpluses as consumers willingly accept lower prices and demand more in response to producers discounting prices until the market clears at a new equilibrium quantity (Q_{E2}) and a new equilibrium price (P_{E2}). Permanent surpluses result when the price of a good or service is held at a level higher than the market equilibrium price by law/regulation (price floor).

A = Initial Equilibrium, B = Supply or Demand change while price remains unchanged resulting in temporary surplus, C = New equilibrium after market forces lower the price to a new market clearing price.

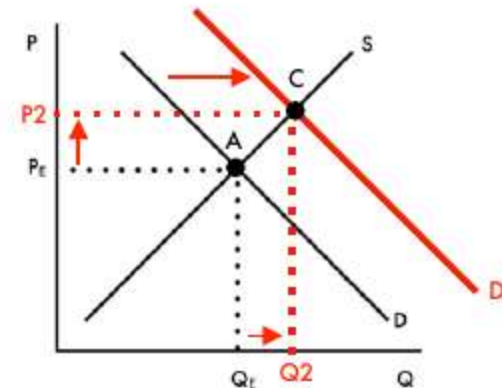


Shortage/Excess Demand - the disequilibrium condition where the quantity supplied (Q_S) is less than the quantity demanded (Q_D) at the current price (P_E). Temporary shortages exist as a result of either increased demand (D to D_2) or decreased supply (S to S_2). Market forces resolve temporary shortages as consumers bid up the price they are willing to pay and producers respond by supplying more until the market clears at a new equilibrium quantity (Q_{E2}) and a new equilibrium price (P_{E2}). Permanent shortages result when the price of a good or service is held at a lower level than the market equilibrium price by law/regulation (price ceiling).

A = Initial Equilibrium, B = Supply or Demand change while price remains unchanged resulting in temporary shortage, C = New equilibrium after market forces increase the price to a new market clearing price.

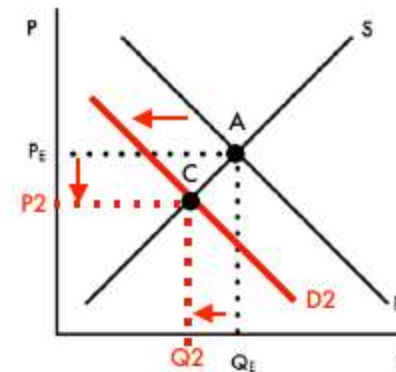


Change in Equilibrium from
Increased Demand (A to C)



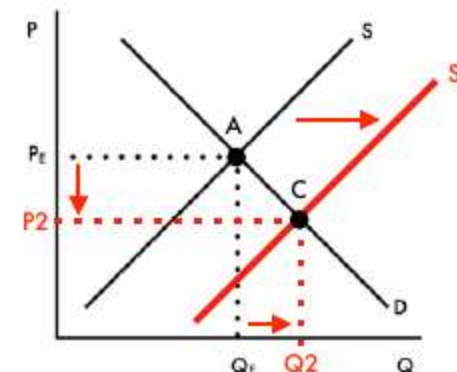
Demand increases (D to D2),
so price increases (P_E to P_2)
and quantity increases (Q_E to Q_2).

Change in Equilibrium from
Decreased Demand (A to C)



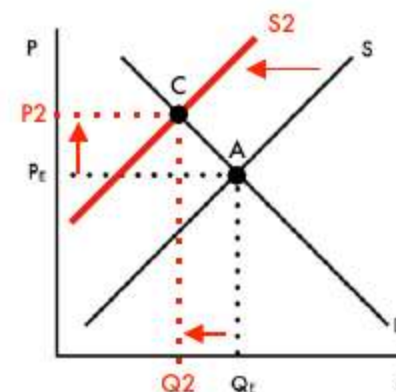
Demand decreases (D to D2),
so price decreases (P_E to P_2)
and quantity decreases (Q_E to Q_2).

Change in Equilibrium from
Increased Supply (A to C)



Supply increases (S to S2),
so price decreases (P_E to P_2)
and quantity increases (Q_E to Q_2).

Change in Equilibrium from
Decreased Supply (A to C)



Supply decreases (S to S2),
so price increases (P_E to P_2)
and quantity decreases (Q_E to Q_2).

	Supply Increase	Supply Decrease
Demand Increase	P: ? / Q: increases	P: Increases / Q: ?
Demand Decrease	P: decreases / Q: ?	P: ? / Q decreases

1. Microprocessors are a necessary component for most consumer, commercial, and industrial electronics. Assume the market for microprocessors is perfectly competitive.

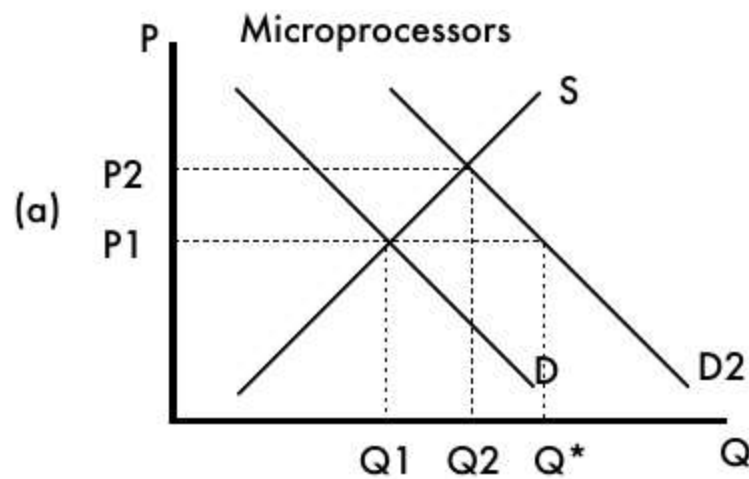
- (a) Draw a correctly labeled supply and demand graph of the market for microprocessors in equilibrium. Label the initial price as P_1 and the initial quantity as Q_1 .
- (b) Assume that microprocessors are a necessary component of robots. Illustrate on your graph how an unexpected increase in the demand for household robots will immediately affect the market for microprocessors. Label the new quantity Q^* .
- (c) Calculate the amount of short-term shortage (excess demand) or surplus (excess supply) in the market and indicate whether it is a shortage or a surplus.
- (d) Explain how market forces will allow the market for microprocessors to reach a new equilibrium.
- (e) Identify the new equilibrium on the graph. Label the new equilibrium price P_2 and the new equilibrium quantity Q_2 .

2. Assume the market for shares of a corporate stock is competitive.

- (a) Draw a correctly labeled supply and demand graph of the market for the corporation's stock in equilibrium. Label the initial price as P_1 and the initial quantity as Q_1 .
- (b) Assume that large brokerage firms decide to sell their holdings of the corporation's stock because of unexpected cash withdrawals while demand for the stock remains unaffected. Show the effect of this decision on the market for the corporation's stock and label the new quantity Q^* .
- (c) Calculate the amount of short-term shortage (excess demand) or surplus (excess supply) in the market and indicate whether it is a shortage or a surplus.
- (d) Explain how market forces will allow the market for the corporation's stock to reach a new equilibrium.
- (e) Identify the new equilibrium on the graph. Label the new equilibrium price P_2 and the new equilibrium quantity Q_2 .

1. Microprocessors are a necessary component for most consumer, commercial, and industrial electronics. Assume the market for microprocessors is perfectly competitive.

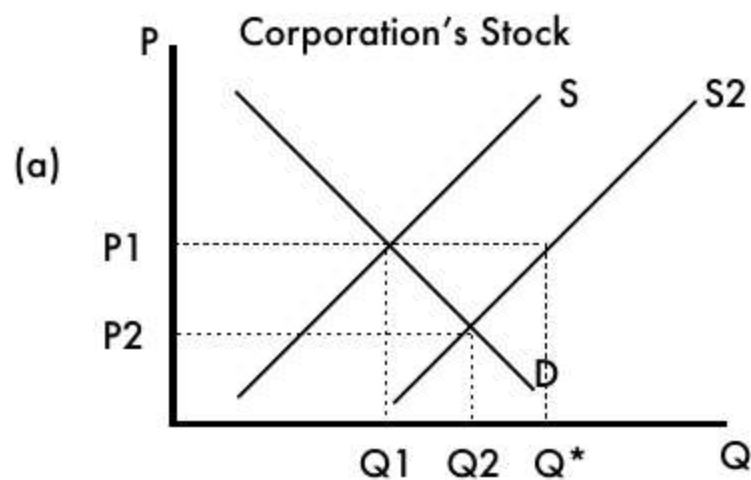
- (a) Draw a correctly labeled supply and demand graph of the market for microprocessors in equilibrium. Label the initial price as P_1 and the initial quantity as Q_1 .
- (b) Assume that microprocessors are a necessary component of robots. Illustrate on your graph how an unexpected increase in the demand for household robots will immediately affect the market for microprocessors. Label the new quantity Q^* .
- (c) Calculate the amount of short-term shortage or surplus in the market and indicate whether it is a shortage or a surplus.
- (d) Explain how market forces will allow the market for microprocessors to reach a new equilibrium.
- (e) Identify the new equilibrium on the graph. Label the new equilibrium price P_2 and the new equilibrium quantity Q_2 .



- (b) see D to D2 at P_1 and Q^* on graph above
- (c) $\text{shortage} = Q^* - Q_1$
- (d) robot manufacturers will compete with each other and offer a higher price to purchase microprocessors, and, in response, microprocessor producers will produce and offer to sell more until the market clears at the new equilibrium price P_2 where $S = D_2$.
- (e) see equilibrium at Q_2, P_2 .

2. Assume the market for shares of a corporate stock is competitive.

- (a) Draw a correctly labeled supply and demand graph of the market for the corporation's stock in equilibrium. Label the initial price as P_1 and the initial quantity as Q_1 .
- (b) Assume that large brokerage firms decide to sell their holdings of the corporation's stock because of unexpected cash withdrawals while demand for the stock remains unaffected. Show the effect of this decision on the market for the corporation's stock and label the new quantity Q^* .
- (c) Calculate the amount of short-term shortage or surplus in the market and indicate whether it is a shortage or a surplus.
- (d) Explain how market forces will allow the market for the corporation's stock to reach a new equilibrium.
- (e) Identify the new equilibrium on the graph. Label the new equilibrium price P_2 and the new equilibrium quantity Q_2 .



(b) see S to S_2 at P_1 and Q^* on graph above

(c) surplus = $Q^* - Q_1$

(d) shareholders will lower the price they are willing to accept for shares of the corporation's stock, and investors will respond by purchasing more shares of the stock until the market clears at the new equilibrium price P_2 where $S_2 = D$.

(e) see equilibrium at Q_2, P_2 .

3. Which of the following occurs if the price of oranges is below the equilibrium price?
- (A) There is a surplus of oranges.
 - (B) The quantity supplied of oranges is greater than the quantity demanded.
 - (C) The quantity supplied of oranges is greater than the quantity sold.
 - (D) The quantity purchased of oranges is greater than the quantity sold.
 - (E) The quantity demanded of oranges is greater than the quantity supplied.

3. In the local market for Good X, there are four individual buyers: Emily, Wu, Omar, and Fernanda. The quantities that each individual buyer would be willing and able to purchase at different prices are included in the table provided.

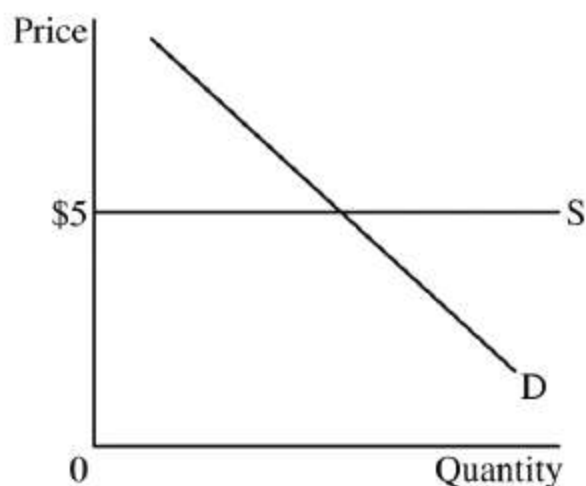
	Quantity of Good X			
Price	Emily	Wu	Omar	Fernanda
\$1	5	4	4	3
\$2	4	3	4	3
\$3	4	3	3	2
\$4	3	2	3	2
\$5	3	2	2	1
\$6	2	1	2	1
\$7	2	1	1	0
\$8	1	0	1	0

- (a) The local market for Good X has a perfectly elastic supply. Draw a correctly labeled graph for the local market for Good X with a market equilibrium price of \$5. Label the equilibrium price as \$5, and label the equilibrium quantity for the market with a specific value based on the data provided in the table.
- (b) Assume the cost of production increases, which causes the price of Good X to increase from \$5 to \$7.
- Calculate the price elasticity of demand for Good X as the price increases from \$5 to \$7. Show your work.
 - Identify whether the demand for Good X is elastic, inelastic, or unit elastic in that range of prices.
- (c) Could Emily's marginal benefit for the second unit of Good X equal \$4.50 ? Explain.

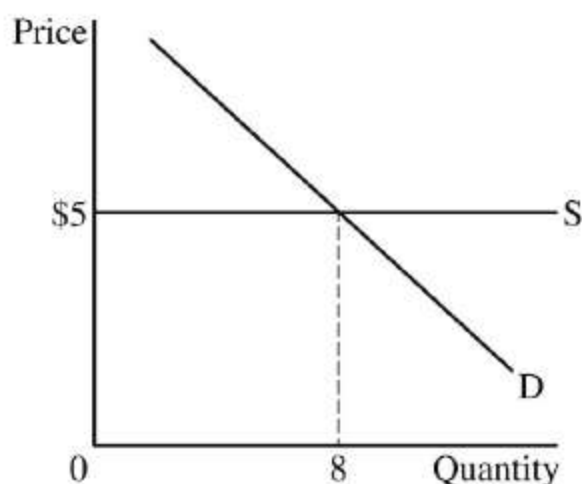
Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

Question 3: Short**5 points**

- (a) Draw a correctly labeled graph of the market with a downward-sloping demand (D) curve and a perfectly elastic supply (S) curve at a price of \$5. **1 point**



For the second point, the graph must show the equilibrium quantity as 8 units. **1 point**

**Total for part (a) 2 points**

- (b) (i) Calculate the magnitude of the price elasticity of demand as 1.25 and show your work. **1 point**

$$\text{Price Elasticity of Demand} = \frac{\text{Percentage Change in Quantity Demanded}}{\text{Percentage Change in Price}}$$

$$= \frac{\left| \left(\frac{4 - 8}{8} \right) \times 100 \right|}{\left| \left(\frac{7 - 5}{5} \right) \times 100 \right|} = \frac{50\%}{40\%} = 1.25$$

OR

$$= \frac{\left(\frac{4 - 8}{8} \right) \times 100}{\left(\frac{7 - 5}{5} \right) \times 100} = \frac{-50\%}{40\%} = -1.25$$

- (ii) State that demand is elastic. **1 point**

Total for part (b) 2 points

-
- | | | |
|------------|--|----------------|
| (c) | State no and explain that Emily's marginal benefit should be greater than or equal to the price she is willing to pay (\$7) for the second unit. | 1 point |
|------------|--|----------------|
-

Total for question 3 5 points

TOPIC 2.8

The Effects of Government Intervention in Markets

SUGGESTED SKILL

 *Graphing and Visuals*

4.C

Demonstrate the effect of a change in an economic situation on an accurately labeled graph or visual.

Required Course Content

ENDURING UNDERSTANDING

POL-1

Government policies influence consumer and producer behavior and therefore affect market outcomes.

LEARNING OBJECTIVE

POL-1.A

- Define forms of government price and quantity intervention.
- Explain (using graphs where appropriate) how government policies alter consumer and producer behaviors that influence incentives and therefore affect outcomes.
- Calculate (using data from a graph or table where appropriate) changes in market outcomes resulting from government policies.

ESSENTIAL KNOWLEDGE

POL-1.A.1

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.

POL-1.A.2

Governments use taxes and subsidies to change incentives in ways that influence consumer and producer behavior, shifting the supply and demand curves accordingly.

POL-1.A.3

Taxes and subsidies affect government revenues or costs.

POL-1.A.4

Government intervention in a market producing the efficient quantity through taxes, subsidies, price controls, or quantity controls can only decrease allocative efficiency.

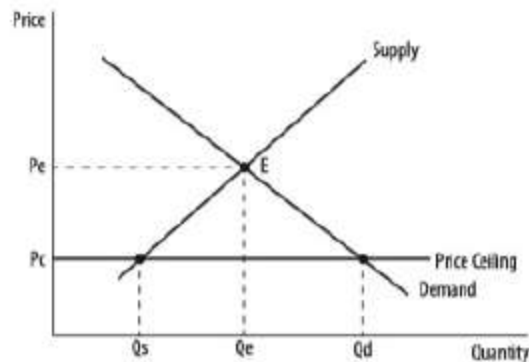
POL-1.A.5

Deadweight loss represents the losses to buyers and sellers as a result of government intervention in an efficient market.

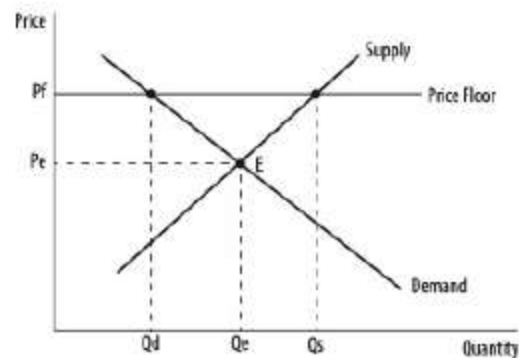
POL-1.A.6

The incidence of taxes and subsidies imposed on goods traded in perfectly competitive markets depends on the elasticity of supply and demand.

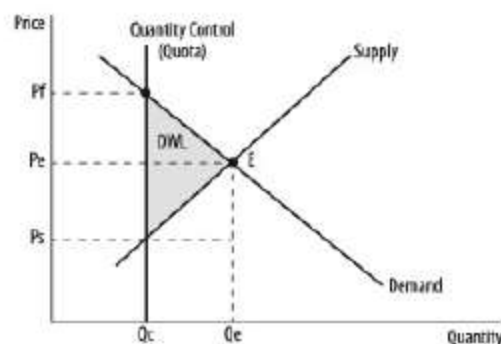
- A. Sometimes governments may decide that market prices are unfair—that the market produces too much or that markets do not allocate goods and services to those desperately in need. When this is the case, governments may put price or quantity controls on the market.
- B. If a government believes that a market price is too high, then it may put a price ceiling on a good or service. A price ceiling is a maximum price that producers and consumers are not allowed to exceed. If a price ceiling is effective, then it results in a shortage equal to $Q_d - Q_s$.



- C. If a government believes that the market equilibrium price for a good is too low, it may put a price floor on a good or service. A price floor is a minimum price that producers and consumers are not allowed to undermine. If a price floor is effective, then it results in a surplus equal to $Q_s - Q_d$.

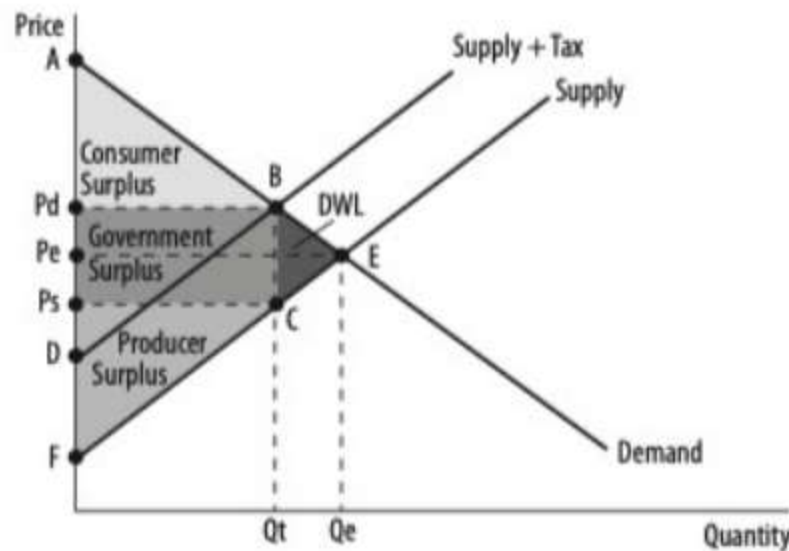


- D. A quota is a quantity limit. A quota is effective if it limits the quantity supplied to an amount less than the market equilibrium quantity. An effective quota results in less quantity supplied in the market at a higher price than the market equilibrium.



Deadweight Loss occurs whenever the market is not in equilibrium. Deadweight loss is the sum of producer and consumer surplus that could have been achieved had the equilibrium price and quantity prevailed in the market.

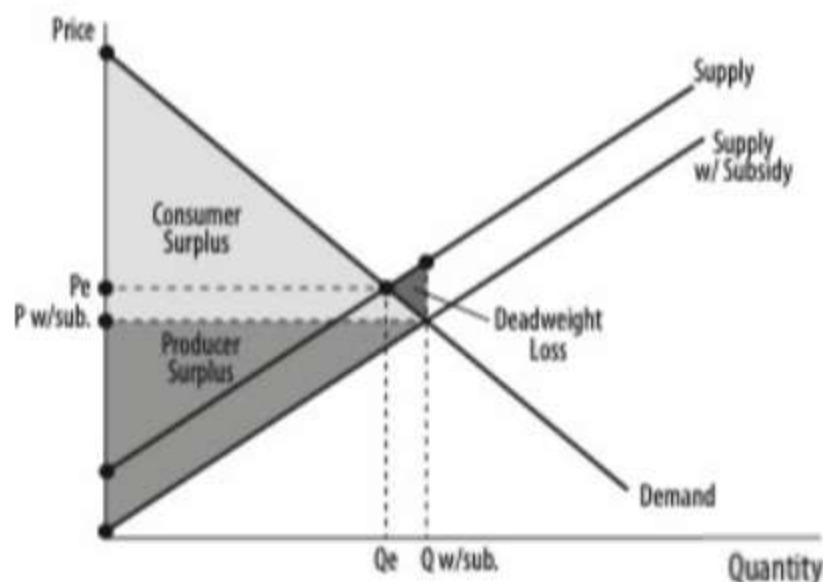
1. Governments use taxes to collect revenue and also as a way to reduce the quantity of a good or service in the market. Below, the effect of an excise tax, or per unit tax on production, on total surplus is shown. P_s is the price suppliers earn, P_d is the price that buyers pay. The difference between them reflects the amount of the excise tax. The area labeled government surplus represents the tax revenue generated by the excise tax. DWL is the area of deadweight loss created by the tax

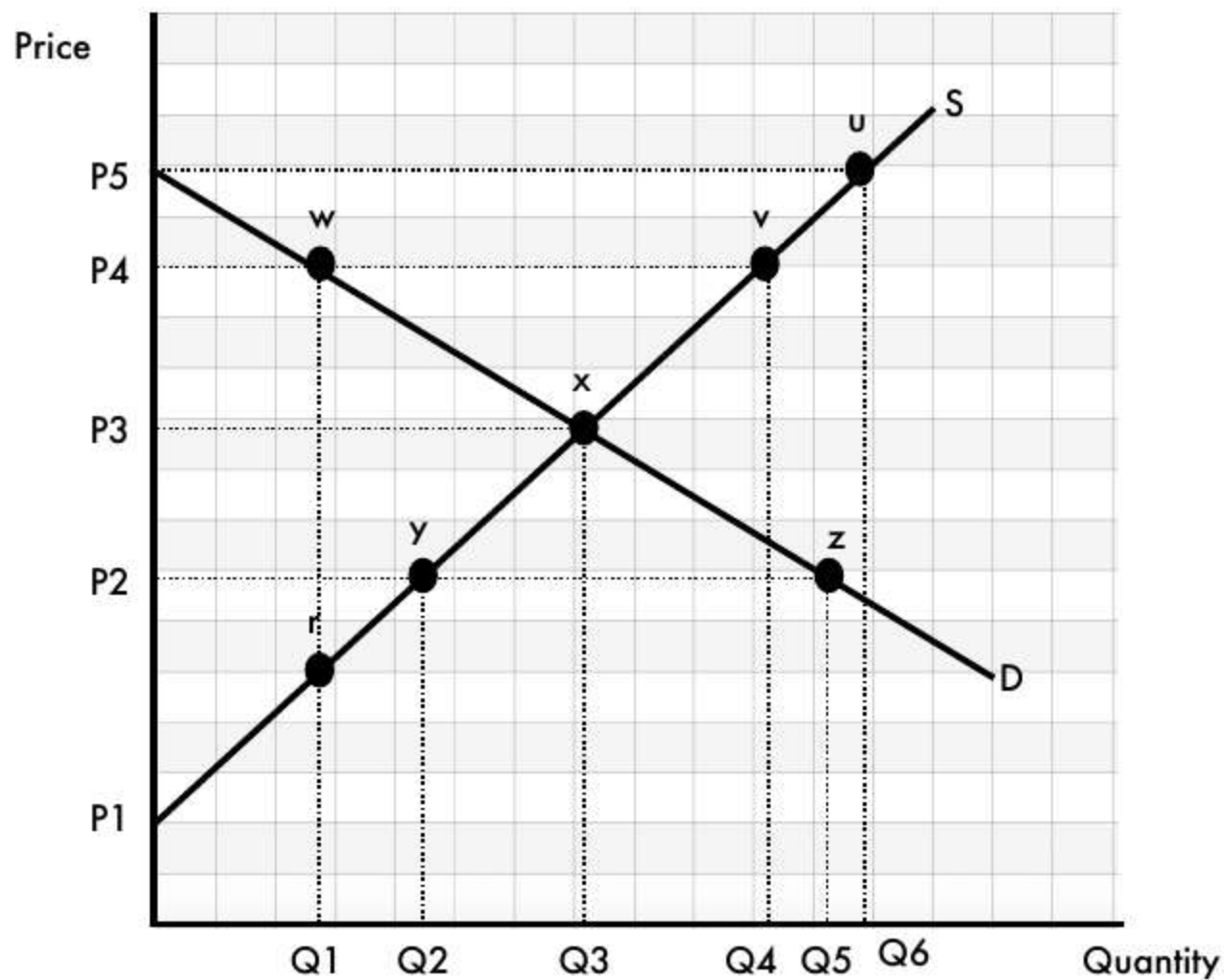


- E. The incidence of a tax, or tax burden, is the percentage of the tax consumers have to pay as a higher price relative to the price before the tax. Tax incidence is dependent on the price elasticity of demand and/or the price elasticity of supply for the good or service being taxed.

There is an inverse relationship between the price elasticities of demand and supply and the tax incidence on consumers. As price elasticity of demand or supply increases from perfectly inelastic to perfectly elastic, the incidence of tax on consumers decreases from 100% to 0%, so when the elasticities are relatively inelastic, consumers pay more of the tax and conversely producers pay less. But, when the elasticities of supply or demand are relatively more elastic, consumers pay less of the tax incidence while producers pay more.

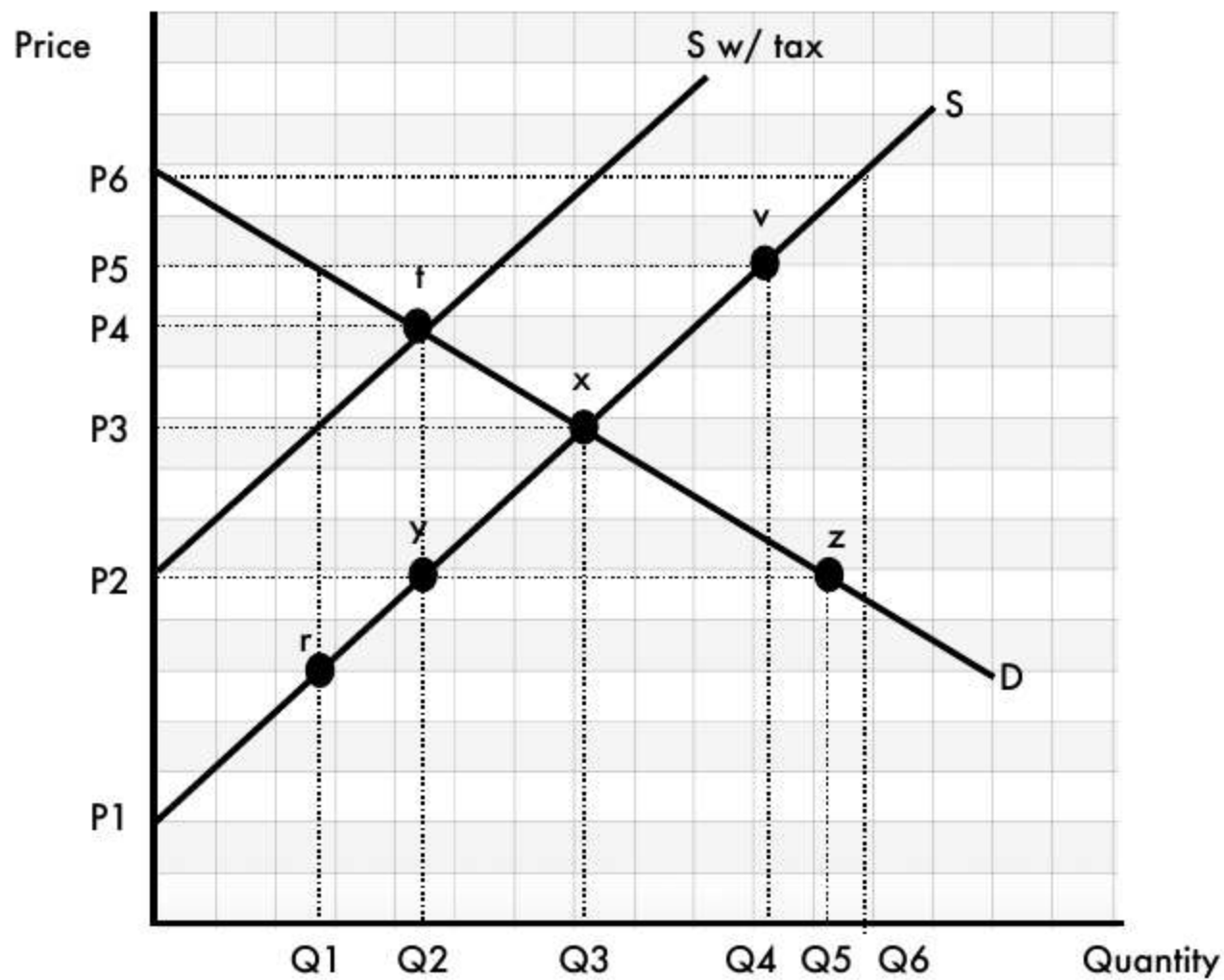
- F. When governments want to encourage producers to produce more of a good or service, then they may offer a per unit subsidy. A per unit subsidy offsets some of the marginal cost of production and results in an increase in supply in the market.





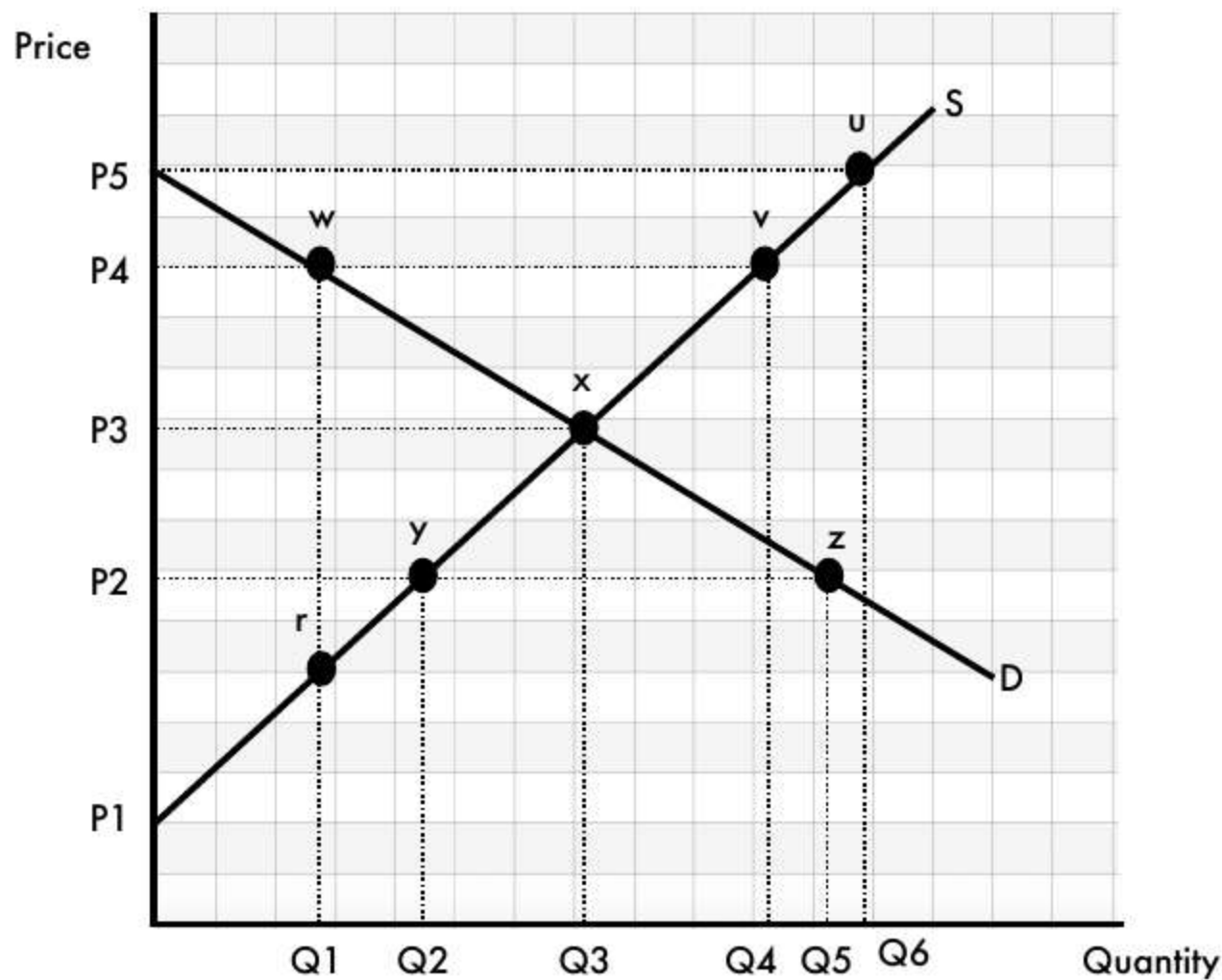
Refer to the supply and demand diagram above:

1. Identify the domestic market equilibrium price AND equilibrium quantity
2. Assume P4 is an effective price floor. Will the price floor result in a surplus or shortage? Calculate the amount of surplus or shortage.
3. Given a price floor of P4, identify the area of consumer surplus
4. Given the price floor or P4, identify the area of producer surplus
5. Identify the area of deadweight loss from price floor P4.



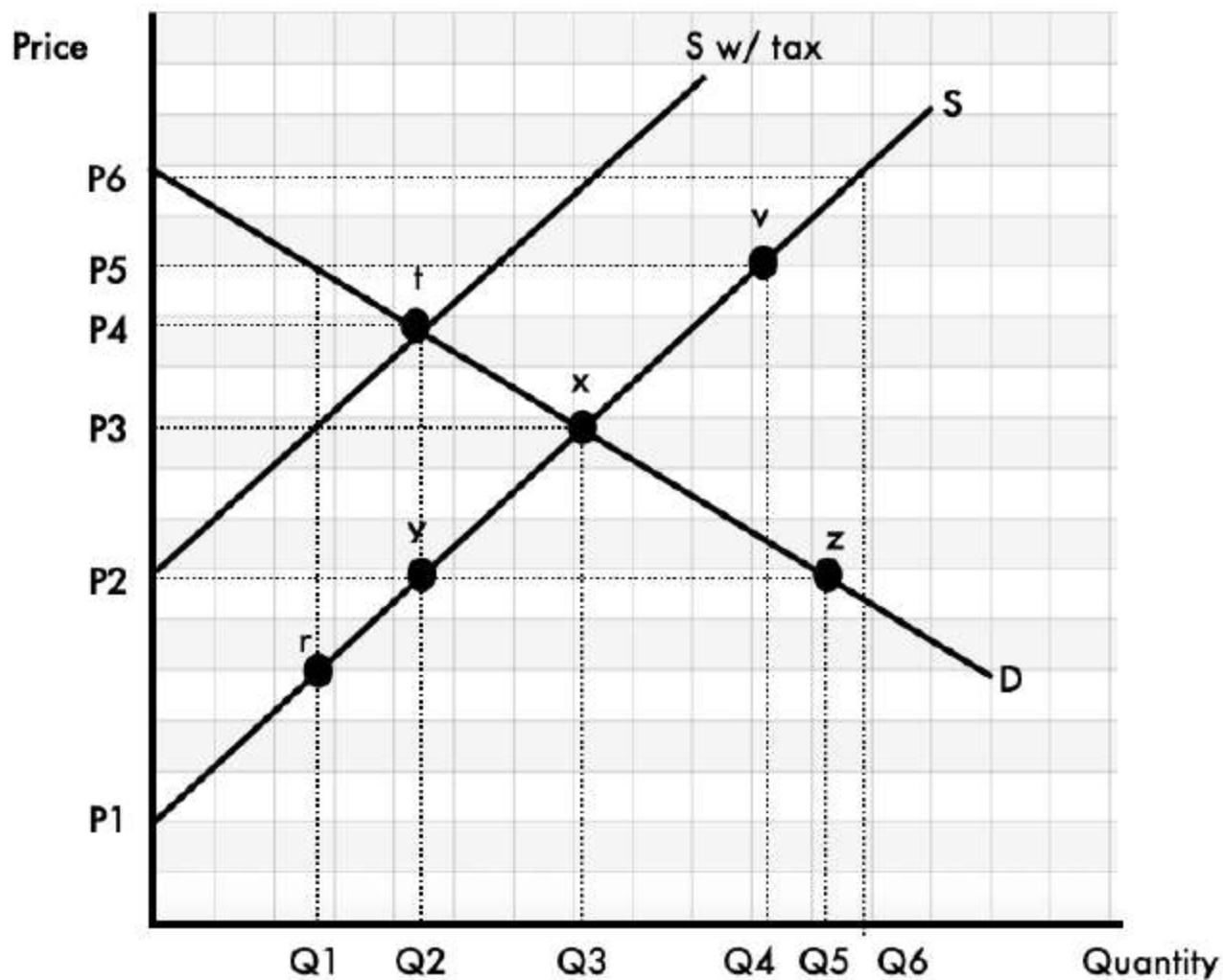
Refer to the supply and demand diagram above. The government has placed a per unit tax on producers in the market:

6. Identify consumer surplus before the tax
7. Identify producer surplus after the tax
8. Identify the per unit value of the tax
9. Identify government revenue from the tax
10. Identify the area of deadweight loss from the tax



Refer to the supply and demand diagram above:

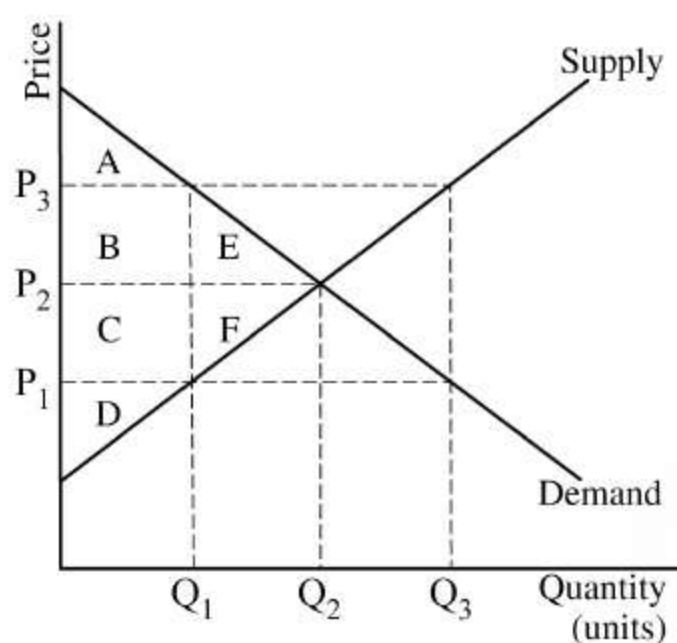
1. Identify the domestic market equilibrium price AND equilibrium quantity
P3, Q3
2. Assume P4 is an effective price floor. Will the price floor result in a surplus or shortage?
Calculate the amount of surplus or shortage.
Surplus, Q4 - Q1
3. Given a price floor of P4, identify the area of consumer surplus
 $\Delta P5, w, P4$
4. Given the price floor or P4, identify the area of producer surplus
trapezoid P1, r, w, P4
5. Identify the area of deadweight loss from the price floor at P4.
 $\Delta w, r, x$



Refer to the supply and demand diagram above. The government has placed a per unit tax on producers in the market:

6. Identify consumer surplus before the tax
 $\Delta P6, x, P3$
7. Identify producer surplus after the tax
 $\Delta P2, y, P1$
8. Identify the per unit value of the tax
 $P2 - P1$
9. Identify government revenue from the tax
rectangle $P4, t, y, P2$
10. Identify the area of deadweight loss from the tax
 $\Delta t, x, y$

Questions 4 and 5 refer to the graph below.



4. Total economic surplus will be maximized at which of the following price and quantity combinations?
- (A) P_3 and Q_3
 (B) P_3 and Q_1
 (C) P_2 and Q_2
 (D) P_1 and Q_1
 (E) P_1 and Q_3
5. Suppose the government sets a price floor at P_3 in the market. The resulting consumer surplus, producer surplus, and deadweight loss will be which of the following?

(A)

Consumer Surplus	Producer Surplus	Deadweight Loss
B + E	C + F	A + B

(B)

Consumer Surplus	Producer Surplus	Deadweight Loss
A + B	C + D	E + F

(C)

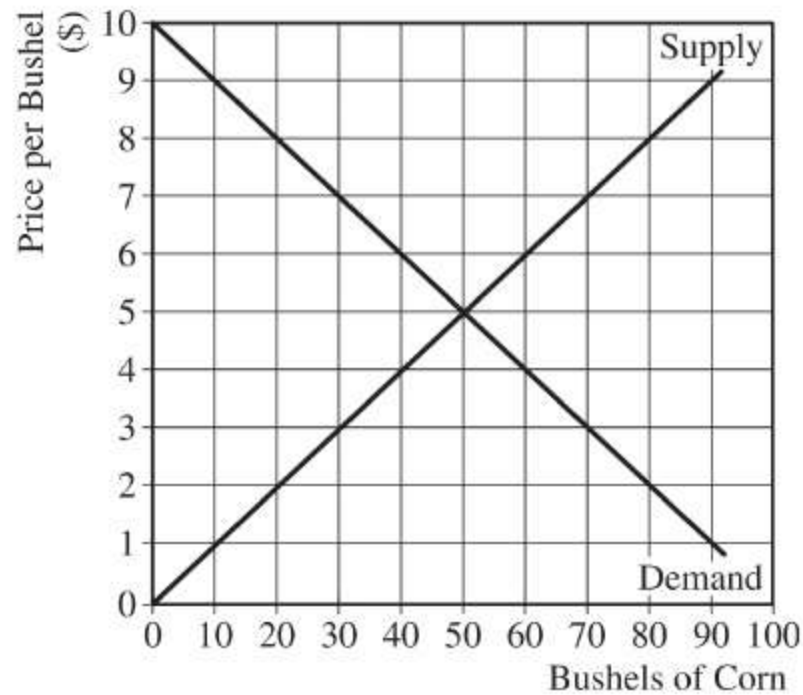
Consumer Surplus	Producer Surplus	Deadweight Loss
A	C + D + F	E

(D)

Consumer Surplus	Producer Surplus	Deadweight Loss
A + B + E	C + D + F	0

(E)

Consumer Surplus	Producer Surplus	Deadweight Loss
A	B + C + D	E + F



3. The diagram above shows the market for corn in the country of Microland. Corn is produced and sold in a constant-cost, perfectly competitive market.
- (a) Calculate the total revenue earned by corn farmers at the market equilibrium price. Show your work.
- (b) In an attempt to assist corn farmers in Microland, the government sets a \$7 price floor on corn.
- How many bushels of corn will be exchanged at the price floor?
 - Calculate the deadweight loss associated with the price floor. Show your work.
 - Assume the government agrees to buy the unsold quantity at \$7. Calculate the producer surplus. Show your work.
 - Assume the price floor and the government buying program remain in effect. In addition, assume the demand for corn does not change. In the long run, will the quantity of corn purchased by the government increase, decrease, or remain the same? Explain.

Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

Question 3: Short**5 points**

-
- (a) Calculate the total revenue at the market price as \$250 and show your work. **1 point**

$$\text{Total Revenue} = (P \times Q) = (\$5 \times 50) = \$250$$

-
- (b) (i) State that the quantity exchanged at the price floor will be 30 bushels. **1 point**

-
- (ii) Calculate the deadweight loss as \$40 and show your work. **1 point**

$$\text{Deadweight loss} = \frac{(\$7 - \$3) \times (50 - 30)}{2} = \frac{\$80}{2} = \$40$$

-
- (iii) Calculate the producer surplus as \$245 and show your work. **1 point**

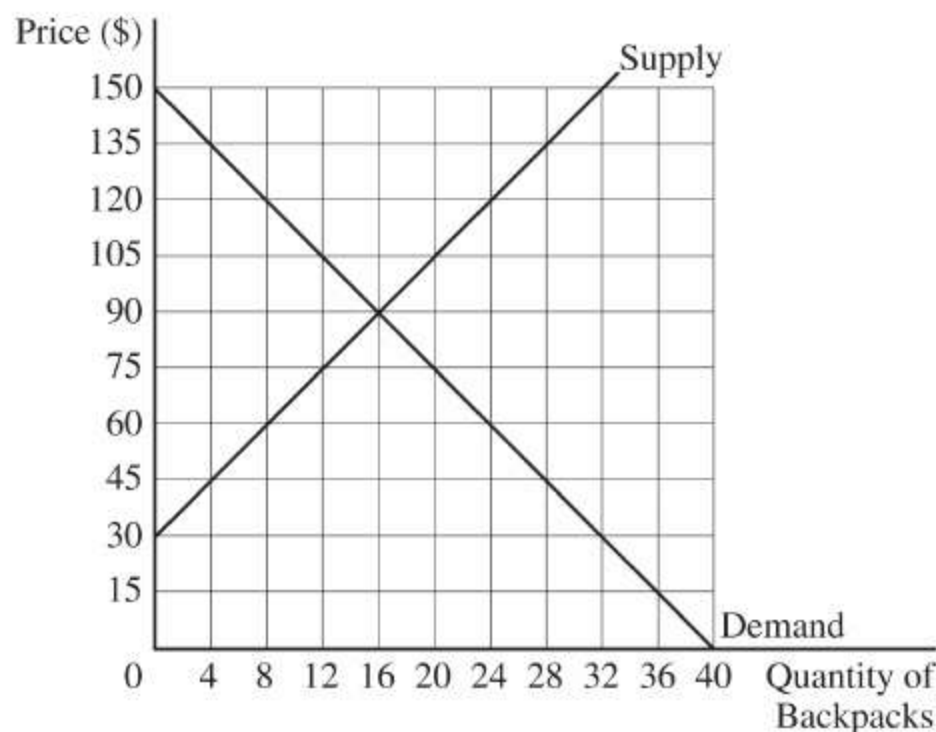
$$\text{Producer surplus} = \frac{(\$7 - \$0) \times (70 - 0)}{2} = \frac{\$490}{2} = \$245$$

-
- (iv) State that the quantity of corn purchased by the government will increase and explain that this happens because the price floor leads to short-run economic profits for typical firms, which incentivize new firms to enter the market, leading to an increase in the market supply of corn and/or because the market supply becomes more elastic in the long run. **1 point**

Total for part (b) 4 points

Total for question 3 5 points

3. Backpacks are produced in a perfectly competitive market that has no externalities. The provided graph shows the market supply and demand curves for backpacks in the country of Jambo.



- (a) Calculate total economic surplus at the market equilibrium. Show your work.
- (b) To decrease the price of backpacks for students, the government of Jambo has decided to set a price ceiling of \$60 per backpack. Compared to the market equilibrium, will the quantity of backpacks purchased increase, decrease, or not change as a result of the price ceiling? Explain.
- (c) Suppose instead the government of Jambo provides a per-unit subsidy of \$30 to the sellers of backpacks.
- Identify the price paid by consumers per backpack after the per-unit subsidy is implemented.
 - Calculate the total cost of the subsidy to the government. Show your work.
 - Does the per-unit subsidy cause deadweight loss to increase, decrease, or remain the same compared to the market equilibrium in part (a)? Explain.

Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

Question 3: Short**5 points**

- (a) Calculate the total economic surplus as \$960 and show the work. **1 point**

$$\text{Total Economic Surplus} = \frac{1}{2} \times (\$150 - \$30) \times (16 - 0) = \frac{1}{2} \times \$120 \times 16 = \$960$$

- (b) State that the quantity of backpacks purchased will decrease and explain that the price ceiling causes a decrease in the quantity supplied of backpacks and the quantity purchased in the market will be limited by the quantity supplied (8), which is less than the equilibrium quantity (16). **1 point**

- (c) (i) State the price consumers pay per backpack after the per-unit subsidy is \$75. **1 point**

- (ii) Calculate the total cost of the subsidy to the government as \$600 and show the work. **1 point**

$$\text{Total Cost of Subsidy to the Government} = \text{Per-unit Subsidy} \times \text{Quantity of Backpacks}$$

$$\text{Total Cost of Subsidy to the Government} = \$30 \times 20 = \$600$$

- (iii) State the deadweight loss will increase and explain with **ONE** of the following. **1 point**

- The per-unit subsidy causes the new equilibrium quantity (20 backpacks) to be greater than the allocatively efficient quantity (16 backpacks).
- The per-unit subsidy causes the marginal cost (\$105) to be greater than the marginal benefit (\$75) at the new equilibrium quantity (20 backpacks).

Total for part (c) 3 points

Total for question 3 5 points

SUGGESTED SKILL

 *Graphing and Visuals*

4.C

Demonstrate the effect of a change in an economic situation on an accurately labeled graph or visual.



AVAILABLE RESOURCES

- Classroom Resources >
 - [International Economics and the AP Microeconomics Course](#)
 - [International Economics](#)

TOPIC 2.9

International Trade and Public Policy

Required Course Content

ENDURING UNDERSTANDING

POL-1

Government policies influence consumer and producer behavior and therefore affect market outcomes.

LEARNING OBJECTIVE

POL-1.B

- a. Define tariffs and quotas.
- b. Explain (using graphs where appropriate) how markets are affected by public policy related to international trade.
- c. Calculate (using data from a graph or table as appropriate) changes in market outcomes resulting from public policy related to international trade.

ESSENTIAL KNOWLEDGE

POL-1.B.1

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.

POL-1.B.2

Tariffs, which governments sometimes use to influence international trade, affect domestic price, quantity, government revenue, and consumer surplus and total economic surplus.

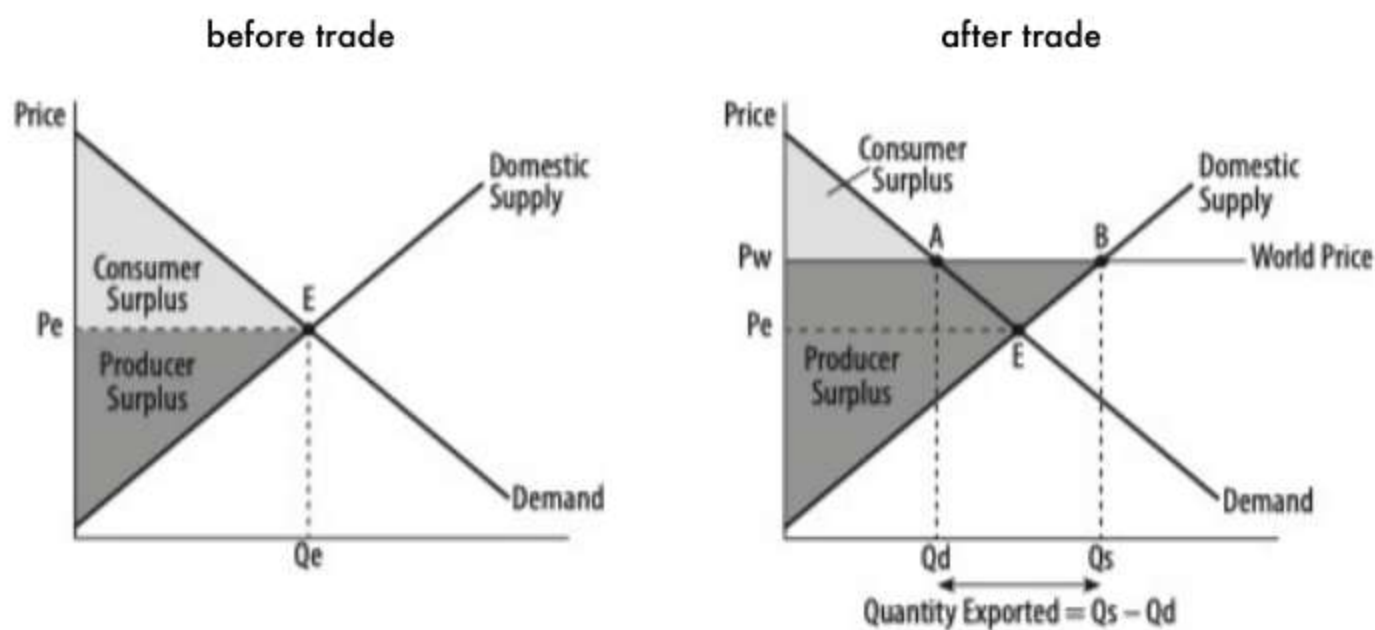
POL-1.B.3

Quotas can be used to alter quantities produced and therefore affect price, consumer surplus, and total economic surplus.

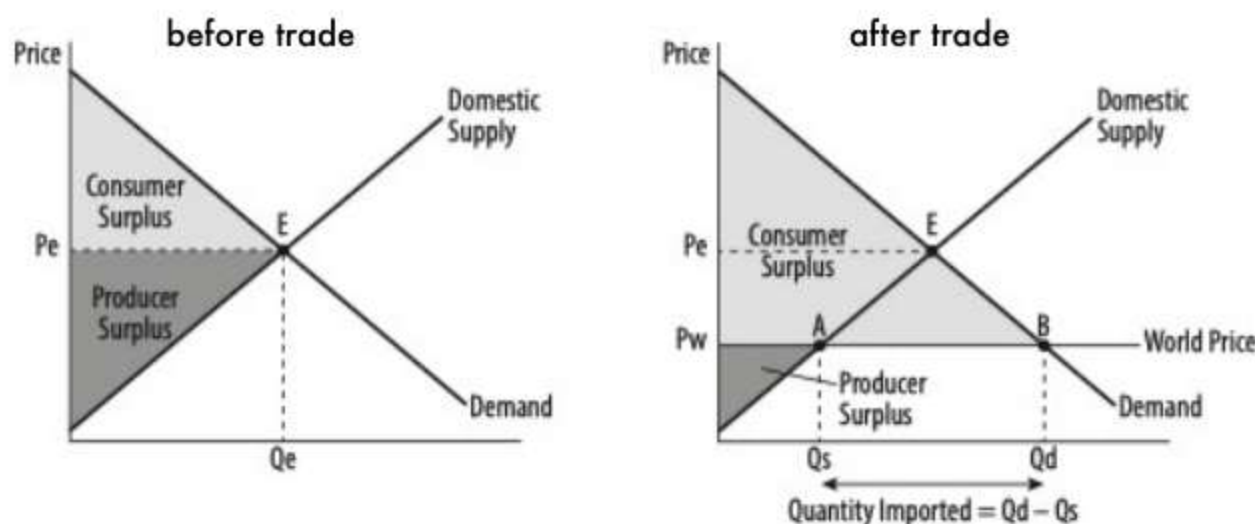
✖ Exclusion:

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.

- A. When a country is open to international trade, the goods and services being either produced or consumed in the country can also be produced or consumed in other countries as well. Based on the world price of a good as determined in the worldwide market for that good, the presence of international trade may result in exports and imports.
1. Exports are goods produced domestically that are then sold outside of the country. When a domestic firm sells its good outside of the country it is called exporting.
 2. If the world price for a good (P_w) is higher than the domestic price (P_e), then producers have an incentive to export. The quantity exported at the world price equals the quantity supplied minus the quantity demanded in the domestic market. The result of exports is an increase in domestic producer surplus and a decrease in domestic consumer surplus.

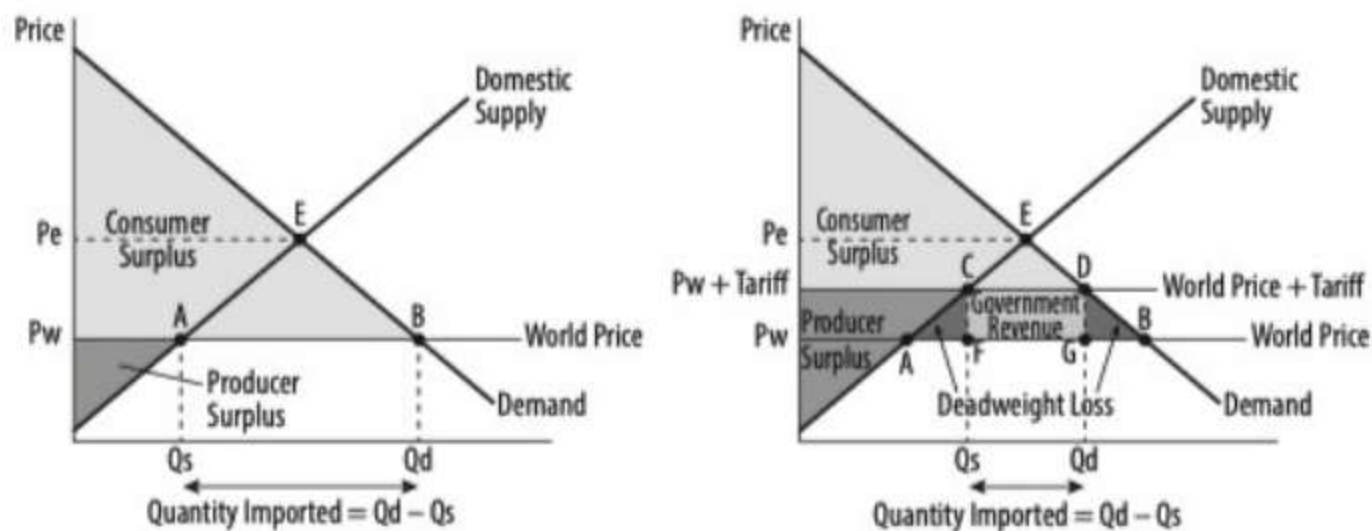


3. Imports are goods produced outside of the country that are then sold domestically. When consumers purchase goods produced outside of the country it is called importing.
4. If the world price for a good (P_w) is lower than the domestic price (P_e), then consumers have an incentive to import. The quantity imported equals the quantity demanded minus the quantity being supplied domestically. The result of imports is an increase in domestic consumer surplus and a decrease in domestic producer surplus.

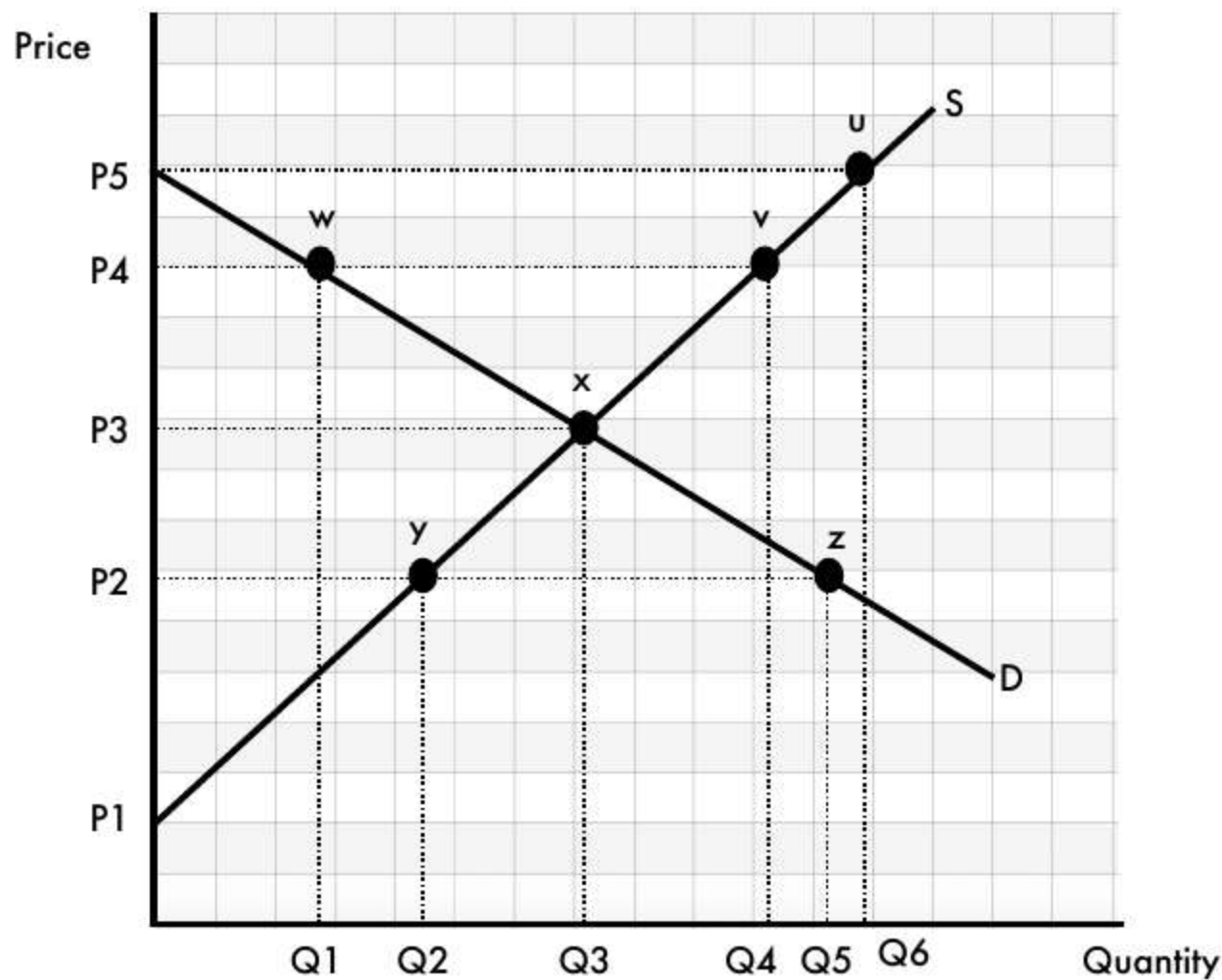


B. When a government either wants to limit competition from outside of the country and/or collect additional tax revenue, it may place a tariff, a tax on trade, on either the good or goods from other countries.

1. The result of the tariff is a loss of consumer surplus equal to the trapezoid $P_w + \text{Tariff}$, D, B, P_w . The tariff results in an increase of producer surplus equal to the trapezoid $P_w + \text{Tariff}$, C, A, P_w . The tariff generates government revenue or government surplus equal to the rectangle C, D, G, F. Finally, the tariff creates deadweight loss equal to the areas of triangle A, C, F plus triangle D, B, G.

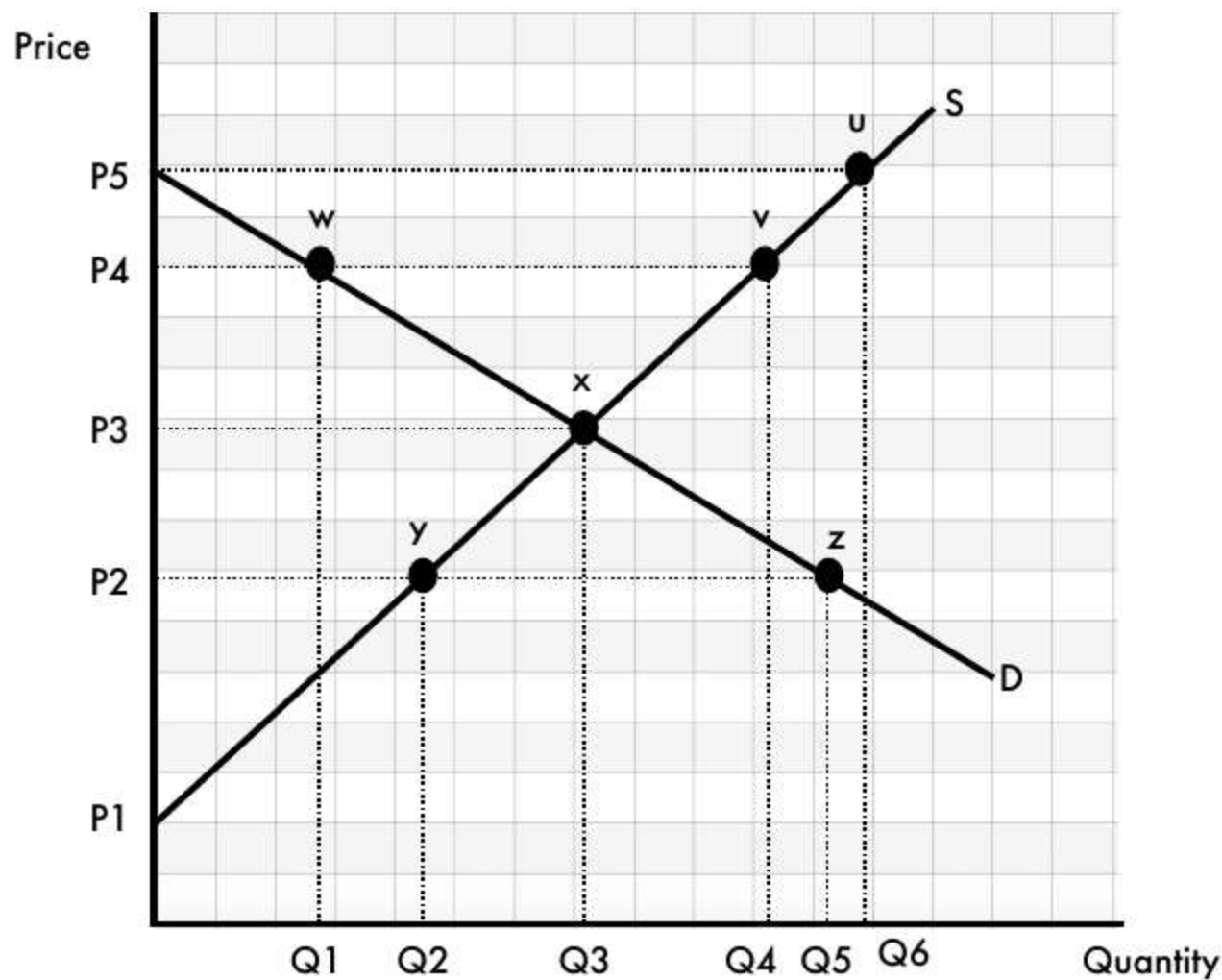


C. When a government wants to limit the amount of a good being imported from outside of the country, it may put a quantity control, such as a quota, in place. The effect of import quotas on the market is to raise the price consumers pay and to increase the quantity of domestic production relative to foreign production in the market.



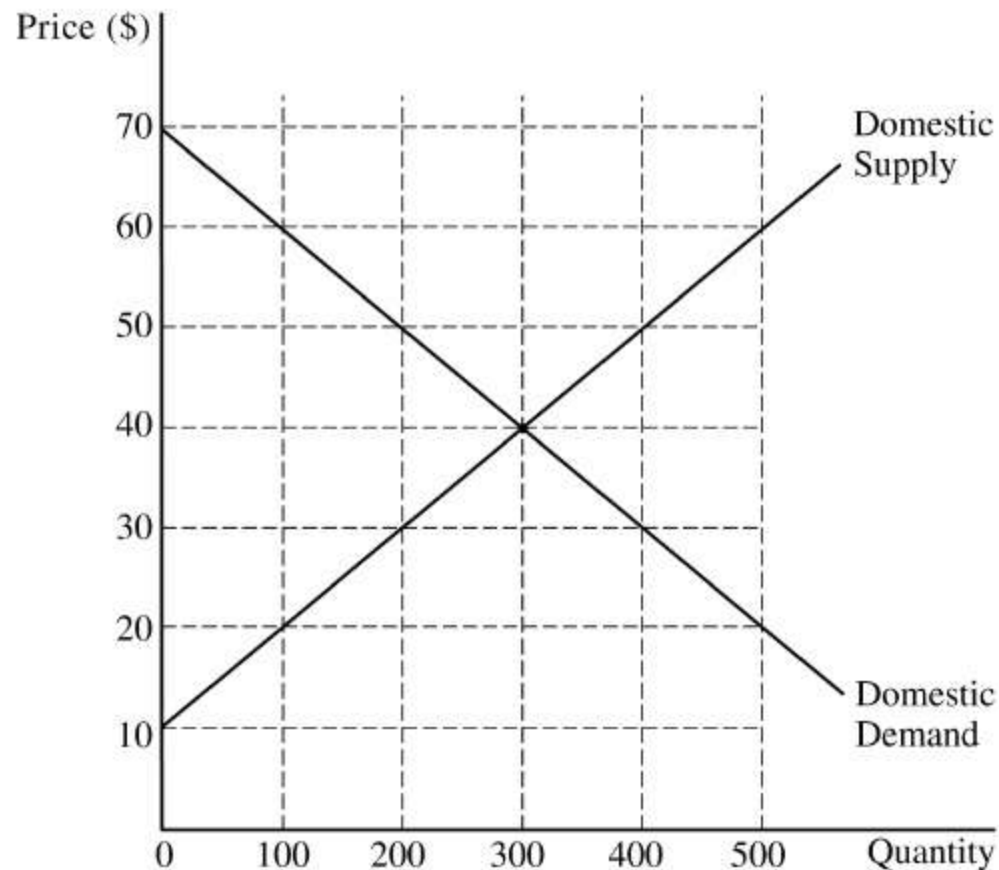
Refer to the supply and demand diagram above:

1. Identify the domestic market equilibrium price AND equilibrium quantity
2. Assume the world price is P2, compared to the domestic equilibrium price, will the domestic economy import or export the good? Calculate the quantity of imports or exports.
3. Assume the world price is P2, identify the area of consumer surplus
4. Assume the world price is P2, identify the area of producer surplus
5. Compared to producer surplus before world trade, is producer surplus with trade greater than or less than before? Explain.



Refer to the supply and demand diagram above:

1. Identify the domestic market equilibrium price AND equilibrium quantity
 $P3, Q3$
2. Assume the world price is $P2$, compared to the domestic equilibrium price, will the domestic economy import or export the good? Calculate the quantity of imports or exports.
Import, $Q5 - Q2$
3. Assume the world price is $P2$, identify the area of consumer surplus
 $\Delta P5, z, P2$
4. Assume the world price is $P2$, identify the area of producer surplus
 $\Delta P2, y, P1$
5. Compared to producer surplus before world trade, is producer surplus with trade greater than or less than before? Explain.
Less than before... producer surplus before trade was $\Delta P3, x, P1$, but after trade producer surplus decreased to $\Delta P2, y, P1$



2. The graph provided depicts New Zealand's domestic supply and demand for wool.
- (a) Calculate the consumer surplus if New Zealand does not trade with the rest of the world. Show your work.
- (b) Instead, assume New Zealand decides to trade wool in the world market. The current world price of wool is \$60 per unit, and New Zealand is a price taker in the world market.
- (i) How many units of wool will New Zealand export?
 - (ii) What will happen to the consumer surplus of wool consumers in New Zealand when New Zealand begins to trade with the rest of the world? Explain.
 - (iii) Will total economic surplus in New Zealand increase, decrease, or remain unchanged when New Zealand begins to trade wool in the world market? Explain using numbers.
- (c) Now assume domestic demand in New Zealand increases. Will New Zealand's exports increase, decrease, or stay the same?

Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

Question 2: Short**5 points**

- (a) Calculate the consumer surplus in New Zealand before trade as \$4,500 and show your work. **1 point**

$$\text{Consumer Surplus} = \frac{1}{2} \times 300 \times (\$70 - \$40) = \frac{1}{2} \times 300 \times \$30 = \frac{\$9,000}{2} = \$4,500$$

- (b) (i) State that New Zealand will export 400 units of wool. **1 point**

- (ii) State that consumer surplus in New Zealand will decrease and explain with **ONE** of the following: **1 point**

- The domestic price will increase to the world price, which decreases the domestic quantity demanded of wool.
- The consumer surplus decreased from \$4,500 before trade to \$500 after trade.

- (iii) State that total economic surplus in New Zealand will increase by \$4,000 and explain that producer surplus will increase by \$8,000 while consumer surplus will decrease by \$4,000, resulting in an increase in total economic surplus. **1 point**

Total for part (b) 3 points

- (c) State that New Zealand's exports will decrease. **1 point**

Total for question 2 5 points