

AP MICRO FRQ 2.5-2.9 ANSWERS

2. Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. If the question prompts you to "Calculate," you must show how you arrived at your final answer.

The table below shows the marginal benefit, in dollars, that Ahmet derives from consuming two goods, books and Good D.

Quantity of Books	Marginal Benefit of Books	Quantity of Good D	Marginal Benefit of Good D
1	\$28	1	\$32
2	\$16	2	\$16
3	\$4	3	\$8
4	\$2	4	\$4
5	\$1	5	\$2
6	\$0	6	\$1

Ahmet has a limited weekly income of 18, and he spends it all on books and Good D. Assume the price of each book is 4 and the price of Good D is \$1 per unit.

- (a) Calculate the total consumer surplus from books if Ahmet buys 5 books. Show your work.
- (b) Given his weekly income, would Ahmet be able to buy 3 books and 2 units of Good D? Explain using numbers.
- (c) Identify the quantity of books and the quantity of Good D that will maximize Ahmet's total benefit given his weekly income. Explain using marginal analysis.
- (d) Assume books are produced in a perfectly competitive market and that there is an increase in the number of buyers in the market for books.
- (i) Would Ahmet's total consumer surplus from books if he buys 5 books increase, decrease, or stay the same compared to your answer in part (a)? Explain.
- (ii) Will the quantity of books that will maximize Ahmet's total benefit increase, decrease, or stay the same? Explain.

Respond to all parts of the question.

(a) Calculate the total consumer surplus from books if Ahmad buys 5 books.

Consumer surplus:

$$\text{CS} = \text{Total Benefit} - \text{Total Amount Paid}$$

The marginal benefits of the first 5 books are:

$$\$28 + \$16 + \$4 + \$2 + \$1 = \$51$$

Ahmad pays \$4 per book:

$$5 \times \$4 = \$20$$

Therefore:

$$\text{CS} = \$51 - \$20 = \$31$$

✓ Answer: \$31

Easy way to remember:

Consumer surplus is the **extra value the consumer gets above what they actually pay.**

(b) Could Ahmad buy 3 books and 2 units of Good D?

Books:

$$3 \times \$4 = \$12$$

Good D:

$$2 \times \$1 = \$2$$

Total cost:

$$\$12 + \$2 = \$14$$

Ahmad has \$18 of income.

Since:

$$\$14 \leq \$18$$

✔ Yes, Ahmad can afford them.

He would have:

$$\$18 - \$14 = \$4 \text{ left over.}$$

(c) What combination maximizes Ahmad's total benefit?

We want Ahmad to spend his limited **\$18** where he gets the **most marginal benefit per dollar**.

Marginal benefit per dollar

Good	MB/P
Book 1	$\$28 \div \$4 = 7$
Book 2	$\$16 \div \$4 = 4$
Book 3	$\$4 \div \$4 = 1$
Good D 1	$\$32 \div \$1 = 32$
Good D 2	$\$16 \div \$1 = 16$
Good D 3	$\$8 \div \$1 = 8$
Good D 4	$\$4 \div \$1 = 4$
Good D 5	$\$2 \div \$1 = 2$
Good D 6	$\$1 \div \$1 = 1$

Ahmad should buy the units with the **highest MB per dollar first**.

With his \$18:

- 6 units of Good D cost **\$6**
- 3 books cost **\$12**

Total:

$$\$6 + \$12 = \$18$$

So:

✔ **3 books and 6 units of Good D**

Why?

At this combination:

- 3rd book: $MB/P = 1$
- 6th unit of D: $MB/P = 1$

The marginal benefit per dollar is equal.

This is the consumer equilibrium rule:

MB/P should be equal for the last unit of each good purchased.

(d)(i) What happens to Ahmad's consumer surplus from books if the number of buyers increases?

In a perfectly competitive market, an increase in the number of buyers causes **demand to increase**.

Demand shifts **right** → equilibrium **price increases**.

Therefore, Ahmad must pay a **higher price for books**.

His willingness to pay has not changed, but his price has increased.

✔ **Consumer surplus decreases.**

Simple explanation:

Higher price → smaller consumer surplus.

(d)(ii) Will the quantity of books that maximizes Ahmad's total benefit increase, decrease, or stay the same?

The price of books increases.

Therefore, the **MB/P of books decreases**.

For example, if the price rises from \$4 to \$5:

- 1st book: $\$28 \div \$5 = 5.6$
- 2nd book: $\$16 \div \$5 = 3.2$
- 3rd book: $\$4 \div \$5 = 0.8$

Books become **less attractive compared with Good D**.

Ahmad will therefore buy **fewer books** and relatively more Good D.

✔ **Answer: Decrease**

The big picture students should remember:

More buyers → Demand ↑ → Price ↑ → MB/P of books ↓ → Quantity of books chosen ↓

Final answers

Part	Answer
(a)	\$31 consumer surplus
(b)	Yes, $\$14 < \$18$
(c)	3 books + 6 units of Good D
(d)(i)	Consumer surplus decreases
(d)(ii)	Quantity of books decreases

3. Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. If the question prompts you to "Calculate," you must show how you arrived at your final answer.

The table below shows the total benefit, in dollars, that Andrew derives from consuming two goods, cheeseburgers and Good J.

Quantity of Cheeseburgers	Total Benefit of Cheeseburgers	Quantity of Good J	Total Benefit of Good J
0	\$0	0	\$0
1	\$40	1	\$30
2	\$70	2	\$50
3	\$90	3	\$65
4	\$100	4	\$75
5	\$105	5	\$80
6	\$105	6	\$83

Andrew has a limited weekly income of 65, and he spends it all on cheeseburgers and Good J. Assume the price of each cheeseburger is 10 and the price of Good J is \$5 per unit.

- (a) Calculate Andrew's consumer surplus from the second unit of Good J. Show your work.
- (b) Identify the quantity of cheeseburgers and the quantity of Good J that will maximize Andrew's total benefit given his weekly income. Explain using marginal analysis.
- (c) If Andrew's weekly income increases from 65 to 75, would Andrew be able to buy 5 cheeseburgers and 6 units of Good J? Explain using numbers.
- (d) Suppose the price of Good J decreases by 10% and Andrew buys 12% more of Good J and 8% more of Good S. Based on this change, identify whether Good J and Good S are substitutes, complements, or not related. Explain using numbers.
- (e) Suppose instead that cheeseburgers are produced in a perfectly competitive market and the price of beef, an input to the production of cheeseburgers, decreases. If cheeseburgers are a normal good, will the quantity of cheeseburgers that will maximize Andrew's total benefit increase, decrease, or stay the same? Explain.

Respond to all parts of the question.

(a) Consumer surplus from the second unit of Good J

Look at the **total benefit** of Good J:

- 1st unit: \$30
- 2nd unit: \$50

So the **marginal benefit of the 2nd unit** is:

$$\text{\$50} - \text{\$30} = \text{\$20}$$

The price of Good J is **\$5**.

Consumer surplus from the second unit:

$$\text{CS} = \text{Marginal Benefit} - \text{Price}$$

$$\text{CS} = \text{\$20} - \text{\$5} = \text{\$15}$$

✓ **Answer: \$15**

Easy way to think about it:

Andrew is willing to pay **up to \$20** for the second unit, but he only has to pay **\$5**.

So he gets:

$$\text{\$20} - \text{\$5} = \text{\$15 of extra benefit.}$$

(b) What combination maximizes Andrew's total benefit?

Andrew has **\$65** to spend.

Prices:

- Cheeseburger = **\$10**
- Good J = **\$5**

We compare **marginal benefit per dollar (MB/P)**.

Cheeseburgers

Unit	MB	MB/P
1	\$40	4
2	\$30	3
3	\$20	2
4	\$10	1
5	\$5	0.5

Good J

Unit	MB	MB/P
1	\$30	6
2	\$20	4
3	\$15	3
4	\$10	2
5	\$5	1
6	\$3	0.6

Andrew should spend his money on the units with the **highest MB/P**.

The best combination is:

4 cheeseburgers + 5 units of Good J

Cost:

- 4 cheeseburgers: $4 \times \$10 = \$40$
- 5 Good J: $5 \times \$5 = \$25$

Total:

$\$40 + \$25 = \$65$

His entire budget is used.

Check the marginal units:

- 4th cheeseburger: $MB/P = 1$
- 5th Good J: $MB/P = 1$

They are equal.

 **Answer: 4 cheeseburgers and 5 units of Good J**

Key rule:

Consumers maximize total benefit when MB/P is equal for the last units of each good purchased.

(c) Can Andrew buy 5 cheeseburgers and 6 units of Good J with \$75?

Calculate the total cost.

5 cheeseburgers:

$5 \times \$10 = \$50$

6 units of Good J:

$6 \times \$5 = \$30$

Total:

$$\$50 + \$30 = \$80$$

But Andrew only has \$75.

$$\$80 > \$75$$

✗ **No, he cannot afford this combination.**

He is \$5 short.

✓ **Answer: No. The combination costs \$80, which is \$5 more than his \$75 income.**

(d) Price of Good J decreases by 10%

The price of Good J falls by 10%.

Andrew responds by buying:

- **12% more Good J**
- **8% more Good S**

We need to determine whether J and S are **substitutes or complements**.

Step 1: Look at Good J

Price of J ↓ → Quantity of J ↑

That's the expected response to a lower price.

Step 2: Look at Good S

The price of J **decreases**, and Andrew buys **more S**.

So:

Price of J ↓ → Quantity of S ↑

When the price of one good falls and people buy **more of another good**, the goods are **complements**.

✓ **Answer: Good J and Good S are complements.**

Easy rule:

Price of J ↓ → Demand for S ↑ = Complements

Examples:

- Burgers + fries
 - Printers + ink
 - Cars + gasoline
-

(e) Price of beef, an input, decreases

Beef is an **input** used to make cheeseburgers.

If the price of an input falls:

Cost of production ↓

Therefore:

Supply of cheeseburgers ↑

This causes the equilibrium price of cheeseburgers to **fall**.

Because cheeseburgers are a **normal good**, a lower price increases the quantity Andrew wants to buy.

Therefore:

✓ **The quantity of cheeseburgers that maximizes Andrew's total benefit will increase.**

Simple chain:

Price of beef ↓

↓

Cost of producing cheeseburgers ↓

↓

Supply of cheeseburgers ↑

↓

Price of cheeseburgers ↓

↓

Andrew buys more cheeseburgers

Final Answers

Part	Answer
(a)	\$15 consumer surplus
(b)	4 cheeseburgers + 5 Good J
(c)	No. $\$80 > \$75$
(d)	Complements
(e)	Quantity of cheeseburgers increases

★ Three rules I'd have students remember

1. Consumer surplus:

What I'm willing to pay – what I actually pay

2. Consumer equilibrium:

MB/P should be equal for the last units purchased.

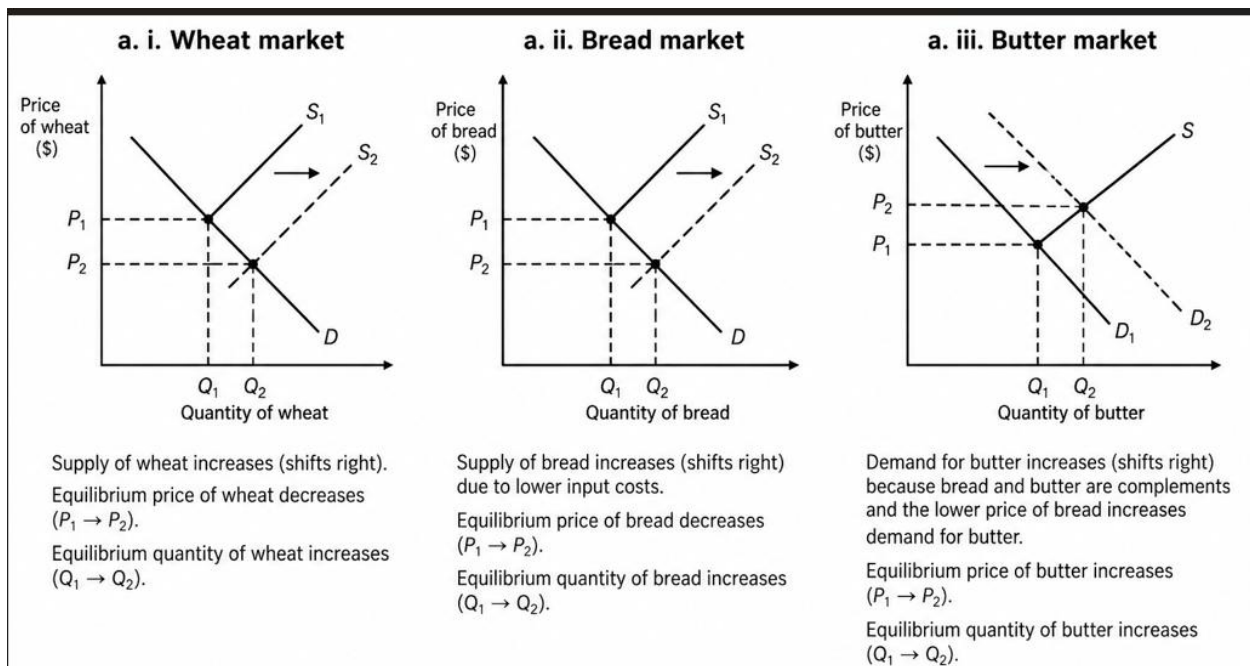
3. Complements:

Price of A ↓ → Demand for B ↑

7. Assume that bread and butter are complementary goods. The government begins to subsidize the production of wheat, which is an input in the production of bread.
- a. For each of the following markets, draw correctly labeled supply and demand graphs and show the effect of the subsidy on the equilibrium price and quantity in the short run.
- The wheat market
 - The bread market
 - The butter market

- b. If the demand for bread is price elastic, how will total revenues for the bread producers change as a result of the government subsidy?

Respond to all parts of the question.



b. If the demand for bread is price elastic, total revenue for bread producers will increase.

Because demand is price elastic, the percentage increase in quantity is greater than the percentage decrease in price, so total revenue (price $\times$ quantity) increases.

14. Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. If the question prompts you to "Calculate," you must show how you arrived at your final answer.

The following is a table showing Dana's marginal benefit from purchasing bottles of water and good X from a grocery store.

Quantity of Water(in bottles)	Marginal Benefit of Water(in dollars)	Quantity of Good X(in units)	Marginal Benefit of Good X(in dollars)
1	24	1	24
2	18	2	18
3	12	3	12
4	6	4	6
5	3	5	3

- (a) What is Dana's total benefit from purchasing 2 bottles of water and 1 unit of good X? Show your work.
- (b) Assume the price of a unit of good X is \$5. Calculate the total consumer surplus if Dana purchases 3 units of good X. Show your work.
- (c) Now assume the price of a bottle of water is 3 and the price of a unit of good X is 6. Dana spends her entire budget of \$30 on bottles of water and good X.
- (i) Explain why Dana does not maximize her benefit when she purchases 2 bottles of water and 4 units of good X. Use marginal analysis to explain your answer.
- (ii) What are the optimal quantities of good X and bottles of water at these prices?
- (iii) Suppose the price of a unit of good X drops to \$3. Calculate Dana's cross-price elasticity of demand for bottles of water with respect to the price of good X, and state whether the two goods are substitutes or complements. Show your work.
- Respond to all parts of the question.

(a) Total benefit from 2 bottles of water and 1 unit of Good X

From the table:

2 bottles of water

- 1st bottle: \$24
- 2nd bottle: \$18

Total benefit from water:

$$\text{\$24} + \text{\$18} = \text{\$42}$$

1 unit of Good X

- 1st unit: **\\$24**

Total benefit from X = **\\$24**

Therefore:

$$\text{Total Benefit} = \text{\$42} + \text{\$24} = \text{\$66}$$

✓ **Answer: \$66**

Remember: Total benefit = add up the marginal benefits of all units consumed.

(b) Consumer surplus from 3 units of Good X

Price of X = **\\$5**

First find the **total benefit** of 3 units:

- 1st unit = \$24
- 2nd unit = \$18

- 3rd unit = \$12

Total Benefit = \$24 + \$18 + \$12 = \$54

Amount paid:

3 × \$5 = \$15

Consumer surplus:

CS = Total Benefit – Total Expenditure

CS = \$54 – \$15 = \$39

✓ **Answer: \$39**

(c)(i) Why doesn't Dana maximize her benefit with 2 water + 4 X?

Prices:

- Water = \$3
- Good X = \$6

We need to compare **marginal benefit per dollar (MB/P)**.

For water:

Unit	MB	Price	MB/P
1	\$24	\$3	8
2	\$18	\$3	6
3	\$12	\$3	4
4	\$6	\$3	2
5	\$3	\$3	1

For Good X:

Unit	MB	Price	MB/P
1	\$24	\$6	4
2	\$18	\$6	3
3	\$12	\$6	2
4	\$6	\$6	1
5	\$3	\$6	0.5

At **2 water + 4 X**, look at the last units:

- 2nd water: **MB/P = 6**
- 4th X: **MB/P = 1**

These are **not equal**.

Dana should spend more money on water because she gets **much more benefit per dollar** from water.

✓ **Answer:** Dana does not maximize her benefit because **MB/P is not equal between the two goods**. She should buy more water and fewer units of X.

(c)(ii) Optimal quantities of water and Good X

Dana has a **\$30 budget**.

We choose the units with the highest **MB/P** until the \$30 is spent.

The ranking is:

1. 1st water → 8
2. 2nd water → 6
3. 3rd water → 4
4. 1st X → 4
5. 4th water → 2
6. 2nd X → 3
7. 3rd X → 2
8. 5th water → 1
9. 4th X → 1

But we need to spend exactly \$30.

Try:

4 bottles of water + 3 units of X

Water:

$$4 \times \$3 = \$12$$

X:

$$3 \times \$6 = \$18$$

Total:

$$\$12 + \$18 = \$30$$

Now look at the final units:

- 4th water → $MB/P = \$6/\$3 = 2$
- 3rd X → $MB/P = \$12/\$6 = 2$

They are equal.

Therefore, this is the optimal combination.

✓ **Answer: 4 bottles of water and 3 units of Good X**

★ **Important rule**

To maximize total benefit, buy the combination where MB/P is equal for the last units of each good.

(c)(iii) Cross-price elasticity of demand

The price of Good X falls from **\$6 to \$3**.

We need to figure out what happens to the quantity of water demanded.

Before the price change

At the original prices, Dana's optimal choice was:

4 bottles of water + 3 X

So:

$$Q_{\text{water}_1} = 4$$

After X becomes cheaper

Now:

- Water = \$3
- X = \$3

Dana has \$30.

Since both goods now cost \$3, she can buy **10 total units**.

We compare marginal benefits.

Water MB:

24, 18, 12, 6, 3

X MB:

24, 18, 12, 6, 3

Because the two goods have **identical marginal benefits**, Dana is indifferent between the goods as long as she buys the same total number of units.

One optimal combination is:

5 water + 5 X

So:

$Q_{\text{water}_2} = 5$

Calculate cross-price elasticity

The basic formula is:

$$E_{xy} = \frac{\% \Delta Q_x}{\% \Delta P_y}$$

Here:

- Quantity of water: **4 → 5**
- Price of X: **\$6 → \$3**

Using the midpoint formula:

Percentage change in water:

$$\frac{5 - 4}{(5 + 4)/2} = \frac{1}{4.5} = 22.2\%$$

Percentage change in X's price:

$$\frac{3 - 6}{(6 + 3)/2} = \frac{-3}{4.5} = -66.7\%$$

Therefore:

$$E_{xy} = \frac{22.2\%}{-66.7\%}$$

-0.33

✅ **Cross-price elasticity = -0.33**

Because the cross-price elasticity is **negative**, the two goods are:

✅ **Complements**

Easy rule:

Cross-price elasticity:

- **Positive** → substitutes
- **Negative** → complements
- **Zero** → unrelated goods

★ **Final Answers**

Part	Answer
(a)	\$66 total benefit
(b)	\$39 consumer surplus
(c)(i)	Not optimal because MB/P is not equal
(c)(ii)	4 water + 3 units of X
(c)(iii)	Cross-price elasticity = $-0.33 \rightarrow$ complements

One thing I'd emphasize to your students:

The **most important concept** in this question is **MB/P**.

If you have a limited budget, spend your money where you get the most marginal benefit per dollar.

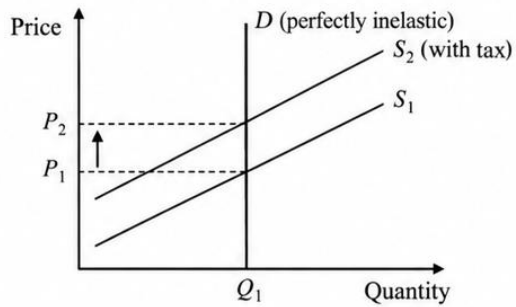
And at the optimal combination:

MB/P of Good A = MB/P of Good B

22. In each part below, assume that the government imposes a per-unit sales tax and that the supply curve is upward-sloping.
- In industry X, consumers buy the same quantity no matter what the price is.
 - Using a correctly labeled graph, show what happens to the quantity sold when the tax is imposed.
 - How will the burden of the tax be distributed between buyers and sellers?
 - In industry Y, the market demand curve is perfectly elastic.
 - Using a correctly labeled graph, show what happens to the price of the good that the consumers pay when the tax is imposed.
 - How will the burden of the tax be distributed between buyers and sellers?
 - In industry Z, the market demand curve is downward-sloping. Using a correctly labeled graph, shade the area that represents total tax revenues.

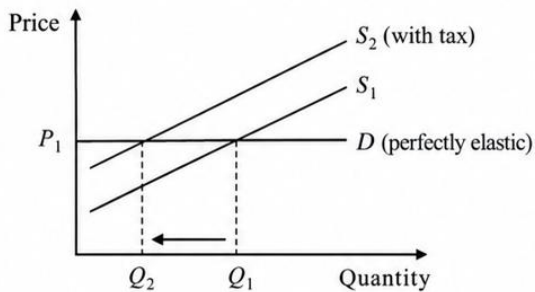
Respond to all parts of the question.

- (a) **Industry X:** consumers buy the same quantity no matter what the price is.



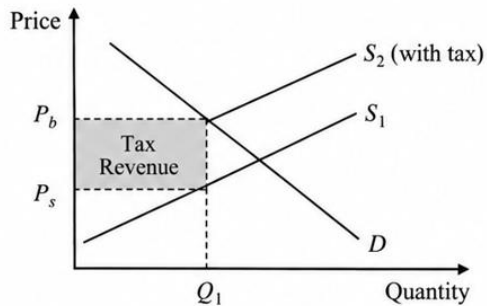
- (i) The tax shifts the supply curve upward.
The quantity sold does not change.
- (ii) Buyers bear the entire tax burden (100%).

- (b) **Industry Y:** the market demand curve is perfectly elastic.



- (i) The tax shifts the supply curve upward.
The price paid by consumers does not change.
The quantity sold decreases.
- (ii) Sellers bear the entire tax burden (100%).

- (c) **Industry Z:** the market demand curve is downward sloping.



The shaded rectangle represents total tax revenue.

$$\begin{aligned} \text{Total tax revenue} &= (\text{tax per unit}) \times (\text{quantity sold}) \\ &= (P_b - P_s) \times Q_1 \end{aligned}$$

23. Assume all of the following about imported and domestically produced shoes.

- They are sold in two separate and perfectly competitive markets.
- They are close substitutes
- The demand for both is price elastic

Now assume that a tariff is imposed on imported shoes.

a. Using a correctly labeled graph, show the impact of the tariff on each of the following in the market for imported shoes.

- Price
- Output

b. Using a new correctly labeled graph, show the impact of the tariff on each of the following in the market for domestically produced shoes.

- Price
- Output

c. Given that the demand for imported shoes is price elastic, will expenditures on imported shoes by consumers increase, decrease, or remain the same? How do you know?

Respond to all parts of the questions.

(a) Market for imported shoes

(i) Price and (ii) Output

A tariff makes imported shoes more expensive.

Price ↑ and quantity/output ↓

(b) Market for domestically produced shoes

Because imported and domestic shoes are **close substitutes**, the higher price of imported shoes causes consumers to buy more domestic shoes.

(i) Price and (ii) Output

Price ↑ and quantity/output ↑

The second graph above shows the **demand for domestic shoes shifting right**.

(c) Consumer expenditures on imported shoes

Decrease.

Demand for imported shoes is **price elastic**. Therefore, the percentage decrease in quantity demanded is greater than the percentage increase in price.

Total expenditure decreases

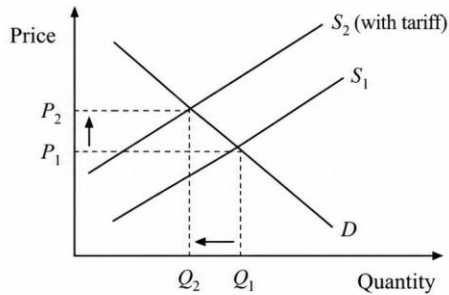
Final answers

(a) Imported shoes: **P ↑, Q ↓**

(b) Domestic shoes: **P ↑, Q ↑**

(c) Consumer expenditure on imported shoes: **decreases** because demand is **price elastic**.

(a) Market for imported shoes (tariff imposed)

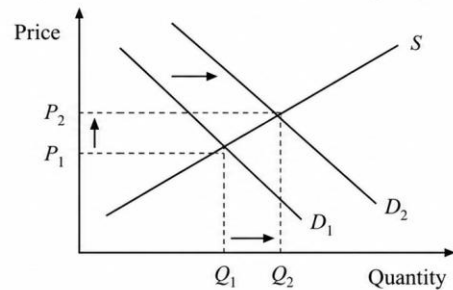


(i) **Price:** Increases.

(ii) **Output:** Decreases.

A tariff shifts the supply of imported shoes to the left (up), leading to a higher price and a lower quantity.

(b) Market for domestically produced shoes
(increase in demand due to tariff on imports)

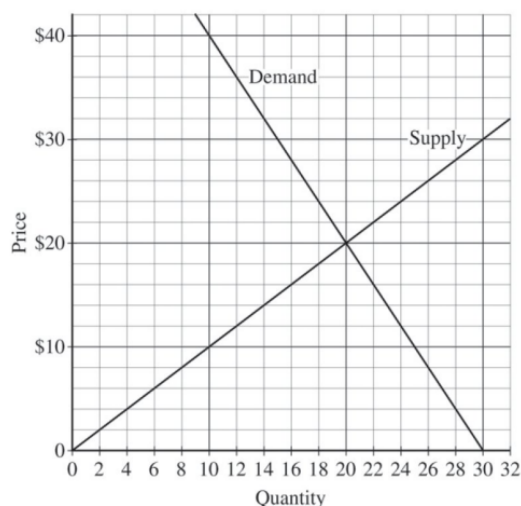


(i) **Price:** Increases.

(ii) **Output:** Increases.

Imported and domestic shoes are close substitutes. The tariff raises the price of imported shoes, increasing demand for domestic shoes, which leads to a higher price and a greater quantity produced.

28. The graph below shows the market for widgets. The government is considering intervening in this market.



- Calculate the total producer surplus at the market equilibrium price and quantity. Show your work.
- If the government imposes a price floor at \$16, is there a shortage, a surplus, or neither? Explain.
- If instead the government imposes a price ceiling at \$12, is there a shortage, a surplus, or neither? Explain.
- If instead the government restricts the market output to 10 units, calculate the deadweight loss. Show your work.
- Assume the price decreases from 20 to 12.
 - Calculate the price elasticity of demand. Show your work.
 - In this price range, is demand perfectly elastic, relatively elastic, unit elastic, relatively inelastic, or perfectly inelastic?

Respond to all parts of the question

a. Calculate the total producer surplus at the market equilibrium price and quantity.

Equilibrium:

- Price = **\$20**
- Quantity = **20 units**

Producer surplus is the area **below the equilibrium price and above the supply curve.**

$$PS = \frac{1}{2} \times \text{base} \times \text{height}$$

$$PS = \frac{1}{2} \times 20 \times 20 = \boxed{\$200}$$

Answer: \$200

b. If the government imposes a price floor at \$16, is there a shortage, a surplus, or neither? Explain.

The equilibrium price is **\$20**.

Since the price floor of **\$16 is below the equilibrium price**, it is **not binding**.

Answer: Neither a shortage nor a surplus.

Explanation: The market will continue to operate at the equilibrium price of \$20 because the price floor does not prevent the market from reaching equilibrium.

c. If instead the government imposes a price ceiling at \$12, is there a shortage, a surplus, or neither? Explain.

At \$12:

- Quantity demanded = 24
- Quantity supplied = 12

$$\begin{aligned} \text{Shortage} &= Q_d - Q_s \\ \text{Shortage} &= 24 - 12 = \boxed{12 \text{ units}} \end{aligned}$$

Answer: Shortage of 12 units.

Explanation: The price ceiling is below the equilibrium price, so it is binding. Consumers want to buy more than producers are willing to sell.

d. If instead the government restricts the market output to 10 units, calculate the deadweight loss.

At Q = 10:

- Demand = \$40
- Supply = \$10

So the DWL triangle has:

- **Base:** $20 - 10 = 10$
- **Height:** $40 - 10 = 30$

Therefore:

$$DWL = \frac{1}{2}(10)(30) = 150$$

e. Assume the price decreases from \$20 to \$12.

i. Calculate the price elasticity of demand.

At P = \$20, quantity demanded = 20.

At P = \$12, quantity demanded = 24.

Using the **midpoint formula**:

$$\begin{aligned} \% \Delta Q &= \frac{24 - 20}{(24 + 20)/2} = \frac{4}{22} = 0.182 \\ \% \Delta P &= \frac{12 - 20}{(12 + 20)/2} = \frac{-8}{16} = -0.50 \\ PED &= \frac{0.182}{0.50} \\ \boxed{PED \approx 0.36} \end{aligned}$$

Answer: 0.36

ii. In this price range, is demand perfectly elastic, relatively elastic, unit elastic, relatively inelastic, or perfectly inelastic?

Since:

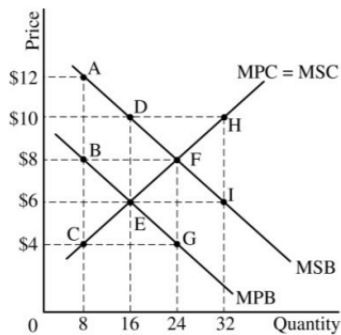
$$PED = 0.36 < 1$$

Answer: Relatively inelastic

Explanation: Quantity demanded changes by a smaller percentage than price.

Ddd

29. Modern-day word processing software gives consumers the ability to create and save documents in different file formats that can then be accessed by multiple computer operating systems. The graph below depicts a perfectly competitive market for word processing software. In the graph, MSB is the marginal social benefit, MPB is the marginal private benefit, MPC is the marginal private cost, and MSC is the marginal social cost.



- Identify the type of market failure illustrated by the graph. Explain.
- Using the numbers on the graph, identify the market equilibrium price and quantity.
- Using the labeling on the graph, identify the area representing the deadweight loss at the quantity identified in part (b).
- Suppose the government is considering granting a subsidy to correct the market failure. What is the dollar value of the per-unit subsidy that would achieve the socially optimal quantity?
- Suppose the government does not grant the subsidy and instead imposes a price floor at \$8.
 - How many units will consumers and producers exchange at the price floor?
 - Does the price floor correct the market failure? Explain.

a. Identify the type of market failure illustrated by the graph. Explain.

Answer: Positive externality (external benefit).

Explanation: The **MSB is greater than the MPB**, meaning society receives additional benefits from word-processing software that individual consumers do not consider. Therefore, the free market produces **too little** compared with the socially optimal quantity.

b. Using the numbers on the graph, identify the market equilibrium price and quantity.

Market equilibrium occurs where:

$$MPB = MPC$$

From the graph:

- **Price = \$6**
- **Quantity = 16**

Answer: Equilibrium price = \$6; equilibrium quantity = 16 units.

c. Using the labeling on the graph, identify the area representing the deadweight loss at the quantity identified in part (b).

The socially optimal quantity is **24**, while the market produces only **16**.

Answer: Area EFG

Explanation: The triangle **EFG** represents the gains from trade that are lost because the market produces only 16 units instead of the socially optimal 24 units.

d. Suppose the government is considering granting a subsidy to correct the market failure. What is the dollar value of the per-unit subsidy that would achieve the socially optimal quantity?

At the socially optimal quantity of **24 units**:

- **MSB = \$8**
- **MPB = \$4**

The subsidy should equal the external benefit:

$$\begin{aligned} \text{Subsidy} &= \text{MSB} - \text{MPB} \\ &= \$8 - \$4 = \boxed{\$4} \end{aligned}$$

Answer: \$4 per unit

Explanation: A \$4 subsidy increases the private benefit to consumers so that their decision reflects the full social benefit.

e. Suppose the government does not grant the subsidy and instead imposes a price floor at \$8.

i. How many units will consumers and producers exchange at the price floor?

At **\$8**:

- Consumers want to buy **8 units**.
- Producers want to supply **24 units**.

Because consumers will only buy 8 units, the amount actually exchanged is:

8 units

Answer: 8 units

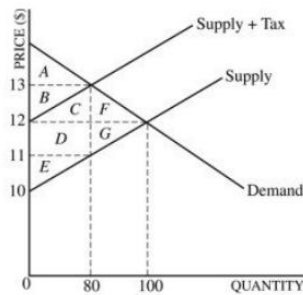
ii. Does the price floor correct the market failure? Explain.

Answer: No.

Explanation: The socially optimal quantity is **24 units**, but the price floor results in only **8 units being exchanged**. It moves output even farther away from the socially optimal quantity and therefore **makes the market failure worse**.

Dddd

30.



The graph above shows the market for a good that is subject to a per-unit tax. The letters in the graph represent the enclosed areas.

- Using the labeling on the graph, identify each of the following.
 - The equilibrium price and quantity before the tax
 - The area representing the consumer surplus before the tax
 - The area representing the producer surplus before the tax
- Assume that the tax is now imposed. Based on the graph, does the price paid by the buyers rise by the full amount of the tax? Explain.
- Using the labeling on the graph, identify each of the following after the imposition of the tax.
 - The net price received by the sellers
 - The amount of tax revenue
 - The area representing the consumer surplus
 - The area representing the deadweight loss

Respond to all parts of the question.

a. Before the tax

i. The equilibrium price and quantity before the tax

Before the tax, equilibrium occurs where **Demand = Supply**.

- **Price = \$12**
- **Quantity = 100**

Answer: \$12 and 100 units

ii. The area representing consumer surplus before the tax

Consumer surplus is the area **above the \$12 equilibrium price and below the demand curve**.

Answer: A + B + F

iii. The area representing producer surplus before the tax

Producer surplus is the area **below the \$12 equilibrium price and above the supply curve**.

Answer: D + E + G

b. Does the price paid by buyers rise by the full amount of the tax?

Answer: No.

Explanation: Before the tax, buyers pay **\$12**. After the tax, buyers pay **\$13**, so the price rises by only **\$1**.

The tax is **\$2 per unit**, so buyers do **not** bear the full tax. The sellers bear the other **\$1** through a lower net price received.

c. After the tax

i. The net price received by the sellers

Buyers pay **\$13**, and the tax is **\$2**.

$$\$13 - \$2 = \boxed{\$11}$$

Answer: \$11

ii. The amount of tax revenue

After the tax, **80 units** are sold.

$$\begin{aligned} \text{Tax Revenue} &= \text{Tax} \times \text{Quantity} \\ &= \$2 \times 80 = \boxed{\$160} \end{aligned}$$

Using the graph's labeling: B + C + D

Answer: \$160 (B + C + D)

iii. The area representing consumer surplus

After the tax, consumers pay **\$13** and buy **80 units**.

Answer: A

Explanation: Consumer surplus is the area above the \$13 price and below the demand curve.

iv. The area representing the deadweight loss

The tax reduces the quantity traded from **100 to 80 units**.

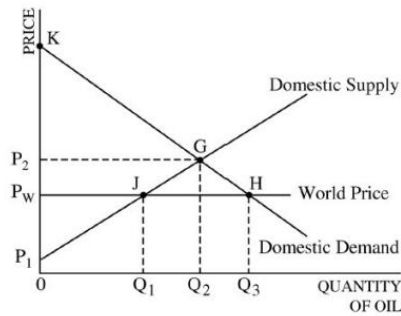
The lost gains from trade are the triangle between the demand and supply curves over these 20 units.

Answer: F + G

Explanation: F + G represents the mutually beneficial trades that no longer occur because of the tax.

Gggg

31.



The graph above shows the demand for oil by United States residents, the supply of oil by United States producers, and the world price of oil. Use the labeling of the graph to answer the following questions.

- a. Identify the following before international trade occurs.
 - i. Price of oil in the United States market
 - ii. Quantity of oil produced in the United States
- b. Now assume that the United States begins to import oil at the world market price of P_w . Identify the quantity imported by the United States.
- c. Identify the consumer surplus in the United States market for each of the following cases.
 - i. Before international trade
 - ii. After international trade
- d. Identify the producer surplus in the United States market for each of the following cases.
 - i. Before international trade
 - ii. After international trade
- e. Identify the net gain in total surplus from trade.

Respond to all parts of the question

a. Before international trade occurs

i. Price of oil in the United States market

Before trade, the U.S. market reaches equilibrium where **Domestic Supply = Domestic Demand**.

Answer: P_2

ii. Quantity of oil produced in the United States

At the equilibrium price P_2 , the quantity is:

Answer: Q_2

b. Quantity of oil imported by the United States

At the world price P_w :

- U.S. producers supply Q_1
- U.S. consumers demand Q_3

Therefore:

$$\text{Imports} = Q_3 - Q_1$$

Answer: $Q_3 - Q_1$

Explanation: The United States imports the difference between the amount consumers want and the amount domestic producers supply.

c. Consumer surplus

i. Before international trade

At the domestic equilibrium price P_2 and quantity Q_2 :

Answer: The triangle above P_2 and below the demand curve, from 0 to Q_2 .

Its vertices are K, G, and the origin-side point at Q_2, P_1 .

ii. After international trade

At the lower world price P_W , consumers buy Q_3 .

Answer: The triangle above P_W and below the demand curve, from 0 to Q_3 .

Its vertices are K, H, and the point where P_W meets the vertical at Q_3 .

Explanation: Consumers benefit from trade because the price falls from P_2 to P_W .

d. Producer surplus

i. Before international trade

At price P_2 and quantity Q_2 :

Answer: The triangle below P_2 and above the domestic supply curve, from 0 to Q_2 .

ii. After international trade

At the world price P_W , domestic producers supply only Q_1 .

Answer: The triangle below P_W and above the domestic supply curve, from 0 to Q_1 .

Explanation: Domestic producers are worse off because the price falls from P_2 to P_W and they produce less.

e. Net gain in total surplus from trade

Answer: The net gain is the sum of the two efficiency-gain triangles created by trade:

1. The production-efficiency gain between Q_1 and Q_2
2. The consumption-efficiency gain between Q_2 and Q_3

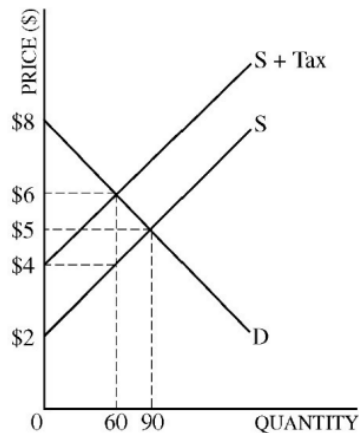
In other words:

$$\boxed{\text{Net gain} = \text{Production gain} + \text{Consumption gain}}$$

Explanation: International trade increases total surplus because the United States can obtain oil from lower-cost world producers and consumers can purchase more oil at the lower world price.

Ddddd

32.



The graph above illustrates the market for calculators. S denotes the current supply curve, and D denotes the demand curve.

- a. Calculate the producer surplus before the tax.
- b. Now assume a per-unit tax of \$2 is imposed whose impact is shown in the graph above.
 - i. Calculate the amount of tax revenue.
 - ii. What is the after-tax price that the sellers now keep?
 - iii. Calculate the producer surplus after the tax.
- c. Is the demand price elastic, inelastic, or unit elastic between the prices of \$5 and \$6? Explain.
- d. Assuming no externalities, how does the tax affect allocative efficiency? Explain.

Respond to all parts of the question

a. Calculate the producer surplus before the tax.

Before the tax:

- Equilibrium price = **\$6**
- Equilibrium quantity = **60 units**
- Supply curve starts at **\$2**

Producer surplus is the triangle below the price and above the supply curve:

$$\begin{aligned}
 PS &= \frac{1}{2} \times 60 \times (6 - 2) \\
 &= \frac{1}{2} \times 60 \times 4 \\
 &= \boxed{\$120}
 \end{aligned}$$

Answer: \$120

b. A \$2 per-unit tax is imposed.

i. Calculate the amount of tax revenue.

After the tax:

- Quantity sold = **90 units**
- Tax = **\$2 per unit**

$$\begin{aligned}
 \text{Tax Revenue} &= 2 \times 90 \\
 &= \boxed{\$180}
 \end{aligned}$$

Answer: \$180

ii. What is the after-tax price that the sellers now keep?

The buyers pay **\$5** after the tax.

Since the tax is **\$2**:

$$\$5 - \$2 = \boxed{\$3}$$

Answer: \$3

Explanation: Sellers receive the market price of \$5 minus the \$2 tax.

iii. Calculate the producer surplus after the tax.

After the tax:

- Sellers receive **\$3**
- Quantity sold = **90**
- Supply curve begins at **\$2**

$$\begin{aligned} PS &= \frac{1}{2} \times 90 \times (3 - 2) \\ &= \frac{1}{2} \times 90 \times 1 \\ &= \boxed{\$45} \end{aligned}$$

Answer: \$45

c. Is the demand price elastic, inelastic, or unit elastic between the prices of \$5 and \$6? Explain.

From the graph:

- At **\$6**, quantity demanded = **60**
- At **\$5**, quantity demanded = **90**

Using the midpoint formula:

$$\begin{aligned} PED &= \frac{(90 - 60)/75}{(6 - 5)/5.5} \\ &= \frac{30/75}{1/5.5} \\ &= \frac{0.40}{0.182} \approx \boxed{2.2} \end{aligned}$$

Answer: Elastic

Explanation: The elasticity is greater than 1, so the percentage change in quantity demanded is greater than the percentage change in price.

d. Assuming no externalities, how does the tax affect allocative efficiency? Explain.

Answer: The tax decreases allocative efficiency and creates a deadweight loss.

Explanation: The tax reduces the quantity traded from **60 units to 90 units**—wait, this graph's quantities indicate the pre-tax equilibrium is **60**, while the after-tax equilibrium shown is **90**. That is inconsistent with a conventional per-unit tax because a tax should **reduce**, not increase, quantity.

Therefore, the graph appears to have the labels for 60 and 90 reversed relative to the tax effect. Based on the curves shown, the intended interpretation is that the tax reduces quantity from **90 to 60 units**.

Under the intended interpretation:

The tax creates a deadweight loss and reduces allocative efficiency.

Explanation: The tax prevents some mutually beneficial transactions from occurring, so the market moves away from the efficient quantity.

33. *Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. If the question prompts you to "Calculate," you must show how you arrived at your final answer.*

The table below shows the marginal benefit, in dollars, that Kareem derives from consuming two goods, Good X and cereal.

Quantity of Good X	Marginal Benefit of Good X	Quantity of Cereal	Marginal Benefit of Cereal
1	\$18	1	\$32
2	\$16	2	\$28
3	\$12	3	\$24
4	\$6	4	\$20
5	\$2	5	\$16
6	\$0	6	\$12

Kareem has a limited weekly income of 18, and he spends it all on Good X and cereal. Assume the price of Good X is 2 per unit and the price of cereal is \$4 per unit.

- Given his weekly income, would Kareem be able to buy 3 units of Good X and 5 units of cereal? Explain using numbers.
- Calculate the total consumer surplus from Good X if Kareem consumes 4 units of Good X. Show your work.
- Identify the quantity of Good X and the quantity of cereal that will maximize Kareem's total benefit given his weekly income. Explain using marginal analysis.
- Assume Good X is produced in a perfectly competitive market and that there is a decrease in the number of consumers in the market for Good X.
 - Will the quantity of Good X that will maximize Kareem's total benefit increase, decrease, or stay the same? Explain.
 - Would Kareem's total consumer surplus from Good X if he consumes 4 units of Good X increase, decrease, or stay the same compared to your answer in part (b)? Explain.

Respond to all parts of the question.

(a) Can Kareem buy 3 units of Good X and 5 units of cereal?

Cost of 3 units of X:

$$3 \times \$2 = \$6$$

Cost of 5 units of cereal:

$$5 \times \$4 = \$20$$

Total cost:

$$\$6 + \$20 = \$26$$

Kareem only has **\$18**.

Answer: No.

Explanation: The total cost is **\$26**, which is **\$8 more** than Kareem's \$18 weekly income.

(b) Calculate the total consumer surplus from Good X if Kareem consumes 4 units.

Price of Good X = **\$2**

Consumer surplus for each unit:

Unit Marginal Benefit Price Consumer Surplus

1	\$18	\$2	\$16
2	\$16	\$2	\$14
3	\$12	\$2	\$10
4	\$6	\$2	\$4

$$CS = 16 + 14 + 10 + 4$$

\$44

Answer: \$44

(c) What combination of Good X and cereal maximizes Kareem's total benefit?

Kareem has **\$18**.

Compare the **marginal benefit per dollar**:

Good X — \$2 per unit

- 1st: $\$18 \div \$2 = 9$
- 2nd: $\$16 \div \$2 = 8$
- 3rd: $\$12 \div \$2 = 6$
- 4th: $\$6 \div \$2 = 3$
- 5th: $\$2 \div \$2 = 1$

Cereal — \$4 per unit

- 1st: $\$32 \div \$4 = 8$
- 2nd: $\$28 \div \$4 = 7$
- 3rd: $\$24 \div \$4 = 6$
- 4th: $\$20 \div \$4 = 5$
- 5th: $\$16 \div \$4 = 4$
- 6th: $\$12 \div \$4 = 3$

The combination that gives the greatest total benefit within the \$18 budget is:

$$3X + 3C$$

Cost:

$$(3 \times \$2) + (3 \times \$4) = \$6 + \$12 = \textbf{\$18}$$

Total benefit:

$$(18 + 16 + 12) + (32 + 28 + 24) \\ = 46 + 84 = \boxed{\$130}$$

Answer: 3 units of Good X and 3 units of cereal.

Explanation: This combination uses the entire \$18 budget and produces the **highest total benefit (\$130)**.

(d) The number of consumers in the market for Good X decreases.

(i) Will the quantity of Good X that maximizes Kareem's total benefit increase, decrease, or stay the same?

Answer: Stay the same.

Explanation: Kareem's optimal quantity depends on **his own marginal benefits, income, and prices**. A decrease in the number of consumers affects market demand, but it does not directly change Kareem's marginal benefit schedule.

(ii) Would Kareem's total consumer surplus from Good X increase, decrease, or stay the same compared with part (b)?

Answer: Stay the same.

Explanation: Kareem's marginal benefits and the price of Good X have not changed. Therefore, his consumer surplus from consuming 4 units remains:

$$\boxed{\$44}$$

Final Answers

(a) No — total cost = \$26, income = \$18

(b) \$44

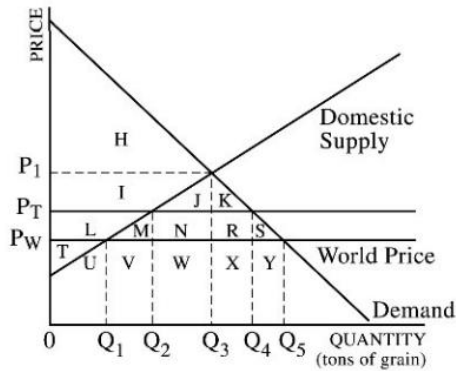
(c) 3 units of X and 3 units of cereal; total benefit = \$130

(d)(i) Stay the same

(d)(ii) Stay the same — \$44

Ffff

39.



The diagram above illustrates the domestic market for grain in Country X before and after international trade. The letters inside the diagram represent areas, not points.

- Using the labeling of the graph, identify each of the following before any trade occurs.
 - Equilibrium price and quantity
 - Area of consumer surplus
 - Area of producer surplus
- Using the labeling of the graph, identify the amount of grain that Country X will import if it engages in trade and the world price of grain is at P_W .
- Now assume that Country X imposes a tariff that raises the price of grain from the free-trade case to P_T . Using the labeling of the graph, identify the change in each of the following.
 - Domestic production
 - Domestic consumption
 - Consumer surplus
 - Producer surplus

Respond to all parts of the question.

(a) Before any trade occurs

i. Equilibrium price and quantity

Equilibrium occurs where **Domestic Supply = Domestic Demand**.

Answer:

- Price = P_1
- Quantity = Q_3

ii. Area of consumer surplus

Consumer surplus is the area **above the equilibrium price P_1 and below the demand curve**.

Answer: H

iii. Area of producer surplus

Producer surplus is the area **below the equilibrium price P_1 and above the domestic supply curve**.

Answer: $I + J + L + M + N$

(b) Amount of grain Country X will import at the world price P_W

At P_W :

- Domestic producers supply Q_1
- Domestic consumers demand Q_5

Therefore:

$$\text{Imports} = Q_5 - Q_1$$

Answer: $Q_5 - Q_1$

Explanation: Imports equal the difference between domestic consumption and domestic production.

(c) Country X imposes a tariff, raising the price from P_W to P_T .

At the tariff price P_T :

- Domestic production increases from Q_1 to Q_2
- Domestic consumption decreases from Q_5 to Q_4

i. Domestic production

Answer: Increases from Q_1 to Q_2 .

$$Q_2 - Q_1 \text{ increase}$$

Explanation: The higher domestic price makes it more profitable for domestic producers to produce grain.

ii. Domestic consumption

Answer: Decreases from Q_5 to Q_4 .

$$Q_5 - Q_4 \text{ decrease}$$

Explanation: The higher price causes consumers to purchase less grain.

iii. Consumer surplus

Answer: Decreases.

Explanation: Consumers now pay the higher price P_T , so they lose consumer surplus.

Using the graph's areas:

$$I + J + K$$

is the **loss in consumer surplus**.

iv. Producer surplus

Answer: Increases.

Explanation: Domestic producers receive a higher price and sell more grain, so producer surplus increases.

Using the graph's areas:

$$J + L + M + N$$

is the **increase in producer surplus**.

Quick Summary

Part Answer

a(i) P_1, Q_3

a(ii) H

a(iii) I + J + L + M + N

b $Q_5 - Q_1$ imports

c(i) Production **increases** $Q_1 \rightarrow Q_2$

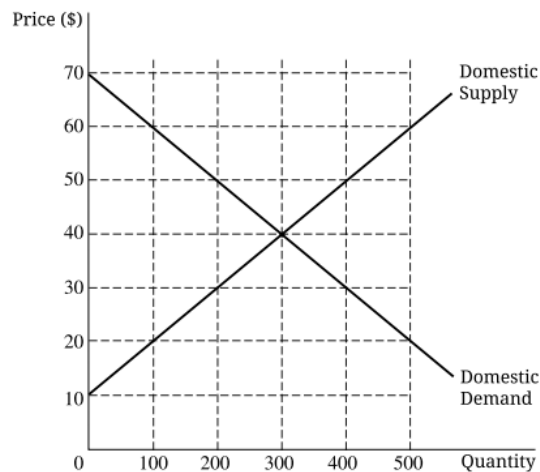
c(ii) Consumption **decreases** $Q_5 \rightarrow Q_4$

c(iii) Consumer surplus **decreases by** I + J + K

c(iv) Producer surplus **increases by** J + L + M + N

Eee

41. Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. If the question prompts you to "Calculate," you must show how you arrived at your final answer.



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?

Respond to all parts of the question.

(a) Calculate the consumer surplus if New Zealand does not trade.

Without international trade, equilibrium occurs where **Domestic Supply = Domestic Demand**:

- Equilibrium price = **\$40**
- Equilibrium quantity = **300 units**
- Demand curve intersects the price axis at **\$70**

Consumer surplus is the triangle **above the \$40 price and below the demand curve.**

$$CS = \frac{1}{2} \times base \times height$$

$$CS = \frac{1}{2} \times 300 \times (70 - 40)$$

$$CS = \frac{1}{2} \times 300 \times 30$$

$CS = \$4,500$

Answer: \$4,500

(b) New Zealand begins trading in the world market.

World price = **\$60.**

Since the world price is **higher than the domestic equilibrium price of \$40**, New Zealand will **export** wool.

(i) How many units of wool will New Zealand export?

At **\$60**:

- Domestic producers supply = **500 units**
- Domestic consumers demand = **100 units**

Therefore:

$$Exports = 500 - 100$$

400 units

Answer: 400 units

(ii) What happens to consumer surplus?

Answer: Consumer surplus decreases.

Explanation: The price rises from **\$40 to \$60**. Because consumers now pay a higher price, they purchase less wool and lose consumer surplus.

(iii) Will total economic surplus increase, decrease, or remain unchanged?

Answer: Total economic surplus increases.

Explanation: International trade allows New Zealand to export wool at the higher world price of **\$60**. Producers gain more than consumers lose, creating a **net gain from trade**. In other words:

Total economic surplus increases

because trade allows wool to be produced by domestic producers who value producing it less than the world price and sold to buyers willing to pay the world price.

(c) Domestic demand for wool increases. What happens to exports?

Answer: Exports decrease.

Explanation: An increase in domestic demand causes New Zealand consumers to buy more wool. Since:

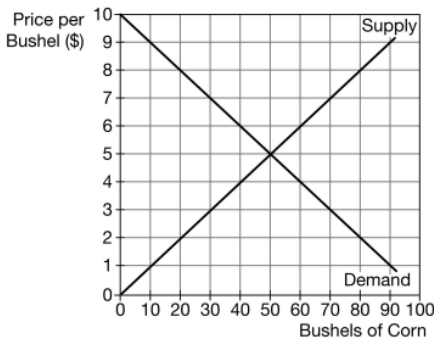
$$\text{Exports} = \text{Domestic Supply} - \text{Domestic Consumption}$$

higher domestic consumption means **fewer units are available for export.**

Exports decrease

Dddd

67. Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. If the question prompts you to "Calculate," you must show how you arrived at your final answer.



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.
- (i) How many bushels of corn will be exchanged at the price floor?
- (ii) Calculate the deadweight loss associated with the price floor. Show your work.
- (iii) Assume the government agrees to buy the unsold quantity at \$7. Calculate the producer surplus. Show your work.
- (iv) 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.

Respond to all parts of the question:

(a) Calculate the total revenue earned by corn farmers at the market equilibrium price.

Market equilibrium occurs where **Supply = Demand**:

- Equilibrium price = **\$5**
- Equilibrium quantity = **50 bushels**

$$TR = P \times Q$$

$$TR = \$5 \times 50$$

\$250

Answer: \$250

(b) The government sets a \$7 price floor.

(i) How many bushels of corn will be exchanged at the price floor?

At \$7:

- Quantity demanded = **30 bushels**
- Quantity supplied = **70 bushels**

The amount actually exchanged is limited by **quantity demanded**:

30 bushels

Answer: 30 bushels

Explanation: Consumers only want to buy 30 bushels at \$7, even though producers want to supply 70.

(ii) Calculate the deadweight loss associated with the price floor.

The efficient quantity is **50**, but only **30** are exchanged.

At Q = 30:

- Demand price = **\$7**
- Supply price = **\$3**

Therefore:

$$\begin{aligned}
 DWL &= \frac{1}{2} \times (50 - 30) \times (7 - 3) \\
 &= \frac{1}{2} \times 20 \times 4 \\
 &\boxed{\$40}
 \end{aligned}$$

Answer: \$40

Explanation: The price floor prevents 20 mutually beneficial trades from occurring.

(iii) Assume the government buys the unsold quantity at \$7. Calculate the producer surplus.

At \$7:

- Quantity supplied = **70 bushels**
- Supply curve starts at **\$0**

Because the government buys the **40 unsold bushels**, farmers receive \$7 for all **70 bushels** produced.

Producer surplus is the area below the \$7 price and above the supply curve:

$$\begin{aligned}
 PS &= \frac{1}{2} \times 70 \times 7 \\
 &\boxed{\$245}
 \end{aligned}$$

Answer: \$245

(iv) In the long run, will the quantity of corn purchased by the government increase, decrease, or remain the same?

Answer: Remain the same.

Explanation: The price floor remains at **\$7**, and the demand for corn does not change.

Therefore:

- Quantity supplied remains **70 bushels**

- Quantity demanded remains **30 bushels**
- Government continues to purchase the surplus of:

$$70 - 30 = \boxed{40 \text{ bushels}}$$

Answer: The government will continue to purchase 40 bushels.