

ECON 101

Quiz 1 Review Worksheet — ANSWER KEY

Question 1: Elasticity & Total Revenue

The price elasticity of demand for lettuce has been estimated to be 2.58. If an insect infestation destroys 10% of the nation's lettuce crop, how will that affect total revenue from lettuce?

ANSWER: (b) Total revenue will fall

EXPLANATION:

Step 1: Identify what we know:

- Price elasticity of demand = 2.58 (ELASTIC, since > 1)
- Supply decreases by 10% (crop destroyed)
- Supply decrease \rightarrow price will RISE

Step 2: Apply elasticity & total revenue relationship”

When demand is ELASTIC ($E_p > 1$):

- Price $\uparrow \rightarrow$ Total Revenue \downarrow
- Price $\downarrow \rightarrow$ Total Revenue \uparrow

Step 3: Logic

Since demand is elastic ($2.58 > 1$), consumers are very responsive to price changes. When price rises, they cut back dramatically on quantity demanded. The quantity effect dominates the price effect.

Step 4: Conclusion

Supply $\downarrow \rightarrow$ Price $\uparrow \rightarrow$ With elastic demand, TR \downarrow

KEY CONCEPT: Memorize this relationship!

- ELASTIC ($E_p > 1$): P and TR move in OPPOSITE directions.
- INELASTIC ($E_p < 1$): P and TR move in SAME direction.

Question 2: Applied Elasticity Calculation

If the price elasticity of demand is 0.6 and the price rises by 47 percent, by what percent does quantity fall?

ANSWER: 28.2%

WORK:

Step 1: Write the elasticity formula:

$$E_p = (\% \text{ change in QD}) / (\% \text{ change in P})$$

Step 2: Plug in what we know:

$$0.6 = (\% \text{ change in QD}) / 47\%$$

Step 3: Solve for % change in QD”

$$\% \text{ change in QD} = 0.6 \times 47\%$$

$$\% \text{ change in QD} = 28.2\%$$

Step 4: Interpretation:

Quantity demanded falls by 28.2%

WHY THIS MAKES SENSE:

The elasticity is 0.6, which is inelastic (less than 1). This means consumers are not very responsive to price changes. When price rises by 47%, quantity only falls by 28.2% — a smaller percentage change than the price change, which is exactly what inelastic means!

Question 3: Perfectly Competitive Markets

Frank is a barley farmer in a perfectly competitive market. The market price is \$250/ton. If Frank charges \$245/ton, he will:

ANSWER: (d) lower his profitability by \$5 per ton

EXPLANATION:

Key characteristics of perfectly competitive markets:

1. Many buyers and sellers
2. Homogeneous (identical) products
3. Price takers: individual sellers cannot influence market price
4. Perfect information – buyers know the market price

What happens if Frank charges \$245?

- He WILL sell his barley (people will buy it)
- BUT he's leaving \$5 per ton on the table
- In a perfectly competitive market, Frank can sell ALL his barley at the market price of \$250
- By charging \$245, he gives up \$5 profit per ton for no reason.

Question 4: Surplus in Table Format

At what price does this market experience a surplus of 70 units?

ANSWER: \$11

WORK:

Step 1: Understand what a SURPLUS means:

Surplus = Quantity Supplied > Quantity Demanded

Surplus amount = QS - QD

Step 2: Calculate surplus at each price

At P = \$3: QS - QD = 40 - 250 = -210 (shortage, not surplus)

At P = \$5: QS - QD = 80 - 220 = -140 (shortage)

At P = \$7: QS - QD = 120 - 190 = -70 (shortage)

At P = \$9: QS - QD = 160 - 160 = 0 (equilibrium!)

At P = \$11: QS - QD = 200 - 130 = 70 ← SURPLUS OF 70! ✓

At P = \$13: QS - QD = 240 - 100 = 140 (surplus)

At P = \$15: QS - QD = 280 - 70 = 210 (surplus)

KEY INSIGHTS:

- Below equilibrium (<\$9) → shortage (QD > QS)
- At equilibrium (= \$9) → no shortage or surplus
- Above equilibrium (>\$9) → surplus (QS > QD)
- At \$11, there's a surplus of exactly 70 units

Question 5: Shifting in Equation Format

Demand: $P = 48 - 4Q$ and Supply: $P = 6 + 2Q$

PART A: What is the equilibrium price?

ANSWER: $P^* = \$20, Q^* = 7$

WORK:

Step 1: Set demand equal to supply:

$$48 - 4Q = 6 + 2Q$$

Step 2: Solve for Q

$$48 - 6 = 2Q + 4Q$$

$$42 = 6Q$$

$$Q^* = 7$$

Step 3: Plug Q back into either equation to find P:

$$P = 48 - 4(7) = 48 - 28 = 20$$

$$\text{Or: } P = 6 + 2(7) = 6 + 14 = 20 \quad \checkmark$$

PART B: Supply shifts BACK by 3 units. What is the new equilibrium price?

ANSWER: $P^* = \$24, Q^* = 6$

WORK:

Step 1: Understand what 'supply shifts back by 3 means:

At every price, suppliers now produce 3 fewer units.

$$\text{Old supply: } P = 6 + 2Q$$

$$\text{Rearranged: } Q = (P - 6)/2$$

$$\text{New supply: } Q_{\text{new}} = (P - 6)/2 - 3$$

$$\text{Simplify: } Q_{\text{new}} = (P - 6)/2 - 6/2 = 1/2P - 6$$

$$\text{New supply: } P = 2Q + 12 \quad \text{or} \quad Q = (1/2)P - 6$$

Step 2: Set new supply equal to (unchanged) demand

$$\text{Demand: } P = 48 - 4Q$$

$$\text{Rearranged: } Q = (48 - P)/4$$

$$\text{Set equal: } (48 - P)/4 = (P - 12)/2$$

Step 3: Solve for P

Multiply both sides by 4:

$$48 - P = 2(P - 12)$$

$$48 - P = 2P - 24$$

$$48 + 24 = 2P + P$$

$$72 = 3P$$

$$P^* = 24$$

Step 4: Find Q

$$Q = (48 - 24) / 4 = 24 / 4 = 6$$

INTERPRETATION:

Supply shifted left (back), so equilibrium price ROSE from \$20 to \$24, and equilibrium quantity FELL from 7 to 6. This makes sense!

Question 6: Consumer Choice & Marginal Utility per Dollar

Suppose $MU_x/P_x > MU_y/P_y$ and the consumer is spending all income. What should this consumer do?

ANSWER: (a) Buy more of good x and less of good y

EXPLANATION:

The Rule: To maximize utility, consumers should allocate their budget so that

$$MU_1/P_1 = MU_2/P_2 = MU_3/P_3 = \dots \text{ (for all goods)}$$

What MU_x/P_x means: 'utility per dollar spent on good x'

Current situation: $MU_x/P_x > MU_y/P_y$

This means: Good x gives MORE utility per dollar than good y

The consumer is getting more 'bang for their buck' from good x

What should the consumer do?

1. Buy MORE of good x (the better deal)
2. Buy LESS of good y (the worse deal)
3. Reallocate dollars from y to x

What happens as they do this?

- As they buy more x \rightarrow MU_x falls (diminishing marginal utility)
- As they buy less y \rightarrow MU_y rises
- Eventually $MU_x/P_x = MU_y/P_y$ (optimum reached!)

EXAMPLE:

Suppose pizza costs \$10 and gives you 50 utils \rightarrow $MU/P = 5$ utils per dollar

Suppose tacos cost \$5 and give you 20 utils \rightarrow $MU/P = 4$ utils per dollar

You should buy more pizza and fewer tacos until the ratios equalize.

Question 7: Double Shifts (The Elasticity Trap!)

Suppose supply shifts out (increases) and demand shifts back (decreases). What happens to equilibrium price and quantity?

ANSWER: (a) Price falls. The effect on quantity is uncertain.

EXPLANATION:

Step 1: Analyze SUPPLY SHIFT OUT (increase)

- Supply curve shifts RIGHT
- At old equilibrium: surplus forms ($Q_S > Q_D$)
- This puts DOWNWARD pressure on price
- Once price adjusts down: Q increases

Step 2: Analyze DEMAND SHIFT BACK (decrease)

- Demand curve shifts LEFT
- At old equilibrium: surplus forms ($Q_S > Q_D$)
- This puts DOWNWARD pressure on price
- Once price adjusts down: Q decreases

Step 3: COMBINE both shifts

Supply out → P down, Q up

Demand back → P down, Q down

PRICE: Both shifts push price DOWN → P definitely FALLS ✓

QUANTITY: Supply pushes Q up, Demand pushes Q down → AMBIGUOUS

The quantity effect depends on the MAGNITUDE of each shift:

- If supply shift is larger → Q rises overall
- If demand shift is larger → Q falls overall
- If shifts are equal → Q stays the same

WHY STUDENTS GET THIS WRONG:

Many students overthink this and try to bring elasticity into it. You DON'T need elasticity here — just follow the curves! When both curves shift, you can immediately determine one outcome (here: price falls) and the other is ambiguous (quantity).

THE DOUBLE SHIFT RULE:

Same direction shifts → Q certain, P ambiguous

Opposite direction shifts → P certain, Q ambiguous