Consumer and Producer Surplus

Student workbook: attempt every question before looking at the solutions manual.

O1	Explain willingness to pay, and read it from a demand curve.
O2	Calculate consumer surplus for individual buyers and as an area on a demand diagram.
O3	Calculate producer surplus for individual sellers and as an area on a supply diagram.
O4	Explain why a competitive equilibrium maximises total surplus, and state the limits of that result.

O1: Explain willingness to pay, and read it from a demand curve.

Q01 [Foundational · short answer]

Define willingness to pay.

Q02 [Foundational · multiple choice]

On a demand curve, the height at a given quantity shows: (a) the total amount spent (b) the willingness to pay of the marginal buyer (c) the seller's cost (d) consumer surplus

Q03 [Core · numerical]

Using the mango demand curve (price height = (1100 - Q)/200), what is the willingness to pay of the buyer of the 300th kilogram?

Q04 [Core · conceptual]

Explain why a demand curve made from many buyers looks like a smooth line, while one made from five buyers looks like a staircase.

Q05 [Core · numerical]

At what price does the mango demand curve meet the price axis, and what does that price mean?

Q06 [Applied · scenario]

Two friends both buy a coffee for $3. One would have paid $6, the other $3.10. Did they gain equally from the purchase? Explain.

O2: Calculate consumer surplus for individual buyers and as an area on a demand diagram.

Q07 [Foundational · numerical]

Lena would pay up to $80 for a concert ticket and pays $50. What is her consumer surplus?

Q08 [Core · numerical]

Using the five buyers in the lesson (willingness to pay $5, $4.50, $4, $3.50, $3), find consumer surplus at a price of $4.

Q09 [Core · numerical]

In the mango market, the price is $4. Find consumer surplus.

Q10 [Core · true/false]

True or false: consumer surplus is the whole area under the demand curve up to the quantity bought.

Q11 [Applied · numerical]

The mango price falls from $3 to $2. By how much does consumer surplus rise, and how much of the rise goes to buyers who were already buying?

Q12 [Applied · conceptual]

Explain in words why a fall in price raises consumer surplus in two distinct ways.

G01a [Core · numerical]

Market for bread loaves per day: Qd = 1200 - 200P and Qs = -200 + 200P. Find the equilibrium and the consumer surplus.

G02a [Core · numerical]

Market for cinema seats per night: Qd = 900 - 60P and Qs = -60 + 60P. Find the equilibrium and the consumer surplus.

G03a [Core · numerical]

Market for bus rides per day: Qd = 6000 - 1000P and Qs = -1000 + 1000P. Find the equilibrium and the consumer surplus.

O3: Calculate producer surplus for individual sellers and as an area on a supply diagram.

Q13 [Foundational · numerical]

A farmer would accept as little as $1.20 per kg and sells for $3. What is her producer surplus per kilogram?

Q14 [Foundational · short answer]

Where is producer surplus on a supply and demand diagram?

Q15 [Core · numerical]

Using the five sellers (lowest acceptable prices $1, $1.50, $2, $2.50, $3), find producer surplus at a price of $2.50.

Q16 [Core · numerical]

In the mango market, find producer surplus at the equilibrium price of $3.

Q17 [Applied · conceptual]

A stall owner says: 'My producer surplus is $625 a day, so I make $625 profit.' Explain the error.

Q18 [Applied · numerical]

If the mango price were $3.50 with 500 kg still traded, how would producer and consumer surplus change compared with $3?

G01b [Core · numerical]

In the same market, find producer surplus and total surplus at equilibrium.

G02b [Core · numerical]

In the same market, find producer surplus and total surplus at equilibrium.

G03b [Core · numerical]

In the same market, find producer surplus and total surplus at equilibrium.

O4: Explain why a competitive equilibrium maximises total surplus, and state the limits of that result.

Q19 [Foundational · short answer]

Define total surplus.

Q20 [Core · numerical]

Find total surplus in the mango market at equilibrium.

Q21 [Core · true/false]

True or false: if the mango market traded 600 kg instead of 500 kg, total surplus would rise because more mangoes change hands.

Q22 [Applied · numerical]

Only 300 kg of mangoes are traded. Calculate the lost surplus and the remaining total surplus.

Q23 [Applied · conceptual]

Explain why the market equilibrium is called 'efficient', and give one reason why an efficient outcome may still be criticised.

Q24 [Advanced · critical thinking]

A factory's production pollutes a river, harming people downstream. Explain why the market quantity may no longer maximise total surplus.

Q25 [Advanced · long answer]

In about 150 words, with a labelled diagram, explain the statement: 'The price in a competitive market is a transfer; the quantity determines efficiency.'

G01c [Applied · numerical]

If only 400 units were traded in that market, how much total surplus would be lost?

G02c [Applied · numerical]

If only 336 units were traded in that market, how much total surplus would be lost?

G03c [Applied · numerical]

If only 2000 units were traded in that market, how much total surplus would be lost?

Assignment 1: who gains from a market? (individual, about 600 words)

Choose a market you know (a local food market, ride-hailing, concert tickets, second-hand phones). Describe its buyers and sellers and use consumer and producer surplus to analyse it.

1. Explain willingness to pay and lowest acceptable price for typical buyers and sellers in your market, with examples (O1, O3).
2. Draw a labelled supply and demand diagram showing consumer and producer surplus (O2, O3).
3. Describe one event that changes the price (for example a new competitor) and explain how consumer and producer surplus change (O2, O3).
4. Discuss whether the market outcome is efficient and whether it is fair, giving one reason it might not be efficient (O4).

Assignment 2: calculation set (individual)

A city's market for bicycle repairs has demand Qd = 400 - 10P and supply Qs = -50 + 5P (P in dollars, Q repairs per week).

1. Find the equilibrium price and quantity.
2. Calculate consumer, producer and total surplus.
3. Calculate the lost surplus if only 70 repairs a week take place.
4. Explain in two sentences why the lost surplus arises.