

Past-paper walk-through

Introduction to Imperfectly Competitive Markets ■ 4.1

eXercise

Questions in this set

- 2025 Set 1 Q1
- 2024 Set 2 Q1

Reading the mark scheme

- **B1** a mark that stands on its own – the point is either made or not.
- **M1** a *method* mark: the right approach, even if the number is wrong.
- **A1** an *answer* mark, and it usually needs its M mark first.
- **C1** a working mark on the way to the answer.
- **//** separates answers the examiner accepts equally.
- **ecf** = error carried forward: a later part is marked on your own earlier answer.
- **owtte** = “or words to that effect” – the wording need not match.

Question 1

2025 Set 1 ■ Q1

Voda Reservoir is a profit-maximizing firm and the only producer of bottled water in a country. Currently, Voda Reservoir is earning negative economic profit.

(a)(i) Draw a correctly labeled graph for Voda Reservoir and show each of the following. The profit-maximizing quantity, labeled Q_M .

(a)(ii) The profit-maximizing price, labeled P_M .

(a)(iii) The average total cost curve consistent with Voda Reservoir earning negative economic profit, labeled ATC.

(a)(iv) The area of deadweight loss, shaded completely.

Question 1

2025 Set 1 ■ Q1

Voda Reservoir is a profit-maximizing firm and the only producer of bottled water in a country. Currently, Voda Reservoir is earning negative economic profit.

(b) Suppose the government requires Voda Reservoir to produce the socially optimal quantity of bottled water. On your graph in part A, show the socially optimal quantity of bottled water, labeled Q_S .

Question 1

2025 Set 1 ■ Q1

Voda Reservoir is a profit-maximizing firm and the only producer of bottled water in a country. Currently, Voda Reservoir is earning negative economic profit.

(c) Suppose instead the government grants a per-unit subsidy to Voda Reservoir. What will happen to Voda Reservoir's profit-maximizing quantity of bottled water? Explain.

Question 1

2025 Set 1 ■ Q1

Voda Reservoir is a profit-maximizing firm and the only producer of bottled water in a country. Currently, Voda Reservoir is earning negative economic profit.

(d) Suppose new producers have entered the bottled-water market and Voda Reservoir continues to operate in the bottled-water market. Will the demand for Voda Reservoir's bottled water become more elastic, become less elastic, or stay the same as new producers enter the market?

Question 1

2025 Set 1 ■ Q1

Voda Reservoir is a profit-maximizing firm and the only producer of bottled water in a country. Currently, Voda Reservoir is earning negative economic profit.

(e)(i) Voda Reservoir hires workers in a perfectly competitive labor market. If the demand for bottled water increases, what will happen to Voda Reservoir's demand for labor? Explain.

(e)(ii) The government implements a new regulation that increases the minimum age required for a worker to be employed in a bottled-water factory. What will happen to the market wage in the short run? Explain.

Solution 1

(a)(i)

Mark scheme

- Draw a correctly labeled graph for Voda Reservoir (a monopolist) with Price/Cost on the vertical axis and Quantity on the horizontal axis. Show a downward-sloping demand curve (D) and a downward-sloping marginal revenue curve (MR) lying below D, plus a rising marginal cost curve (MC). Label the profit-maximizing quantity Q_M at the intersection of MR and MC (where $MR = MC$). Points: 1 point for the correctly drawn D and MR curves (D downward-sloping, MR downward-sloping and below D); 1 point for the rising MC curve and Q_M correctly labeled where $MR = MC$.

Solution 1

(a)(ii)

Mark scheme

- From Q_M , draw a vertical line up to the demand curve D; the corresponding price on the vertical axis is the profit-maximizing price, labeled P_M . The graph must show P_M read off the D curve directly above Q_M .

Solution 1

(a)(iii)

Mark scheme

- Draw the average total cost (ATC) curve so that it lies ABOVE the demand curve D at Q_M (i.e., $ATC > P_M$ at Q_M), which is consistent with Voda Reservoir earning negative economic profit (a loss). The MC curve must pass through the minimum point of the ATC curve.

Solution 1

(a)(iv)

Mark scheme

- Shade the deadweight loss completely: the triangular area bounded between the demand curve (D) and the marginal cost curve (MC), from Q_M out to the quantity where D intersects MC (the allocatively efficient quantity). This region represents the value lost to society because the monopolist produces less than the efficient quantity.

Solution 1

(b)

Mark scheme

- On the same graph, label the socially optimal quantity Q_S at the intersection of the demand curve (D) and the marginal cost curve (MC) — the allocatively efficient quantity where price equals marginal cost. Q_S must lie to the right of Q_M .

Solution 1

(c)

Mark scheme

- Voda Reservoir's profit-maximizing quantity of bottled water will INCREASE. Explain with ONE of: (1) the per-unit subsidy decreases the firm's marginal cost, shifting the MC curve to the right (down), so it intersects the MR curve at a greater quantity; OR (2) the per-unit subsidy increases the firm's marginal revenue, shifting the MR curve to the right, so it intersects the MC curve at a greater quantity.

Solution 1

(d)

Mark scheme

- The demand for Voda Reservoir's bottled water will become MORE ELASTIC. As new producers enter the bottled-water market, more substitutes become available for Voda Reservoir's product, making its individual demand more sensitive to price changes (more elastic).

Solution 1

(e)(i)

Mark scheme

- Voda Reservoir's demand for labor will INCREASE. Explanation: the increase in demand for bottled water increases the price and marginal revenue of bottled water, which increases the marginal revenue product of labor ($MRP = MR \times MPL$), shifting the labor demand curve to the right.

Solution 1

(e)(ii)

Mark scheme

- The market wage will INCREASE in the short run. Explanation: raising the minimum age required to work in a bottled-water factory decreases the supply of workers, shifting the labor supply curve to the left, which raises the equilibrium market wage.

Question 1

2024 Set 2 ■ Q1

Arzeye Pharma has a patent, a legal barrier to entry, on its newly developed eye treatment that cures common eye problems. Arzeye Pharma is currently earning positive economic profit and is producing the profit-maximizing quantity of eye treatments.

- (a)** Draw a correctly labeled graph for Arzeye Pharma and show each of the following.
- (i) The profit-maximizing quantity of eye treatments, labeled Q^*
 - (ii) The profit-maximizing price, labeled P^*
 - (iii) The average total cost curve consistent with positive economic profit, labeled ATC
 - (iv) The area representing consumer surplus, shaded completely

Question 1

2024 Set 2 ■ Q1

Arzeeye Pharma has a patent, a legal barrier to entry, on its newly developed eye treatment that cures common eye problems. Arzeeye Pharma is currently earning positive economic profit and is producing the profit-maximizing quantity of eye treatments.

(b)(i) Suppose Arzeeye Pharma wants to charge a price that maximizes its total revenue rather than its profit. On your graph in part (a), show the revenue-maximizing quantity, labeled Q_R .

(b)(ii) At quantity Q_R identified in part (b)(i), is the demand for eye treatments elastic, inelastic, or unit elastic?

Question 1

2024 Set 2 ■ Q1

Arzeye Pharma has a patent, a legal barrier to entry, on its newly developed eye treatment that cures common eye problems. Arzeye Pharma is currently earning positive economic profit and is producing the profit-maximizing quantity of eye treatments.

(c)(i) Suppose now that Arzeye Pharma engages in perfect price discrimination. On your graph in part (a), show the lowest price that Arzeye Pharma would charge, labeled P_2 .

(c)(ii) What would happen to consumer surplus? Explain.

Question 1

2024 Set 2 ■ Q1

Arzeye Pharma has a patent, a legal barrier to entry, on its newly developed eye treatment that cures common eye problems. Arzeye Pharma is currently earning positive economic profit and is producing the profit-maximizing quantity of eye treatments.

(d) Suppose instead that Arzeye Pharma's patent expires. Will the demand for Arzeye Pharma's treatment become more elastic, become less elastic, or not change? Explain.

Solution 1

(a) Mark scheme

- Graph of Arzeye Pharma (a profit-maximizing firm with market power) showing, in order: (1) a downward-sloping demand (D) curve and a downward-sloping marginal revenue (MR) curve lying below D; (2) a rising, U-shaped marginal cost (MC) curve intersecting MR at the profit-maximizing quantity, labeled Q^* , where $MR = MC$; (3) the profit-maximizing price P^* , found by going up from Q^* to the demand curve; (4) the average total cost (ATC) curve drawn below P^* at Q^* (so $P^* > ATC$, i.e. positive economic profit), with the MC curve passing through the minimum point of the ATC curve; (5) the consumer surplus area — the triangle between the demand curve and the price P^* , from the price axis out to Q^* — shaded completely. 5 points total: 1 point each for (i) D & MR correctly drawn

Solution 1

with MR below D, (ii) MC rising and Q^* located at $MR=MC$, (iii) P^* read off D at Q^* , (iv) ATC below P^* at Q^* with MC through ATC's minimum, (v) consumer surplus fully shaded.

Solution 1

(b)(i)

Mark scheme

- On the same graph, the revenue-maximizing quantity Q_R is marked where the MR curve crosses the horizontal (quantity) axis, i.e. where $MR = 0$. Because total revenue is maximized when marginal revenue is zero, Q_R lies to the right of Q^* (a larger quantity than the profit-maximizing quantity, since profit maximization requires $MR = MC > 0$).

Solution 1

(b)(ii)

Mark scheme

- At quantity Q_R , demand for eye treatments is unit elastic. Total revenue is maximized exactly where marginal revenue equals zero, and that point on the demand curve corresponds to $|E_d| = 1$ (unit elastic demand).

Solution 1

(c)(i)

Mark scheme

- Under perfect price discrimination, Arzeye continues selling additional units as long as a consumer's willingness to pay (given by the demand curve) is at least as high as the marginal cost of producing that unit, so it sells down to the quantity where $D = MC$. The lowest price it charges, labeled P_2 , is therefore found at the intersection of the demand (D) curve and the marginal cost (MC) curve — this price is below both P^* and the price at Q_R .

Solution 1

(c)(ii)

Mark scheme

- Consumer surplus would decrease to \$0. Explanation: under perfect price discrimination Arzeye charges each consumer the maximum price that consumer is willing to pay for each unit, so it captures the entire area that was previously consumer surplus as additional producer surplus/profit, leaving consumers with none.

Solution 1

(d)

Mark scheme

- Arzeye Pharma's demand will become more elastic. Explanation: once the patent expires, other firms are free to enter the market and offer substitute (e.g. generic) eye treatments. With more substitutes available, consumers can more easily switch away from Arzeye's treatment in response to a price increase, making demand more responsive to price changes (more elastic).