Past-paper walk-through

The Effects of Government Intervention in Markets ▪ 2.8

eXercise

Questions in this set

- 2026 Q3
- 2025 Set 1 Q2
- 2025 Set 2 Q1
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- 2017 Q1
- 2016 Q1

Questions in this set

- 2015 Q3
- 2014 Q2

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 3

2026 ▪ Q3

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3. In Gurkeland, the domestic market for cucumbers is characterized by a downward-sloping demand curve and an upward-sloping supply curve, and the market for cucumbers is currently in equilibrium at a price of $20 per bushel.

Part A

Draw a correctly labeled graph of the market for cucumbers and show the equilibrium price, labeled $20, and the equilibrium quantity, labeled Q_1.

Part B

Suppose that Gurkeland engages in free trade with other countries and that the world price of cucumbers is $10 per bushel.

i. On your graph in part A, show the world price of cucumbers, labeled $10, and the quantity of cucumbers sold by domestic producers, labeled Q_2.

Question 3

ii. Will total economic surplus in Gurkeland increase, decrease, or remain the same after engaging in free trade?

Part C

Now suppose that the government of Gurkeland imposes a $5 tariff per bushel on the import of cucumbers.

i. On your graph in part A, show the new quantity of cucumbers, labeled Q_3, that will be sold by domestic producers as a result of the $5 tariff imposed on the import of cucumbers.

ii. As compared with the free trade described in part B, will domestic producer surplus in the market for cucumbers increase, decrease, or remain the same as a result of the $5 tariff imposed on the import of cucumbers? Explain.

Question 3

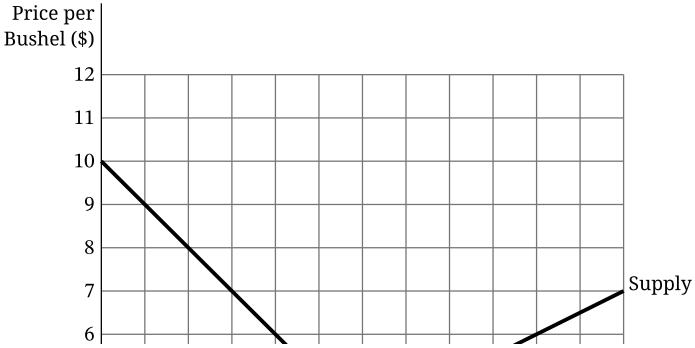
STOP

END OF EXAM

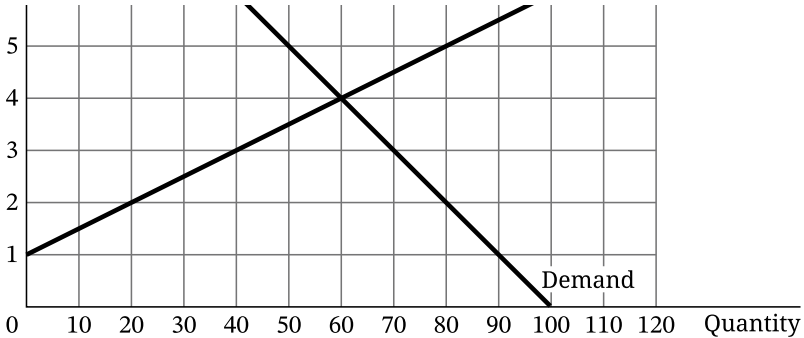
Question 2

2025 Set 1 ▪ Q2

2. The graph provided shows the market for rice in the country of Rushland.



Question 2



Question 2

A. Calculate the total economic surplus at market equilibrium. Show your work.

B. If the government sets a price floor at $3 per bushel, will there be a surplus, a shortage, or neither? Explain.

C. Suppose that instead of the price floor, Rushland engages in international trade and the world price of rice is $5 per bushel.

i. Will Rushland export or import rice? Explain using numbers from the graph.

ii. Calculate the domestic consumer surplus when Rushland engages in international trade. Show your work.

iii. Calculate the total revenue that Rushland's farmers will earn at the world price. Show your work.

Solution 2

(a)

Mark scheme

- Total Economic Surplus $= \frac{1}{2} \times (\$10 - \$1) \times (60 - 0) = \frac{1}{2} \times \$9 \times 60 = \$270.$ (Equivalently, Consumer Surplus + Producer Surplus $= \frac{1}{2} \times (\$10 - \$4) \times 60 + \frac{1}{2} \times (\$4 - \$1) \times 60 = \$180 + \$90 = \$270.$) Must show work; final answer 270.

Solution 2

(b)

Mark scheme

- There will be NEITHER a surplus NOR a shortage. Explanation: a price floor set at $3 per bushel is below the equilibrium price ($4), so it is not binding and therefore has no effect on the market price and quantity.

Solution 2

(c)(i)

Mark scheme

- Rushland will EXPORT rice. Explain with ONE of: (1) at the world price of 5, $the domestic quantity supplied is 80 bushels of rice$, $which is greater than the domestic quantity$ Rushland has a domestic surplus of 30 bushels of rice that can be exported.

Solution 2

(c)(ii)

Mark scheme

- Domestic Consumer Surplus $= \frac{1}{2}\times(\$10-\$5)\times(50-0) = \frac{1}{2}\times\$5\times50 = \$125$. Must show work; final answer \$125.

(c)(iii)

Mark scheme

- Total Revenue = World Price $\times$ Quantity Sold $= \$5\times80 = \$400$ (quantity sold is the domestic quantity supplied at the world price, 80 bushels). Must show work; final answer \$400.

Question 1

2025 Set 2 ▪ Q1

Deskward is a typical profit-maximizing firm that produces and sells wooden desks in a constant-cost, perfectly competitive market that is in long-run equilibrium.

(a)(i) Draw correctly labeled side-by-side graphs for the wooden desk market and for Deskward and show each of the following. The market equilibrium price and quantity, labeled P_M and Q_M, respectively.

(a)(ii) Draw correctly labeled side-by-side graphs for the wooden desk market and for Deskward and show each of the following. Deskward's profit-maximizing price and quantity, labeled P_F and Q_F, respectively.

(a)(iii) Draw correctly labeled side-by-side graphs for the wooden desk market and for Deskward and show each of the following. Deskward's average total cost curve consistent with long-run equilibrium, labeled ATC.

Question 1

2025 Set 2 ▪ Q1

Deskward is a typical profit-maximizing firm that produces and sells wooden desks in a constant-cost, perfectly competitive market that is in long-run equilibrium.

(b) If the monthly rent, a fixed cost, on Deskward's factory building increases, what will happen to the firm's profit-maximizing quantity in the short run? Explain.

Question 1

2025 Set 2 ▪ Q1

Deskward is a typical profit-maximizing firm that produces and sells wooden desks in a constant-cost, perfectly competitive market that is in long-run equilibrium.

(c)(i) Suppose the government is considering granting a per-unit subsidy to producers of wooden desks. On your market graph in part A, show the short-run effect of a per-unit subsidy on each of the following. The new market equilibrium price and quantity of wooden desks, labeled P^* and Q^*, respectively.

(c)(ii) Suppose the government is considering granting a per-unit subsidy to producers of wooden desks. On your market graph in part A, show the short-run effect of a per-unit subsidy on each of the following. The area representing the total cost of the subsidy to the government, shaded completely.

Question 1

2025 Set 2 ▪ Q1

Deskward is a typical profit-maximizing firm that produces and sells wooden desks in a constant-cost, perfectly competitive market that is in long-run equilibrium.

(d) Instead of the per-unit subsidy, suppose the government imposes a binding price floor in the market for wooden desks. Will the price floor result in a shortage of wooden desks, a surplus of wooden desks, or neither? Explain.

Question 1

2025 Set 2 ▪ Q1

Deskward is a typical profit-maximizing firm that produces and sells wooden desks in a constant-cost, perfectly competitive market that is in long-run equilibrium.

(e)(i) Deskward also produces chairs. Deskward increases its production from 500 chairs to 600 chairs, and its long-run total cost increases from \$80,000 to \$108,000. Calculate Deskward's long-run average total cost of producing 500 chairs. Show your work.

(e)(ii) As Deskward increases production from 500 chairs to 600 chairs, is Deskward experiencing economies of scale, diseconomies of scale, or the efficient scale? Explain using numbers.

Solution 1

(a)(i)

Mark scheme

- Draw a correctly labeled graph of the market for wooden desks with a downward-sloping demand (D) curve and an upward-sloping supply (S_1) curve. Label the market equilibrium price (where D and S_1 intersect) as P_M and the market equilibrium quantity as Q_M.

Solution 1

(a)(ii)

Mark scheme

- Draw Deskward's graph with the firm's horizontal demand and marginal revenue curve (d = MR) extended from the market equilibrium price P_M, and label the firm's price as P_F (= P_M, since the firm is a price taker) (1 point). Also draw a rising marginal cost (MC) curve and show the firm's profit-maximizing quantity, labeled Q_F, at the point where MR = MC (1 point).

Solution 1

(a)(iii)

Mark scheme

- Show the average total cost (ATC) curve tangent to the firm's d = MR curve at Q_F, and show the MC curve passing through the minimum point of the ATC curve. Tangency of ATC to price (zero economic profit) with MC crossing ATC at its minimum indicates Deskward's ATC curve is consistent with long-run competitive equilibrium.

Solution 1

(b)

Mark scheme

- Deskward's profit-maximizing quantity will NOT change in the short run. An increase in a fixed cost (like rent) does not affect the firm's marginal cost or marginal revenue; since profit maximization occurs where MR = MC and neither curve shifts, the profit-maximizing quantity is unchanged (only the firm's economic profit falls).

Solution 1

(c)(i)

Mark scheme

- On the market graph from part A, show the supply curve shifting right, from S_1 to S_2 (a per-unit subsidy lowers producers' effective cost of production, increasing supply). Label the new, lower market equilibrium price as P^* and the new, higher market equilibrium quantity as Q^*, at the intersection of D and S_2.

Solution 1

(c)(ii)

Mark scheme

- Shade completely the rectangle bounded by the vertical gap between S_1 and S_2 (the per-unit subsidy) at the new equilibrium quantity Q^* — i.e., the area between S_1 and S_2 from quantity 0 to Q^*, spanning from P^* up to the price on S_1 at Q^*. This area equals the per-unit subsidy times Q^*, the total cost of the subsidy to the government.

Solution 1

(d)

Mark scheme

- The price floor will result in a surplus of wooden desks. Because the price floor is binding, it is set above the market equilibrium price; at this higher price, the quantity of wooden desks supplied is greater than the quantity demanded, creating a surplus.

Solution 1

(e)(i)

Mark scheme

- Long-run average total cost (LRATC) at 500 chairs = Total Cost / Quantity = \$80{,}000 / 500 = \$160 per chair. Show the division as work.

Solution 1

(e)(ii)

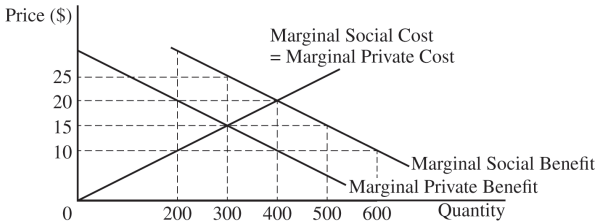
Mark scheme

- Deskward is experiencing diseconomies of scale. As output increases from 500 to 600 chairs, LRATC increases from \$160 (= \$80{,}000/500) to \$180 (= \$108{,}000/600) per chair. Because LRATC rises as output increases, this is diseconomies of scale (economies of scale would require falling LRATC; efficient scale requires LRATC to be at its minimum).

Question 2

2024 Set 1 ▪ Q2

2. Good X is produced and sold in a perfectly competitive market. The provided graph shows the market for Good X.



(a) Identify the market equilibrium price and quantity.

(b) Calculate the deadweight loss at the market equilibrium. Show your work.

Question 2

(c) Suppose the government wants to eliminate the deadweight loss in the market for Good X.

(i) Which of the following will achieve the government's objective: a per-unit tax on consumers or a per-unit subsidy to consumers? Explain.

(ii) What is the dollar value of the per-unit tax or per-unit subsidy identified in part (c)(i) ?

(d) Suppose instead the government imposes a price ceiling of $10. Will the price ceiling achieve the socially optimal quantity of Good X? 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.

Solution 2

(a)

Mark scheme

- The market equilibrium price is \$15, and the market equilibrium quantity is 300 units (read directly off the given supply-and-demand graph/data as the point where quantity supplied equals quantity demanded).

Solution 2

(b)

Mark scheme

- Deadweight loss = \$500. Work: \$DWL = \tfrac{1}{2} \times (\$25 - \$15) \times (400 - 300) = \tfrac{1}{2} \times \$10 \times 100 = \$500\$. This is the triangle between the demand and supply curves from the market quantity (300) to the socially optimal quantity (400), using the demand price (\$25) and supply price (\$15) at the margin.

Solution 2

(c)(i) Mark scheme

- The government should grant a per-unit subsidy to consumers (not a per-unit tax) to eliminate the deadweight loss and achieve the socially optimal quantity of Good X. Explanation (any one is sufficient): a per-unit subsidy to consumers internalizes the external benefit and increases consumers' incentive/ability to buy, raising quantity to the socially optimal level (400); a subsidy equal to the marginal external benefit lowers the effective price paid by consumers, increasing consumption to 400; a subsidy equal to the gap between marginal social benefit and marginal private benefit increases the quantity exchanged to the socially optimal quantity (400). (This implies Good X generates a positive externality, so a tax would move the market further from the optimum, not closer.)

Solution 2

(c)(ii)

Mark scheme

- The dollar value of the per-unit subsidy is \$10 — equal to the vertical gap between the marginal social benefit (demand) curve and the marginal private benefit at the socially optimal quantity of 400 units.

Solution 2

(d)

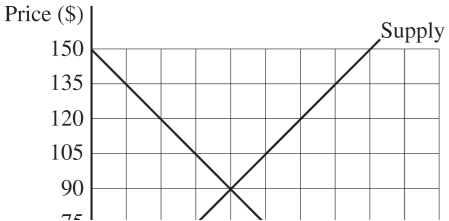
Mark scheme

- No, the price ceiling of \$10 will not achieve the socially optimal quantity of Good X. Explanation: a binding price ceiling causes the quantity actually exchanged in the market to be limited by the (lower) quantity supplied at that price, which is 200 units — less than the socially optimal quantity of 400 units. So the price ceiling creates a shortage and under-provides the good relative to the social optimum.

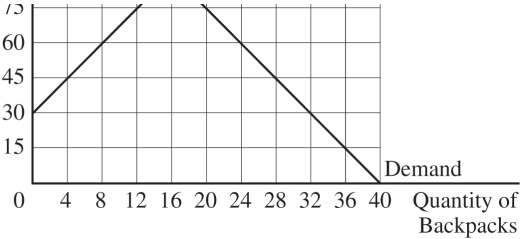
Question 3

2024 Set 2 ▪ Q3

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.



Question 3



(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.

Question 3

(i) Identify the price paid by consumers per backpack after the per-unit subsidy is implemented.
(ii) Calculate the total cost of the subsidy to the government. Show your work.
(iii) 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

Question 3

STOP

END OF EXAM

Solution 3

(a)

Mark scheme

- Total Economic Surplus $= \frac{1}{2} \times$ (choke price $-$ minimum supply price) $\times$ equilibrium quantity $= \frac{1}{2} \times (150-30) \times (16 - 0) = \frac{1}{2} \times 120 \times 16 = 960$.

Solution 3

(b)

Mark scheme

- The quantity of backpacks purchased will decrease. Explanation: the price ceiling of $60, set below the equilibrium price, causes a decrease in the quantity of backpacks supplied to 8. Because a shortage results, the quantity actually purchased in the market is limited by this (lower) quantity supplied (8), which is less than the equilibrium quantity (16).

Solution 3

(c)(i)

Mark scheme

- The price consumers pay per backpack after the per-unit subsidy is implemented is $75.

(c)(ii)

Mark scheme

- Total Cost of Subsidy to the Government = Per-unit Subsidy $\times$ Quantity of Backpacks = 30×20 =600.

Solution 3

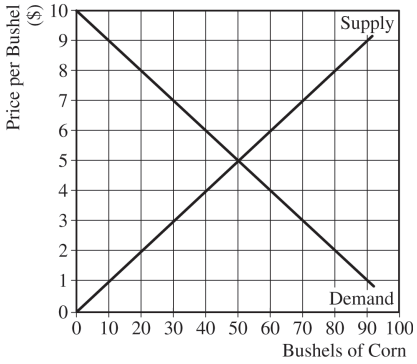
(c)(iii)

Mark scheme

- The deadweight loss will increase compared to the market equilibrium in part (a). Explanation (either is sufficient): the per-unit subsidy causes the new equilibrium quantity (20 backpacks) to exceed the allocatively efficient quantity (16 backpacks) — i.e. the market overproduces; equivalently, at the new equilibrium quantity of 20 backpacks the marginal cost (105)*isgreaterthanthemarginalbenefit*(75), and this gap between marginal cost and marginal benefit on the extra units produced is the source of the increased deadweight loss.

Question 3

2021 Set 1 ▪ Q3



Question 3

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.

   (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.

Question 3

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.

STOP

END OF EXAM

Solution 3

(a)

Mark scheme

- Total revenue at the market equilibrium price = \$250. Work: $TR = P \times Q = \$5 \times 50 = \$250$, using the market equilibrium price of \$5 and equilibrium quantity of 50 bushels.

Solution 3

(b)(i)

Mark scheme

- 30 bushels of corn will be exchanged at the $7 price floor. At a binding price floor, the quantity actually exchanged is the smaller of quantity supplied and quantity demanded; here quantity demanded at $7 is 30 bushels (less than the 70 bushels supplied at that price), so only 30 bushels are exchanged.

Solution 3

(b)(ii)

Mark scheme

- Deadweight loss = \$40. Work: $\text{DWL} = \dfrac{(\$7-\$3)\times(50-30)}{2} = \dfrac{\$80}{2} = \$40$, where \$7 is the price floor, \$3 is the price on the supply curve corresponding to the reduced quantity of 30 bushels, and 50 is the original equilibrium quantity — forming the deadweight-loss triangle between quantities 30 and 50.

Solution 3

(b)(iii)

Mark scheme

- Producer surplus = \$245. Work: $PS = \dfrac{(\$7-\$0)\times(70-0)}{2} = \dfrac{\$490}{2} = \$245$. Because the government buys all unsold corn at \$7, producers sell their entire quantity supplied (70 bushels) at \$7, and with the supply curve starting at price \$0 when Q = 0, producer surplus is the full triangle under \$7 across quantities 0 to 70.

Solution 3

(b)(iv)

Mark scheme

- The quantity of corn purchased by the government will increase. Explanation: the \$7 price floor gives typical corn farms short-run economic profits, which incentivizes new firms to enter the market; entry increases market supply (and/or makes market supply more elastic) in the long run, so at the fixed \$7 floor the quantity supplied keeps rising while quantity demanded is unchanged — meaning the unsold surplus the government must buy grows over time.

Question 2

2019 Set 2 ▪ Q2

[Graph titled with y-axis "Price" and x-axis "Quantity". Three upward/downward lines are shown: a downward-sloping "Demand" curve, an upward-sloping "Supply" curve, and a steeper upward-sloping "Supply + Tax" curve (parallel-shifted up-left from Supply). Dashed horizontal gridlines at price levels P_4 (highest), P_3, P_2, P_1 (lowest), and dashed vertical gridlines at quantity levels Q_1, Q_2, Q_3, Q_4, Q_5 (left to right). Labeled points on the diagram: R at (Q_2, P_4) on the Supply + Tax curve; S at (Q_2, P_3) at the intersection of Demand and Supply; X at (Q_3, P_4) on the Supply + Tax curve; Y at (Q_4, P_3) on the Supply curve; T at (Q_2, P_2), unlabeled curve position (interior point); W at (Q_3, P_2) at the intersection of Supply and Supply + Tax; Z at (Q_2, P_1) on the Supply curve; V at (Q_4, P_1) on the Demand curve. The Demand curve slopes downward from upper-left to lower-right through S and V (and further points);

Question 2

the Supply curve slopes upward from lower-left through Z, S(no), W, Y; the Supply + Tax curve slopes upward from lower-left, parallel to Supply, through R, X.]

Hats are produced in a perfectly competitive industry, and the government imposes a per-unit sales tax on hats.

(a)(i) Using the labeling from the graph, identify each of the following. The after-tax price paid by consumers and the after-tax quantity

(a)(ii) The area representing the total tax revenue received by the government

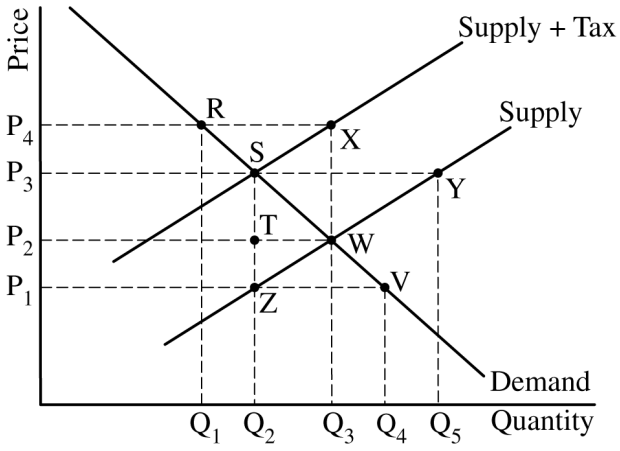
(b)(i) Now assume instead that the demand for hats is perfectly inelastic at Q_3, while the supply and the per-unit tax remain unchanged. Will the after-tax price paid by consumers be higher, lower, or the same compared to the price in your answer to part (a)(i)?

(b)(ii) Will the total tax revenue received by the government be higher, lower, or the same compared to the tax revenue in your answer to part (a)(ii)? Explain.

Question 2

(c) If the demand for hats remains perfectly inelastic at Q_3 and the per-unit sales tax is reduced, will producer surplus increase, decrease, or stay the same? Explain.

Question 2


Price
Supply + Tax
Supply
Demand
Quantity
R
S
T
W
X
Y
V
Z
P_4
P_3
P_2
P_1
Q_1
Q_2
Q_3
Q_4
Q_5

Solution 2

(a)(i)

Mark scheme

- The after-tax price paid by consumers is P_3, and the after-tax quantity is Q_2 (using the graph's labeling, where the per-unit tax drives a wedge between the price consumers pay and the price sellers receive, and reduces the equilibrium quantity from Q_3 to Q_2).

Solution 2

(a)(ii)

Mark scheme

- The area representing the total tax revenue received by the government is the rectangle P_1P_3SZ, equivalently $(P_3 \times Q_2) - (P_1 \times Q_2)$, or $(P_3 - P_1) \times Q_2$ — where P_1 is the price received by sellers after the tax, P_3 is the price paid by consumers, and $(P_3 - P_1)$ is the per-unit tax, multiplied by the after-tax quantity Q_2.

Solution 2

(b)(i)

Mark scheme

- The after-tax price paid by consumers will be higher than in part (a)(i). When demand for hats is perfectly inelastic at Q_3, sellers can pass the entire per-unit tax on to consumers, so the price rises by the full amount of the tax (more than when demand was downward-sloping).

Solution 2

(b)(ii)

Mark scheme

- The total tax revenue received by the government will be higher than in part (a)(ii). This is because the tax does not reduce the quantity purchased when demand is perfectly inelastic (quantity stays at Q_3), whereas quantity falls (to Q_2) when demand is downward-sloping — since $Q_3 > Q_2$, tax revenue (tax per unit $\times$ quantity) is larger under perfectly inelastic demand.

Solution 2

(c)

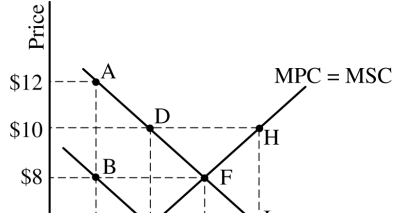
Mark scheme

- Producer surplus will stay the same. Because demand is perfectly inelastic at Q_3, both the price received by sellers (P_2) and the quantity sold (Q_3) do not change when the per-unit sales tax is reduced, so producer surplus (which depends only on price received and quantity) is unaffected. (Equivalently: producer surplus stays the same because the consumer bears the full burden of any change in the tax.)

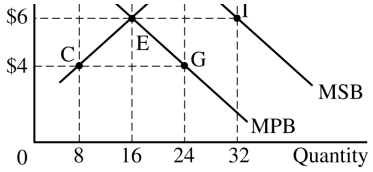
Question 2

2018 ▪ Q2

2. 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.



Question 2



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

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

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

(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?

(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?

Question 2

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

Solution 2

(a)

Mark scheme

- The graph illustrates a positive externality (in production or consumption). Explanation: marginal social benefit is greater than marginal private benefit (MSB $>$ MPB) — equivalently, the market equilibrium quantity is less than the socially optimal quantity.

Solution 2

(b)

Mark scheme

- Market equilibrium price = \$6; market equilibrium quantity = 16 units.

Solution 2

(c)

Mark scheme

- The deadweight loss at the market quantity of 16 units is the triangular area labeled DEF on the graph — the region between the MSB and MSC (supply) curves, spanning from the market quantity (16 units) out to the socially optimal quantity.

Solution 2

(d)

Mark scheme

- The per-unit subsidy needed to achieve the socially optimal quantity is $4.

Solution 2

(e)(i)

Mark scheme

- At a price floor of 8, $consumersandproducerswillexchange8units(thequantitydemandedatthe8$ price floor, which is below the quantity supplied, so the shorter side of the market — quantity demanded — determines the amount actually exchanged).

Solution 2

(e)(ii)

Mark scheme

- No, the $8 price floor does not correct the market failure. Explanation (any one of): the quantity exchanged in the market (8 units) is still less than the socially optimal quantity; marginal social benefit is greater than marginal social cost (MSB $>$ MSC) at a quantity of 8 units; or the deadweight loss increased after the price floor was imposed compared to the unregulated market outcome.

Question 1

2017 ▪ Q1

Corn is used as food and as an input in the production of ethanol, an alternative fuel. Assume corn is produced in a perfectly competitive market.

(a) Draw correctly labeled side-by-side graphs for the corn market and a representative corn farmer. On your graphs show each of the following.

(i) The equilibrium price and quantity in the corn market, labeled P_M and Q_M, respectively

(ii) The profit-maximizing quantity of corn produced by the representative farmer earning zero economic profit, labeled Q_F

Question 1

2017 ▪ Q1

Corn is used as food and as an input in the production of ethanol, an alternative fuel. Assume corn is produced in a perfectly competitive market.

(b)(i) Assume the demand for ethanol increases. On your graphs in part (a) show what will happen to each of the following in the short run.

The market price and quantity of corn, labeled P^* and Q^*

(b)(ii) The area of the profit or loss earned by the representative corn farmer, shaded completely

Question 1

2017 ▪ Q1

Corn is used as food and as an input in the production of ethanol, an alternative fuel. Assume corn is produced in a perfectly competitive market.

(c) Relative to your answer in part (b), state what will happen to the market equilibrium price and quantity of corn in the long run. Explain.

Question 1

2017 ▪ Q1

Corn is used as food and as an input in the production of ethanol, an alternative fuel. Assume corn is produced in a perfectly competitive market.

(d) Soybeans are produced in a perfectly competitive market. Assume farmers can grow either corn or soybeans on the same land. What happens to the price of soybeans in the next planting season if the price of corn increases? Explain.

Question 1

2017 ▪ Q1

Corn is used as food and as an input in the production of ethanol, an alternative fuel. Assume corn is produced in a perfectly competitive market.

(e)(i) Assume instead that the government sets a binding price ceiling in the corn market. Draw a new correctly labeled graph for the corn market and show each of the following.

The binding price ceiling, labeled P_c

(e)(ii) The quantity purchased by consumers in the corn market, labeled Q_p

Solution 1

(a) Mark scheme

- Draw side-by-side graphs. Corn MARKET graph: downward-sloping demand D_1 and upward-sloping supply S intersecting at equilibrium price P_M and quantity Q_M (both labeled on the axes with dashed lines to the intersection). FIRM graph: a horizontal demand/marginal-revenue curve $d_1 = MR_1$ drawn at the market price P_M; the firm's profit-maximizing quantity Q_F is where $MC = MR_1$; the firm's ATC and MC curves are drawn with MC passing through the minimum point of ATC, and $P_M = ATC = MC$ at Q_F (the representative farmer earns zero economic profit). Points earned for: (1) correctly labeled corn-market graph with P_M, Q_M (downward demand, upward supply); (2) horizontal demand curve on the

Solution 1

firm graph extended from P_M; (3) Q_F identified at $MC = MR_1$; (4) ATC/MC shown with MC passing through minimum ATC and $P = ATC = MC$ at Q_F.

Solution 1

(b)(i)

Mark scheme

- An increase in ethanol demand raises the demand for corn, shifting the market demand curve rightward from D_1 to D_2. This raises the market equilibrium price and quantity of corn in the short run, labeled P^* and Q^* (both greater than P_M and Q_M).

Solution 1

(b)(ii)

Mark scheme

- On the firm's graph, with price now at P^* (above ATC) and the firm producing where $MC = MR_2 = d_2$ at quantity Q_{F2}, the profit earned is the rectangle bounded above by P^* and below by ATC, over the output range from 0 to Q_{F2}. This rectangle must be shown completely shaded to earn the point.

Solution 1

(c)

Mark scheme

- In the long run the market quantity of corn will increase and the market price will decrease (moving back down). Because the representative farmer is earning positive economic profit in the short run (part b), new farmers are attracted into the corn market; their entry shifts the market supply curve rightward, which increases quantity and decreases price until economic profit returns to zero.

Solution 1

(d)

Mark scheme

- The price of soybeans will increase in the next planting season. Since farmers can grow either corn or soybeans on the same land, a higher price of corn makes growing corn relatively more profitable, so farmers substitute land away from soybeans and into corn. This decreases the supply of soybeans, raising the equilibrium price of soybeans.

Solution 1

(e)(i)

Mark scheme

- Draw a new, correctly labeled graph of the corn market (same upward-sloping supply and downward-sloping demand) showing a binding price ceiling P_C set below the market equilibrium price.

Solution 1

(e)(ii)

Mark scheme

- The quantity purchased by consumers, Q_P, is the quantity at which the price ceiling P_C intersects the supply curve – i.e. the quantity that sellers are willing to supply at the ceiling price, which is the actual (constrained) quantity transacted in the market.

Question 1

2016 ▪ Q1

MICROECONOMICS
Section II
Total Time—60 minutes
Reading Period—10 minutes
Writing Period—50 minutes

Directions: You are advised to spend the first 10 minutes reading all of the questions and planning your answers. You will then have 50 minutes to answer all three of the following questions. You may begin writing your responses before the reading period is over. It is suggested that you spend approximately half your time on the first question and divide the remaining time equally between the next two questions. 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. Use a pen with black or dark blue ink.

1. The markets for bananas, muffins, and coffee are interrelated, and each market is perfectly competitive.

Question 1

(a) In the market for bananas, the equilibrium price is $1.00 per pound, and the equilibrium quantity is 1,000 pounds per week. Suppose the government imposes a price floor on bananas at $1.20 per pound, causing the quantity supplied to increase to 1,500 pounds per week.

(i) Would the price floor result in a shortage, a surplus, or neither? Explain.

(ii) Calculate the price elasticity of supply if the price increases from $1 to $1.20. Show your work.

(iii) Between $1 and $1.20, is the supply elastic, unit elastic, or inelastic? Explain.

(b) Bananas are an input for muffins.

(i) Draw a correctly labeled graph of the market for muffins indicating the equilibrium price and quantity, labeled P_0 and Q_0, respectively.

(ii) On the graph drawn in part (b)(i), show the impact of an increase in the price of bananas on the muffin market, labeling the new equilibrium price and quantity P_1 and Q_1, respectively.

(iii) On the same graph, completely shade the area that represents the **change** in the consumer surplus caused by the increase in the price of bananas.

Question 1

(c) In the market for coffee, the equilibrium price is $3.00 per cup and the equilibrium quantity is 100 cups per week. The cross-price elasticity of coffee with respect to muffins is −2.

(i) Are coffee and muffins normal goods, inferior goods, complementary goods, or substitute goods?

(ii) Assume the supply of coffee is perfectly elastic. Using the equilibrium price and quantity given above, draw a correctly labeled graph for the coffee market, and show the impact of an increase in the price of muffins on the coffee market.

(iii) Given the original quantity of 100 cups of coffee per week, if the increase in the price of muffins is 10%, calculate the new equilibrium quantity in the coffee market. Show your work.

Solution 1

(a)(i)

Mark scheme

- Surplus. At the price floor of $1.20 (above the 1.00$ equilibrium), the price floor is binding/effective, so quantity supplied (1,500 lb/week) exceeds quantity demanded — this excess of Qs over Qd is a surplus, not a shortage.

Solution 1

(a)(ii)

Mark scheme

- Price elasticity of supply $\approx$ 2.2–2.5 (either the midpoint or point method earns the point). Midpoint formula: $\%\Delta Q = (1500-1000)/1250 = 0.4 = 40\%$; $\%\Delta P = (1.20-1.00)/1.10 \approx 0.182 = 18.2\%$; $E = 40\%/18.2\% \approx 2.2$. (Equivalently with the point method using the original base: $\%\Delta Q = 500/1000 = 50\%$, $\%\Delta P = 0.20/1.00 = 20\%$, $E = 50\%/20\% = 2.5$.) Any correctly-worked elasticity value from a valid formula ($\approx$2, 2.2, or 2.5) earns the point.

Solution 1

(a)(iii)

Mark scheme

- Elastic. Since the price elasticity of supply calculated above is greater than 1 (the percentage change in quantity supplied exceeds the percentage change in price), supply over this range is elastic.

Solution 1

(b)(i)

Mark scheme

- A correctly labeled graph of the muffin market: Price on the vertical axis, Quantity on the horizontal axis, an upward-sloping supply curve S and a downward-sloping demand curve D intersecting at the initial equilibrium, with the equilibrium price and quantity labeled P0 and Q0 respectively (dashed lines dropping to the axes).

Solution 1

(b)(ii)

Mark scheme

- Because bananas are an input to muffins, the rise in the price of bananas raises muffin producers' costs, shifting the muffin supply curve LEFT from S to S1. The new intersection with demand D occurs at a higher price and lower quantity, labeled P1 ($>$ P0) and Q1 ($<$ Q0).

Solution 1

(b)(iii)

Mark scheme

- The area representing the decrease in consumer surplus is the trapezoid bounded above by the new price line P1, below by the original price line P0, on the left by the price (vertical) axis, and on the right by the (unchanged) demand curve D between the points (Q1, P1) and (Q0, P0) — i.e., the whole shaded band between P0 and P1 under the demand curve, out to Q0/Q1, must be completely shaded.

Solution 1

(c)(i)

Mark scheme

- Complementary goods. The cross-price elasticity of coffee with respect to muffins is negative ($-2 < 0$): a rise in the price of muffins decreases the quantity demanded of coffee, which is the defining property of complements.

Solution 1

(c)(ii)

Mark scheme

- Correctly labeled coffee-market graph: Price on the vertical axis, Quantity on the horizontal axis,
  a perfectly elastic (horizontal) supply curve S drawn at $P = 3$, $and a downward-sloping demand curve D with initial equilibrium quantity 100 cups/week. Because coffee and mu$
  while the equilibrium quantity falls (to 80 cups/week, from part (c)(iii)).

Solution 1

(c)(iii)

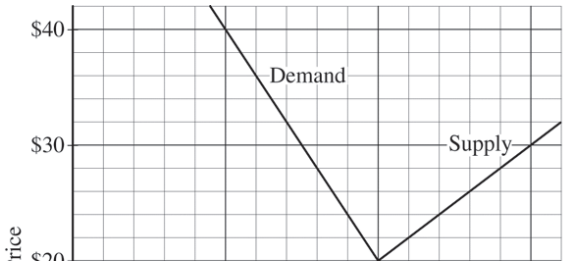
Mark scheme

- $\%\Delta Q = \%\Delta P(\text{muffins}) \times \text{cross-price elasticity} = 10\% \times (-2) = -20\%$. New equilibrium quantity $= 100 - (0.20 \times 100) = 100 \times (1 - 0.20) = 80$ cups per week. (Using the midpoint formula to back out the same $-20\%/80$ result is also acceptable.)

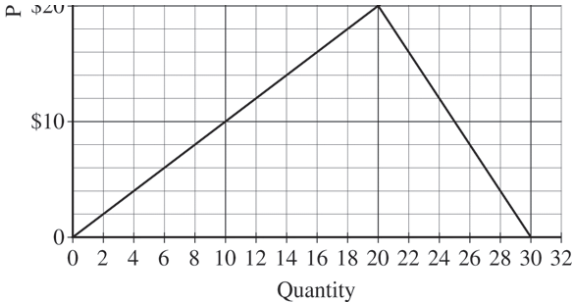
Question 3

2015 ▪ Q3

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



Question 3



Question 3

(a) Calculate the total producer surplus at the market equilibrium price and quantity. Show your work.

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

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

(d) If instead the government restricts the market output to 10 units, calculate the deadweight loss. Show your work.

(e) Assume the price decreases from $20 to $12.
   (i) Calculate the price elasticity of demand. Show your work.
   (ii) In this price range, is demand perfectly elastic, relatively elastic, unit elastic, relatively inelastic, or perfectly inelastic?

Question 3

STOP

END OF EXAM

Solution 3

(a)

Mark scheme

- Producer surplus is the area of the triangle between the supply curve and the market price, from output 0 to the equilibrium quantity. $PS = \frac{1}{2} \times \text{base} \times \text{height} = \frac{1}{2} \times 20 \times 20 = \$200$.

Solution 3

(b)

Mark scheme

- Neither a shortage nor a surplus results. The equilibrium price is $20, so a price floor set at $16 is BELOW equilibrium — it is not binding (the market still clears at the higher equilibrium price), so quantity supplied still equals quantity demanded.

Solution 3

(c)

Mark scheme

- A shortage results. The equilibrium price is \$20, so a price ceiling at \$12 is BELOW equilibrium — it is binding: at \$12 the quantity demanded exceeds the quantity supplied, creating a shortage.

Solution 3

(d) Mark scheme

- Restricting output to 10 units (below the equilibrium quantity of 20) creates a deadweight loss of \$150, found as the area of the triangle between the demand and supply curves from Q=10 to Q=20: $DWL = \frac{1}{2} \times 30 \times 10$, equivalently split into two triangles $\left(\frac{1}{2} \times 10 \times 10\right) + \left(\frac{1}{2} \times 20 \times 10\right) = \$50 + \$100 = \$150$.

Solution 3

(e)(i)

Mark scheme

- Using the reference quantity of 20 rising to 24 as price falls from \$20 to \$12: $E_d = \dfrac{(24-20)/20}{(12-20)/20} = \dfrac{0.20}{-0.40} = -0.5$ (equivalently, using the midpoint/arc-elasticity formula).

Solution 3

(e)(ii)

Mark scheme

- Since $|E_d| = 0.5 < 1$, demand is relatively inelastic over this price range.

Question 2

2014 ▪ Q2

Ray's Stable hires workers in a perfectly competitive factor market for unskilled labor.
(a)(i) Using correctly labeled side-by-side graphs for the labor market and Ray's Stable, show each of the following.
The equilibrium wage and quantity for unskilled labor, labeled W_E and Q_E, respectively
(a)(ii) Using correctly labeled side-by-side graphs for the labor market and Ray's Stable, show each of the following.
The wage paid by Ray's Stable and the quantity of unskilled labor hired, labeled W_R and Q_R, respectively

Question 2

2014 ▪ Q2

Ray's Stable hires workers in a perfectly competitive factor market for unskilled labor.

(b) Is the marginal factor cost of unskilled labor for Ray's Stable greater than, less than, or equal to W_E? Explain.

Question 2

2014 ▪ Q2

Ray's Stable hires workers in a perfectly competitive factor market for unskilled labor.

(c)(i) Now assume that the government imposes an effective minimum wage for unskilled labor.

Show the minimum wage on your graphs in part (a), labeled W_{MIN}.

(c)(ii) Now assume that the government imposes an effective minimum wage for unskilled labor.

On the labor market graph in part (a), show the quantity of unskilled labor supplied in the labor market as a result of the minimum wage, labeled Q_S.

(c)(iii) Now assume that the government imposes an effective minimum wage for unskilled labor.

As a result of the new minimum wage, will the marginal revenue product of the last worker hired by Ray's Stable increase, decrease, or stay the same?

Solution 2

(a)(i)

Mark scheme

- Draw the labor market with an upward-sloping labor supply curve (S) and a downward-sloping labor demand curve (D); their intersection identifies the equilibrium wage W_E and equilibrium quantity of unskilled labor Q_E.

Solution 2

(a)(ii)

Mark scheme

- Draw a separate graph for Ray's Stable with a downward-sloping marginal revenue product curve (MRP, Ray's Stable's demand for labor) and a horizontal labor supply/marginal factor cost curve (S = MFC) at the market wage; their intersection gives the wage Ray's Stable pays, W_R (equal to W_E, since Ray's Stable is a wage taker), and the quantity of labor it hires, Q_R.

Solution 2

(b)

Mark scheme

- Ray's Stable's marginal factor cost of unskilled labor is equal to W_E (not greater than). Ray's Stable is a wage taker in the (competitive) unskilled labor market — as one small employer among many, it faces a perfectly elastic (horizontal) labor supply at the wage the market sets, so hiring an extra worker does not bid the wage up.

Solution 2

(c)(i)

Mark scheme

- Show the minimum wage W_{MIN} as a horizontal line on the labor market graph from part (a), drawn above the equilibrium wage W_E — an effective (binding) minimum wage must be set above equilibrium.

Solution 2

(c)(ii)

Mark scheme

- On the labor market graph, at W_{MIN}, read the quantity of unskilled labor supplied, Q_S, off the labor supply curve (S); because $W_{MIN} > W_E$, Q_S exceeds Q_E (and exceeds quantity demanded at W_{MIN}), producing a surplus of unskilled labor.

Solution 2

(c)(iii)

Mark scheme

- The marginal revenue product of the last worker hired by Ray's Stable will increase. As a wage taker, Ray's Stable must now pay W_{MIN} (higher than the old wage W_E) for each worker; since it hires where MRP equals the wage and MRP is downward sloping, the higher mandated wage leads it to hire fewer workers — so the last (marginal) worker hired, at this lower quantity, has a higher MRP than before.