Question 2: Short — 5 points

A — **1 point**

Point 1

Calculate the total economic surplus as \$270 and show your work.

$$\text{Total Economic Surplus} = \frac{1}{2} \times (\$10 - \$1) \times (60 - 0) = \frac{1}{2} \times \$9 \times 60 = \$270$$

OR

$$\begin{aligned}\text{Total Economic Surplus} &= \text{Consumer Surplus} + \text{Producer Surplus} \\ &= \frac{1}{2} \times (\$10 - \$4) \times (60 - 0) + \frac{1}{2} \times (\$4 - \$1) \times (60 - 0) \\ &= \$180 + \$90 = \$270\end{aligned}$$

B — **1 point**

Point 2

State that there will be neither a surplus nor a shortage and explain that a price floor set below the equilibrium price is not binding and, therefore, will have no effect on the market price and quantity.

C (i) — **1 point**

Point 3

State that Rushland will export rice and explain with **ONE** of the following:

- At the world price of \$5, the domestic quantity supplied is 80 bushels of rice, which is greater than the domestic quantity demanded, which is 50 bushels of rice.
- At the world price of \$5, Rushland has a domestic surplus of 30 bushels of rice that can be exported.

(ii) — **1 point**

Point 4

Calculate the domestic consumer surplus in Rushland as \$125 and show your work.

$$\text{Domestic Consumer Surplus} = \frac{1}{2} \times (\$10 - \$5) \times (50 - 0) = \frac{1}{2} \times \$5 \times 50 = \$125$$

(iii) — **1 point**

Point 5

Calculate the total revenue Rushland's farmers will earn as \$400 and show your work.

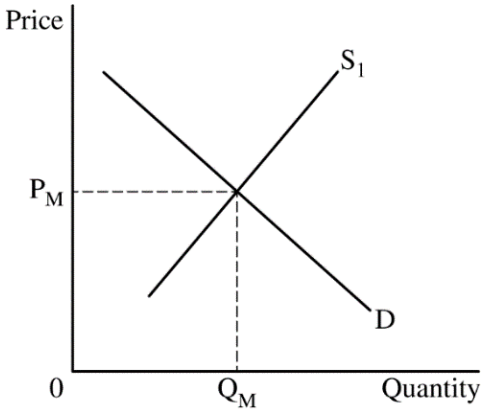
$$\text{Total Revenue} = \text{World Price} \times \text{Quantity Sold} = \$5 \times 80 = \$400$$

Question 1: Long — 10 points

A

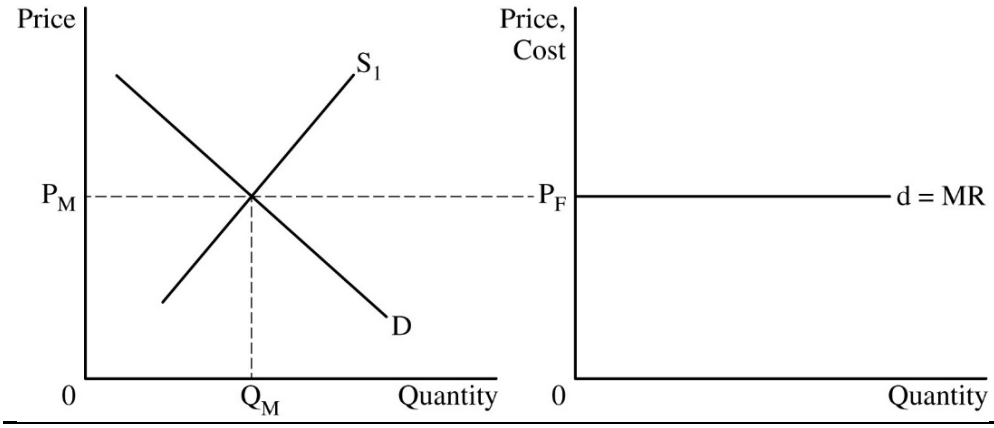
Point 1 — **1 point**

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 and label the market equilibrium price as P_M and the market equilibrium quantity as Q_M.



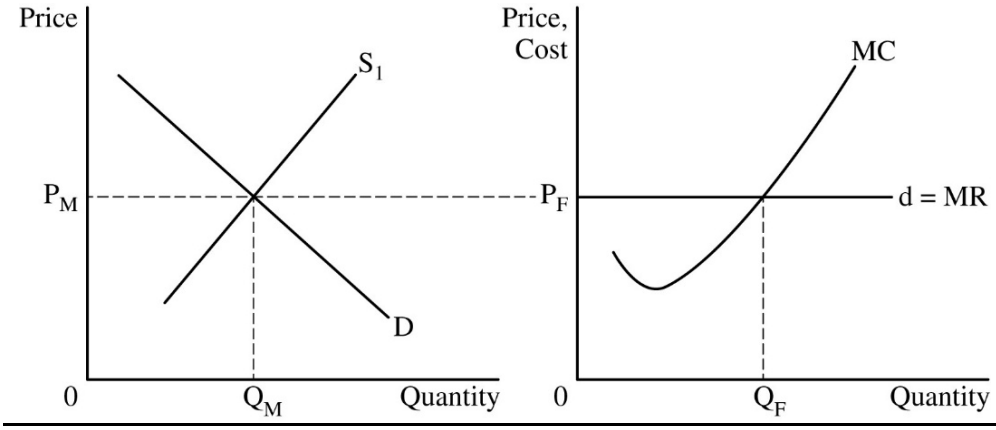
Point 2 — **1 point**

Draw a correctly labeled graph for Deskward that shows the firm's horizontal demand and marginal revenue (d = MR) curve extended from the market equilibrium price (P_M) and label the firm's price as P_F.

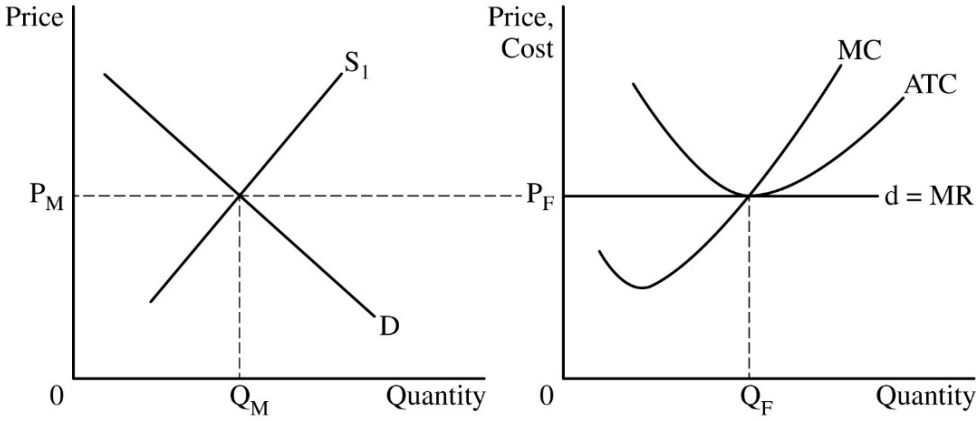


Point 3 — **1 point**

The firm's graph must show a rising marginal cost (MC) curve, and show the firm's profit-maximizing quantity, labeled Q_F, where MR = MC.

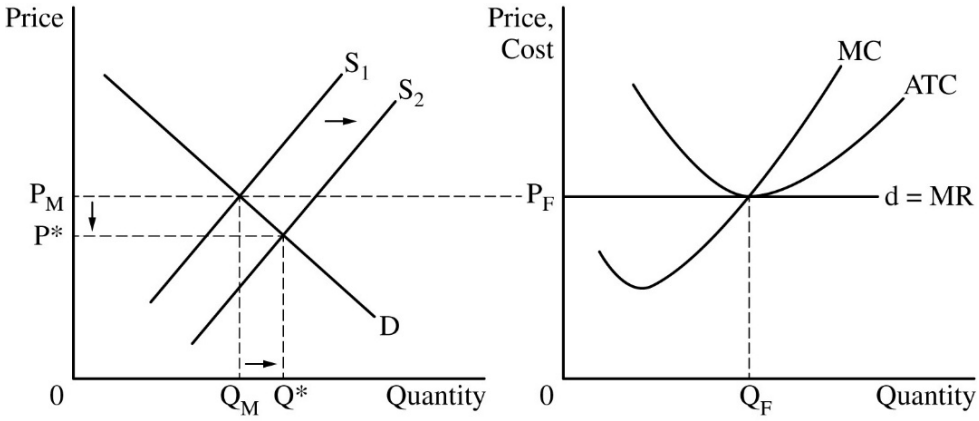


Point 4 — The firm's graph must show the average total cost (ATC) curve tangent to the firm's d = MR curve at Q_F and show the MC curve passing through the minimum point of the ATC curve. **1 point**

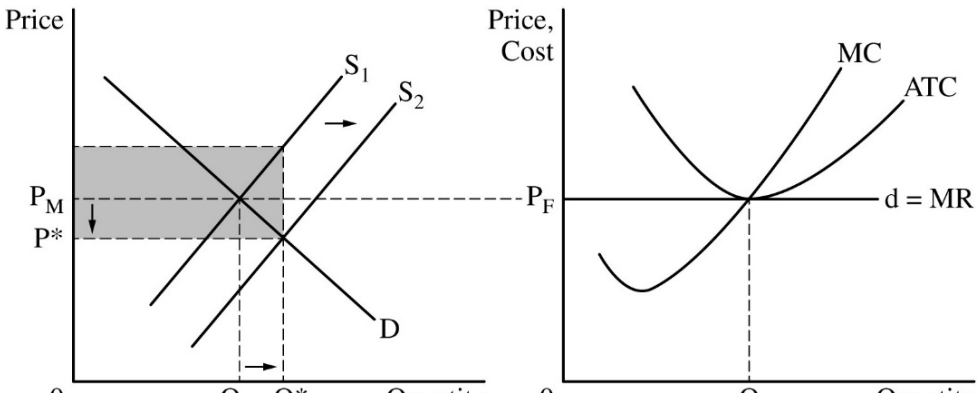


B Point 5 — State that Deskward's profit-maximizing quantity will not change in the short run and explain that a change in a fixed cost does not affect the firm's marginal cost or marginal revenue. **1 point**

C (i) Point 6 — The market graph from part A must show a rightward shift of the market supply curve and show the new market equilibrium price of wooden desks, labeled P*, and the new market equilibrium quantity of wooden desks, labeled Q*. **1 point**



(ii) Point 7 — The market graph from part A must show the area representing the total cost of the subsidy to the government, shaded completely.



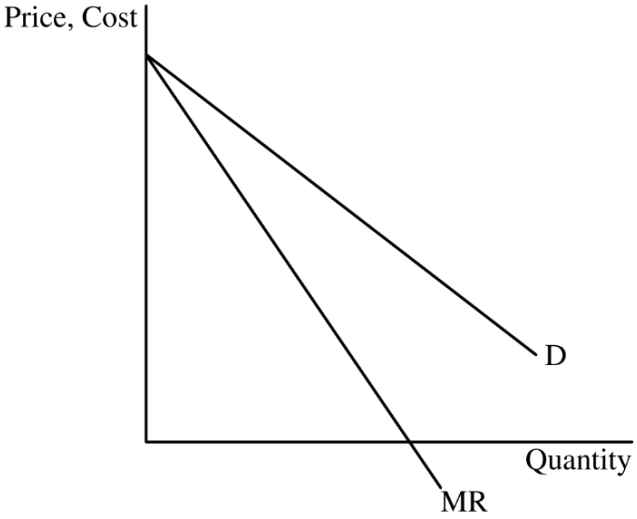
D Point 8	State that the price floor will result in a surplus of wooden desks and explain that the binding price floor is set above the market equilibrium price, which causes the quantity supplied of wooden desks to be greater than the quantity demanded of wooden desks.	**1 point**
E (i) Point 9	Calculate the long-run average total cost (LRATC) as \$160 per chair and show your work. $\text{LRATC at 500 chairs} = \frac{\$80{,}000}{500} = \$160$	**1 point**
(ii) Point 10	State that Deskward is experiencing diseconomies of scale and explain that as output increases from 500 to 600 chairs, its LRATC increases from \$160 to \$180 (=\$108,000/600) per chair.	**1 point**

Question 2: Short — 5 points

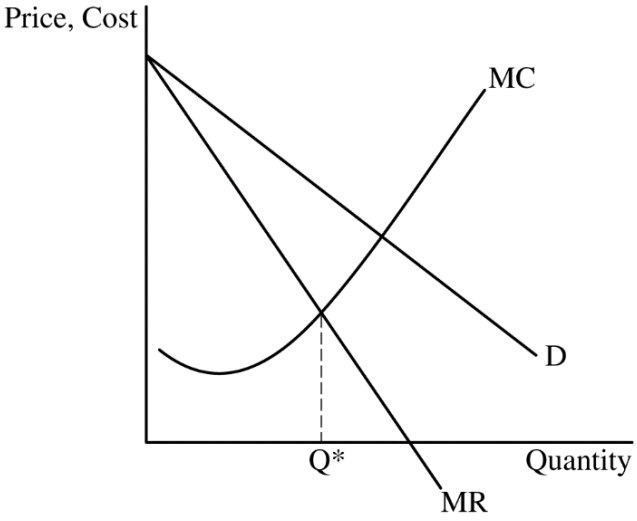
(a)	State that the market equilibrium price is \$15, and the market equilibrium quantity is 300 units.	**1 point**
(b)	Calculate the deadweight loss as \$500 and show your work. $\text{Deadweight loss} = \frac{1}{2} \times (\$25 - \$15) \times (400 - 300) = \frac{1}{2} \times \$10 \times 100 = \$500$	**1 point**
(c) (i)	State that the government will grant a per-unit subsidy to consumers to achieve the socially optimal quantity of Good X and explain with **ONE** of the following: • A per-unit subsidy to consumers that internalizes external benefits increases the incentive and ability of consumers to buy the socially optimal quantity (400). • A per-unit subsidy to consumers equal to the marginal external benefit increases consumption to the socially optimal quantity (400), by lowering the price paid by the consumer. • A per-unit subsidy to consumers equal to the difference between marginal social benefit and marginal private benefit increases the quantity exchanged to the socially optimal quantity (400).	**1 point**
(ii)	State that the dollar value of the per-unit subsidy is \$10.	**1 point**
	Total for part (c)	**2 points**
(d)	State no, the price ceiling will not achieve the socially optimal quantity of Good X and explain that the price ceiling will cause the quantity exchanged in the market, which is limited by the quantity supplied (200), to be less than the socially optimal quantity (400).	**1 point**
	Total for question 2	**5 points**

Question 1: Long — 10 points

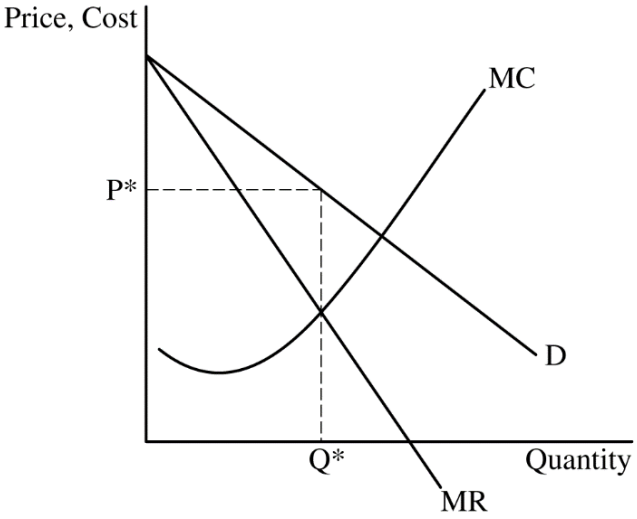
(a) Draw a correctly labeled graph of Arzeye Pharma with a downward-sloping demand (D) curve and a downward-sloping marginal revenue (MR) curve with the MR curve below the D curve. **1 point**



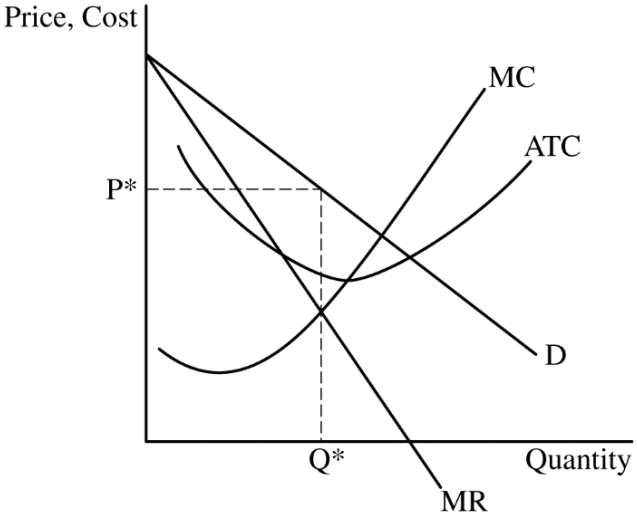
For the second point, the graph must show a rising marginal cost (MC) curve and the profit-maximizing quantity, labeled Q*, where MR = MC. **1 point**



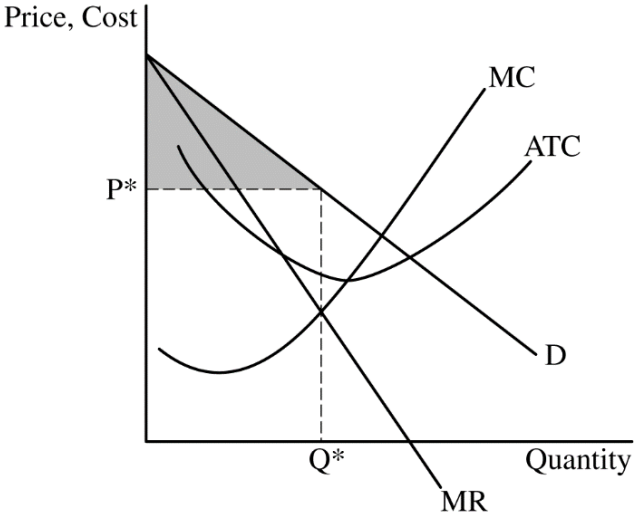
For the third point, the graph must show the profit-maximizing price, labeled P*, from the downward-sloping demand curve at Q*. **1 point**



For the fourth point, the graph must show the average total cost (ATC) curve below P* at Q* and the marginal cost curve passing through the minimum point of the ATC curve. **1 point**

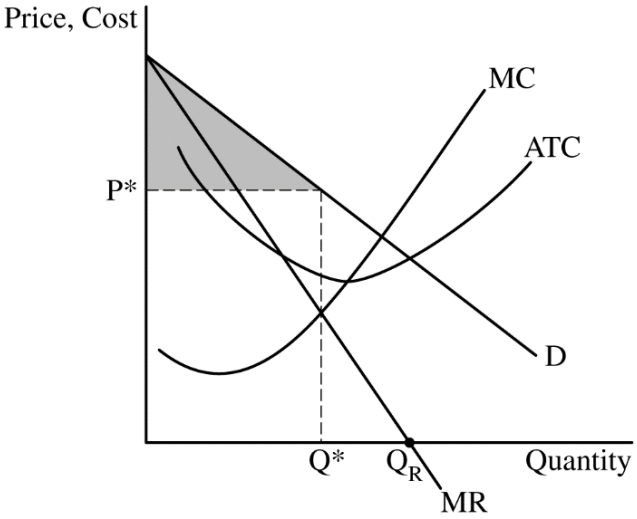


For the fifth point, the graph must show the area of consumer surplus, shaded completely. **1 point**



Total for part (a) **5 points**

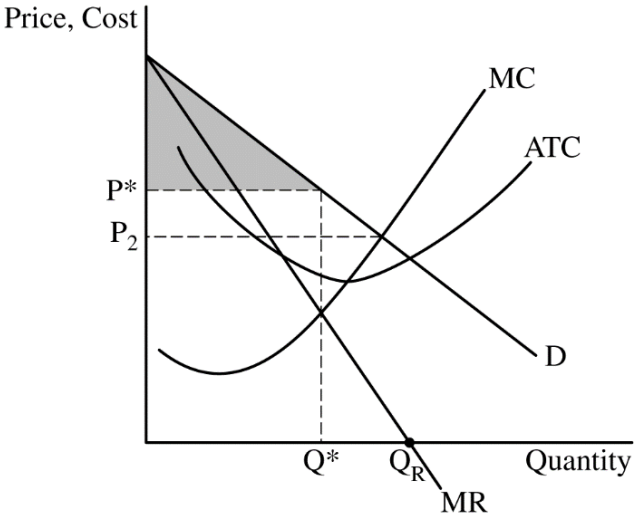
(b) (i) The graph from part (a) must show the quantity that maximizes total revenue, labeled Q_R, where marginal revenue equals 0. **1 point**



(ii) State that demand is unit elastic. **1 point**

Total for part (b) **2 points**

(c) (i) The graph from part (a) must show the lowest price that Arzeye Pharma would charge if it engaged in perfect price discrimination, labeled P_2, from the intersection of the demand and marginal cost curves. **1 point**



(ii) State that consumer surplus would decrease to \$0 and explain that Arzeye is able to charge the maximum price each consumer is willing to pay. **1 point**

Total for part (c) 2 points

(d) State that Arzeye Pharma's demand will become more elastic and explain that as the patent expires more firms will enter the market which increases the number and availability of substitutes, causing consumers to be more responsive to changes in the price of eye treatments. **1 point**

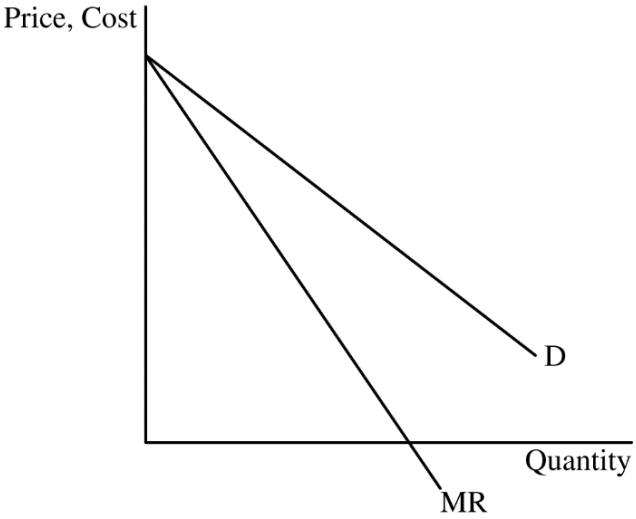
Total for question 1 10 points

Question 3: Short — 5 points

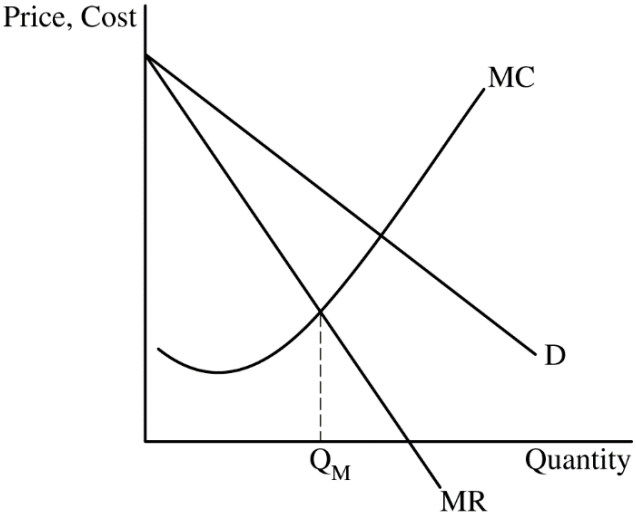
(a)	Calculate the total economic surplus as \$960 and show the work. $\text{Total Economic Surplus} = \frac{1}{2} \times (\$150 - \$30) \times (16 - 0) = \frac{1}{2} \times \$120 \times 16 = \$960$	**1 point**
(b)	State that the quantity of backpacks purchased will decrease and explain that the price ceiling causes a decrease in the quantity supplied of backpacks and the quantity purchased in the market will be limited by the quantity supplied (8), which is less than the equilibrium quantity (16).	**1 point**
(c) (i)	State the price consumers pay per backpack after the per-unit subsidy is \$75.	**1 point**
(ii)	Calculate the total cost of the subsidy to the government as \$600 and show the work. $\text{Total Cost of Subsidy to the Government} = \text{Per-unit Subsidy} \times \text{Quantity of Backpacks}$ $\text{Total Cost of Subsidy to the Government} = \$30 \times 20 = \$600$	**1 point**
(iii)	State the deadweight loss will increase and explain with **ONE** of the following. • The per-unit subsidy causes the new equilibrium quantity (20 backpacks) to be greater than the allocatively efficient quantity (16 backpacks). • The per-unit subsidy causes the marginal cost (\$105) to be greater than the marginal benefit (\$75) at the new equilibrium quantity (20 backpacks).	**1 point**
	Total for part (c)	**3 points**
	Total for question 3	**5 points**

Question 1: Long — 10 points

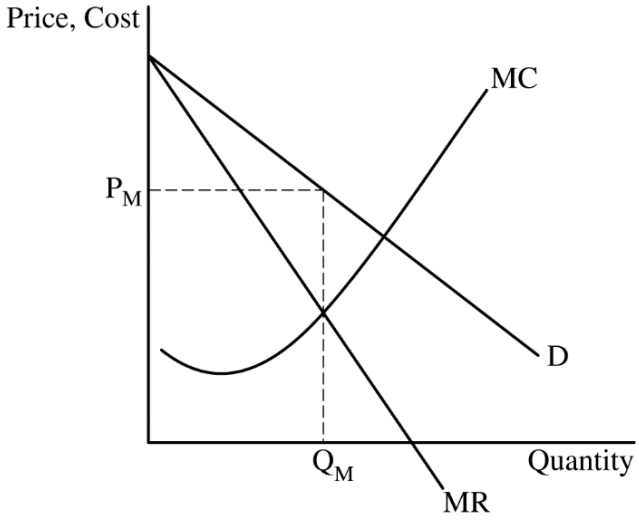
(a) Draw a correctly labeled graph for a monopoly showing downward-sloping demand (D) and marginal revenue (MR) curves with the MR curve below the demand curve. **1 point**



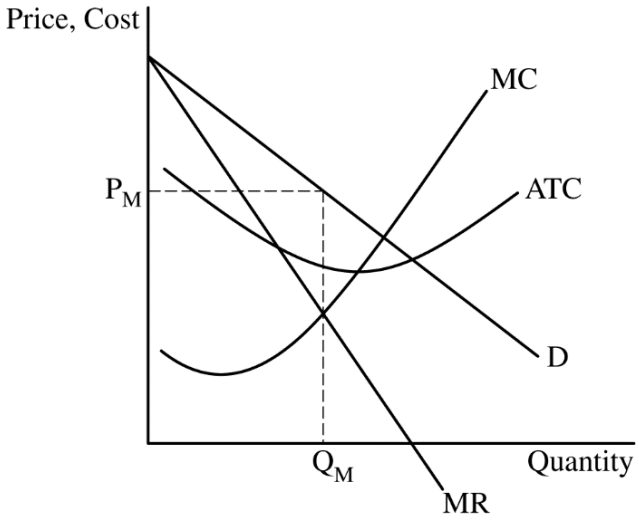
For the second point, the graph must show the marginal cost (MC) curve and the profit-maximizing quantity, labeled Q_M, where MR=MC. **1 point**



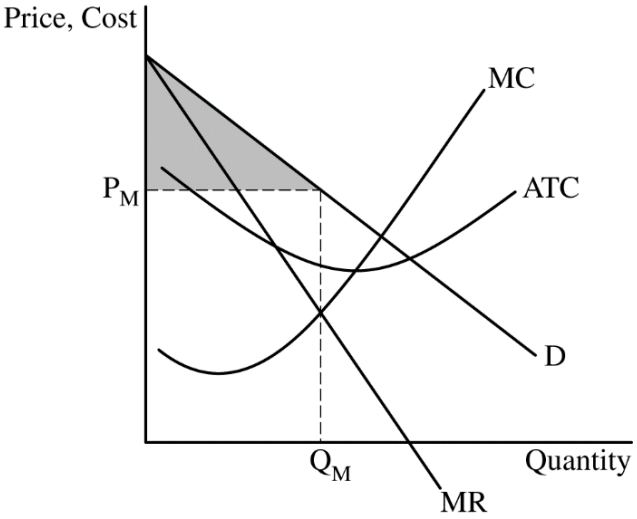
For the third point, the graph must show the profit-maximizing price, labeled P_M, from the demand curve at Q_M. **1 point**



For the fourth point, the graph must show the average total cost (ATC) curve below the demand curve at Q_M and show the MC curve passing through the minimum point of the ATC curve. **1 point**



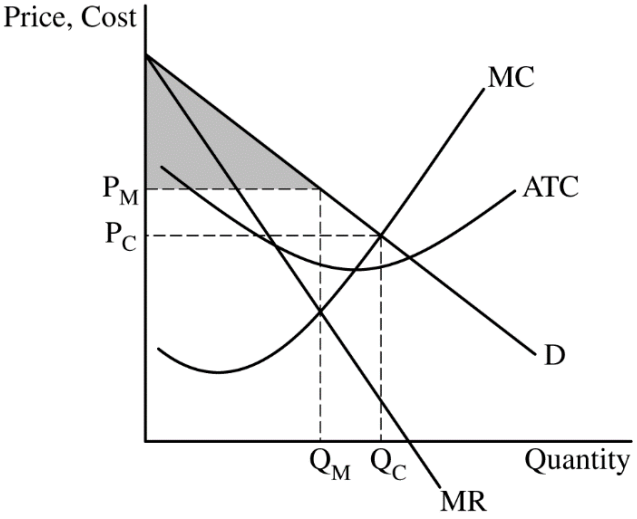
For the fifth point, the graph must show a completely shaded area of the consumer surplus. **1 point**



Total for part (a) **5 points**

(b)(i) State no and explain that a per-unit tax would shift the MC curve upward and intersect the MR curve at a lower quantity, which decreases the firm's profit-maximizing quantity, not increases it to the socially optimal quantity where MC=D. **1 point**

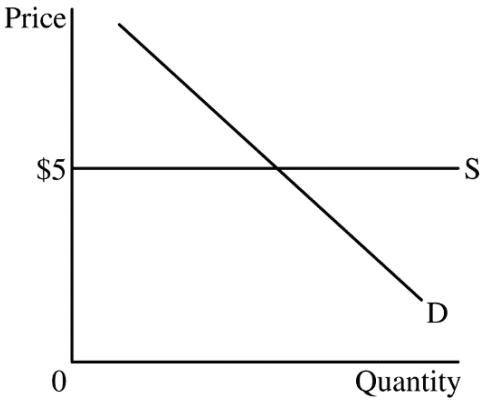
(ii) On your graph from part (a), show the socially optimal quantity labeled as Q_C and the price ceiling labeled as P_C at MC=D. **1 point**



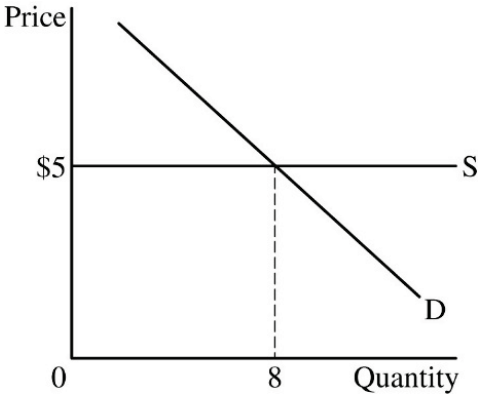
(iii)	State that the firm is earning positive economic profit and explain that ATC is less than P_C at Q_C, as shown. **Scoring Note:** The answer should be consistent with the position of the ATC curve with respect to the demand curve at Q_C on the graph drawn in part (b)(ii). The firm will not earn positive economic profit if the ATC curve is drawn such that ATC>P_C or ATC=P_C at Q_C.	**1 point**
	Total for part (b)	**3 points**
(c) (i)	State that marginal revenue will be negative and explain that after total revenue is maximized, TR decreases since the firm moves onto the inelastic portion of the demand curve.	**1 point**
(ii)	State that the percentage increase in quantity demanded will be less than 10%.	**1 point**
	Total for part (c)	**2 points**
	Total for question 1	**10 points**

Question 3: Short — 5 points

(a) Draw a correctly labeled graph of the market with a downward-sloping demand (D) curve and a perfectly elastic supply (S) curve at a price of $5. **1 point**



For the second point, the graph must show the equilibrium quantity as 8 units. **1 point**



Total for part (a) **2 points**

(b) (i) Calculate the magnitude of the price elasticity of demand as 1.25 and show your work. **1 point**

$$\text{Price Elasticity of Demand} = \frac{\text{Percentage Change in Quantity Demanded}}{\text{Percentage Change in Price}}$$

$$= \frac{\left|\left(\frac{4-8}{8}\right) \times 100\right|}{\left|\left(\frac{7-5}{5}\right) \times 100\right|} = \frac{50\%}{40\%} = 1.25$$

OR

$$= \frac{\left(\frac{4-8}{8}\right) \times 100}{\left(\frac{7-5}{5}\right) \times 100} = \frac{-50\%}{40\%} = -1.25$$

(ii) State that demand is elastic. **1 point**

Total for part (b) **2 points**

(c) State no and explain that Emily's marginal benefit should be greater than or equal to the price she is willing to pay ($7) for the second unit. **1 point**

Total for question 3 **5 points**

Question 2: Short — 5 points

(a) Calculate the consumer surplus in New Zealand before trade as $4,500 and show your work. **1 point**

$$\text{Consumer Surplus} = \frac{1}{2} \times 300 \times (\$70 - \$40) = \frac{1}{2} \times 300 \times \$30 = \frac{\$9{,}000}{2} = \$4{,}500$$

(b) (i) State that New Zealand will export 400 units of wool. **1 point**

(ii) State that consumer surplus in New Zealand will decrease and explain with **ONE** of the following: **1 point**

- The domestic price will increase to the world price, which decreases the domestic quantity demanded of wool.
- The consumer surplus decreased from $4,500 before trade to $500 after trade.

(iii) State that total economic surplus in New Zealand will increase by $4,000 and explain that producer surplus will increase by $8,000 while consumer surplus will decrease by $4,000, resulting in an increase in total economic surplus. **1 point**

Total for part (b) **3 points**

(c) State that New Zealand's exports will decrease. **1 point**

Total for question 2 **5 points**

Question 3: Short — 5 points

(a)	Calculate the total revenue at the market price as \$250 and show your work. Total Revenue = (P × Q) = (\$5 × 50) = \$250	**1 point**
(b) (i)	State that the quantity exchanged at the price floor will be 30 bushels.	**1 point**
(ii)	Calculate the deadweight loss as \$40 and show your work. Deadweight loss = $\frac{(\$7-\$3)\times(50-30)}{2}=\frac{\$80}{2}=\$40$	**1 point**
(iii)	Calculate the producer surplus as \$245 and show your work. Producer surplus = $\frac{(\$7-\$0)\times(70-0)}{2}=\frac{\$490}{2}=\$245$	**1 point**
(iv)	State that the quantity of corn purchased by the government will increase and explain that this happens because the price floor leads to short-run economic profits for typical firms, which incentivize new firms to enter the market, leading to an increase in the market supply of corn and/or because the market supply becomes more elastic in the long run.	**1 point**
	Total for part (b)	**4 points**
	Total for question 3	**5 points**

2019

AP® CollegeBoard

AP® Microeconomics

Scoring Guidelines
Set 1

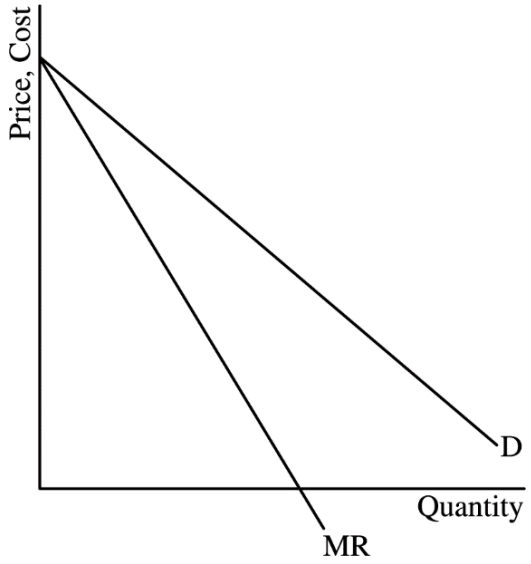
2019 SCORING GUIDELINES

Question 1

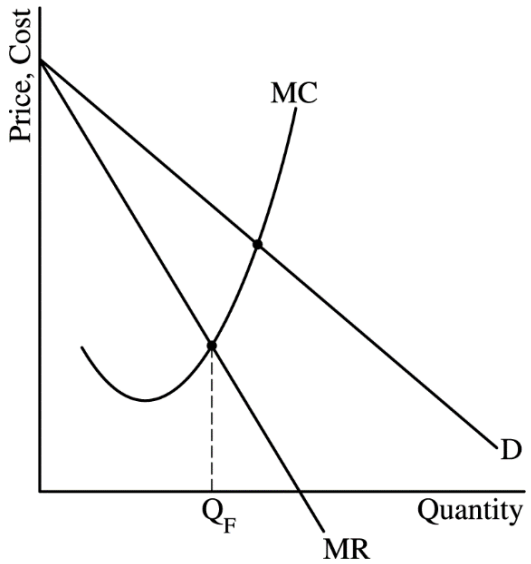
9 points (5 + 2 + 2)

(a) 5 points

- One point is earned for drawing a correctly labeled graph of the monopoly showing downward-sloping demand (D) and marginal revenue (MR) curves with the MR curve below the demand curve.



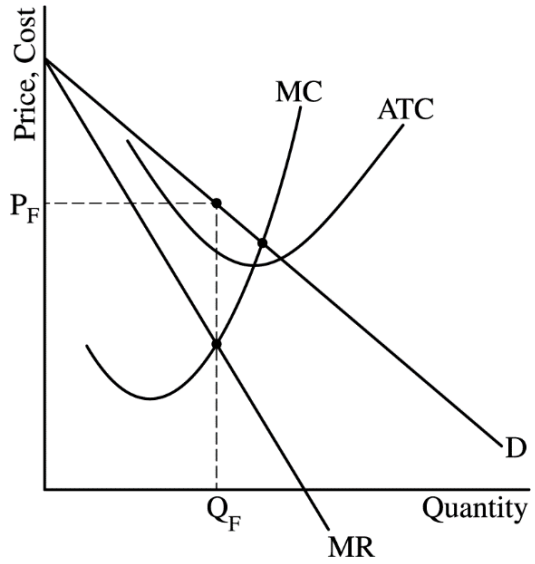
- One point is earned for showing the profit-maximizing quantity, labeled Q_F, where MR = MC.



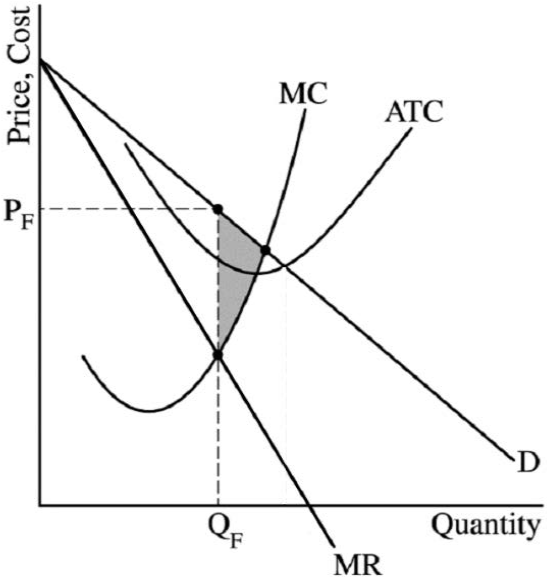
2019 SCORING GUIDELINES

Question 1 (continued)

- One point is earned for showing the profit-maximizing price, labeled P_F, from the demand curve at Q_F, and above the average total cost curve (ATC).



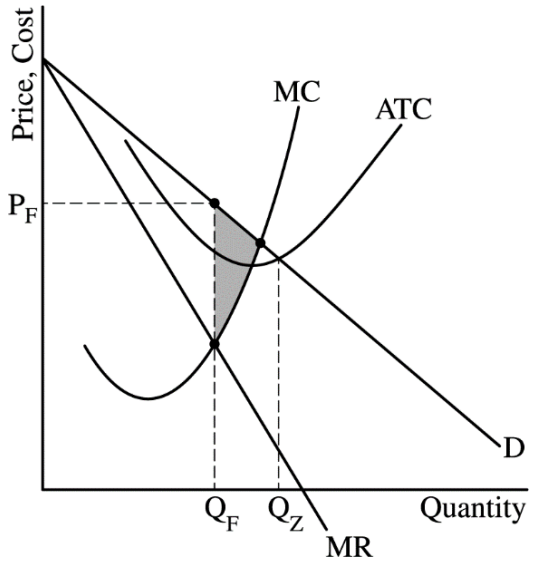
- One point is earned for completely shading the area representing the deadweight loss.



2019 SCORING GUIDELINES

Question 1 (continued)

- One point is earned for showing the quantity where economic profits are zero, labeled Q_Z, where ATC intersects the demand curve.



(b) 2 points

- One point is earned for stating the deadweight loss will remain unchanged, and for explaining that changes in fixed costs do not affect MC or do not change the profit-maximizing quantity of the firm.

- One point is earned for stating that FillUp's economic profit will decrease.

(c) 2 points

- One point is earned for stating that the price must be greater than AVC at the profit-maximizing level of output.

- One point is earned for stating that the profit-maximizing quantity and price will both decrease.

2019 SCORING GUIDELINES

Question 2

5 points (1 + 1 + 3)

(a) 1 point:

- One point is earned for calculating Dana's total benefit from purchasing 2 bottles of water and 1 unit of good X as $66 and for showing the work.

  $24 + $18 + $24 = $66 OR $42 + $24 = $66

(b) 1 point:

- One point is earned for calculating Dana's total consumer surplus from purchasing 3 units of good X as $39 and for showing the work.

  ($24 – $5) + ($18 – $5) + ($12 – $5) = $39 OR $54 – $15 = $39

(c) 3 points:

- One point is earned for explaining that Dana does not maximize her benefit because the marginal benefit per dollar spent on bottles of water is greater than the marginal benefit per dollar spent on good X.

  (18/$3 > 6/$6; OR 6 > 1; OR 6≠1; OR $MB_w/P_w > MB_x/P_x$)

- One point is earned for stating that the optimal quantities of good X and bottles of water are 3 units and 4 bottles respectively.

- One point is earned for correctly determining the optimal quantity of water, calculating the cross-price elasticity of demand for bottles of water with respect to the price of good X, showing the work, and for stating that the goods are complements. Answer must be consistent with (c)(ii).

  (% change in the quantity of bottles of water)/(% change in the price of good X)
  = (25%/–50%) = –0.5

(Using the midpoint formula is also acceptable: (1/4.5)/(–3/4.5) = –0.33)

2019 SCORING GUIDELINES

Question 3

6 points (1 + 1 + 1 + 1 + 2)

(a) 1 point

- One point is earned for stating the actions that maximize the combined profits are for Patrick's Pie to "Advertise" and for Dee's Pizzeria to "Stay Out."

(b) 1 point

- One point is earned for stating that neither firm has an incentive to cheat and for explaining that Dee's Pizzeria profits would decrease from $0 to –$2 if Dee cheated and that Patrick's Pie's profits would decrease from $175 to $100 if Patrick cheated.

(c) 1 point

- One point is earned for stating that Patrick's Pie does not have a dominant strategy.

(d) 1 point

- One point is earned for stating two Nash equilibria as:
  - Patrick's Pie "Do Not Advertise" and Dee's Pizzeria "Enter"
  - Patrick's Pie "Advertise" and Dee's Pizzeria "Stay Out"

(e) 2 points

- One point is earned for correctly redrawing the payoff matrix and showing the effect of the side payment.

		Dee's Pizzeria	
		Enter	Stay Out
Patrick's Pie	Advertise	$50, –$2	$155, $20
	Do Not Advertise	$150, $15	$80, $20

- One point is earned for stating that the Nash equilibrium is for Patrick's Pie to "Advertise" and for Dee's Pizzeria to "Stay Out."

AP® Microeconomics 2016 Scoring Guidelines

2016 SCORING GUIDELINES

Question 1

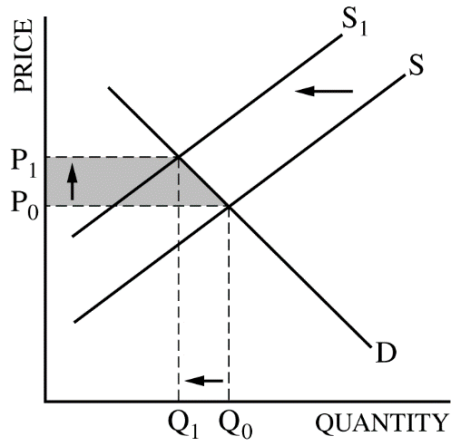
10 points (3+3+4)

(a) 3 points:

- One point is earned for stating that the quantity supplied exceeds the quantity demanded at the price floor **or** the price floor would result in a surplus because the price floor is binding or effective.
- One point is earned for correctly calculating the price elasticity of supply.
  Students can use either the midpoint formula or the point elasticity formula.
  E = (500/1250) / (0.2/1.1) = 2.2
  E = (50%/20%) = 2.5
  E= (500/0.2) × (1/1000) = 2.5
  E = [(1500–1000)/1000]/[(1.2–1)/1] = 0.5/0.2 = 2.5
  E = (500/0.2) x (1.2/1500) = 2

- One point is earned for stating that the supply is elastic and for explaining that the **percentage** change in quantity supplied exceeds the **percentage** change in price or because price elasticity of supply is greater than one. (Other equivalent explanations are accepted.)

(b) 3 points:



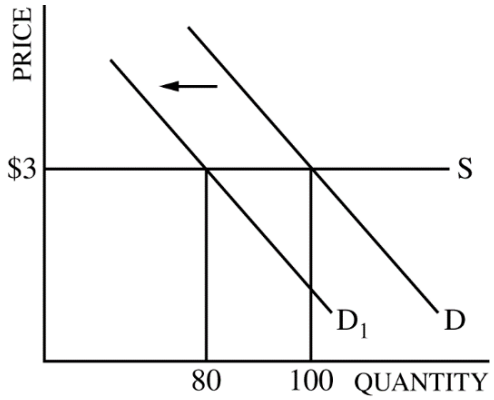
- One point is earned for drawing a correctly labeled graph and for showing the equilibrium price and quantity, labeled P_0 and Q_0, respectively.
- One point is earned for shifting the supply curve to the left and for showing the new equilibrium price and quantity, labeled P_1 and Q_1, respectively.
- One point is earned for completely shading on the graph the area representing the change in consumer surplus.

2016 SCORING GUIDELINES

Question 1 (continued)

(c) 4 points:

- One point is earned for stating that coffee and muffins are complementary goods.



- One point is earned for drawing a correctly labeled graph for the coffee market and showing a horizontal supply curve (S) and a downward sloping demand curve (D).
- One point is earned for shifting the demand curve to the left and for showing a decrease in the equilibrium quantity and no change in the equilibrium price of coffee.
- One point is earned for correctly calculating the new equilibrium quantity and showing the work.

  $\%\Delta Q = (10\% \times -2) = -20\%$
  New Equilibrium Quantity = $100 \times (-20\%) = 80$
  OR
  New Equilibrium Quantity = $100 - (0.2 \times 100) = 80$

  (Using the midpoint formula is also acceptable.)

2016 SCORING GUIDELINES

Question 2

7 points (1+1+1+1+3)

(a) 1 point:

- One point is earned for stating that the marginal benefit is $1.

(b) 1 point:

- One point is earned for correctly calculating the total consumer surplus from consuming 5 units of X.

$$CS = (\$16 - \$4) + (\$12 - \$4) + (\$8 - \$4) + (\$4 - \$4) + (\$1 - \$4) = \$21$$

OR

$$CS = \$41 - \$20 = \$21$$

(c) 1 point:

- One point is earned for explaining that this combination of X and Y is not optimal because the marginal benefit per dollar of good X (MB_x/P_x=\$4/\$4 =1) is less than the marginal benefit per dollar of good Y (MB_y/P_y=\$8/\$2=4). (This can also be stated as $MB_x/MB_y < P_x/P_y$.)

  ($MB_x/P_x = 1$) is not equal to ($MB_y/P_y = 4$) is acceptable.

  MB_x/P_x is less than MB_y/P_y is acceptable.

  MB_y/P_y is greater than MB_x/P_x is acceptable.

(d) 1 point:

- One point is earned for stating that Martha's optimal combination is 3 units of X and 4 units of Y.

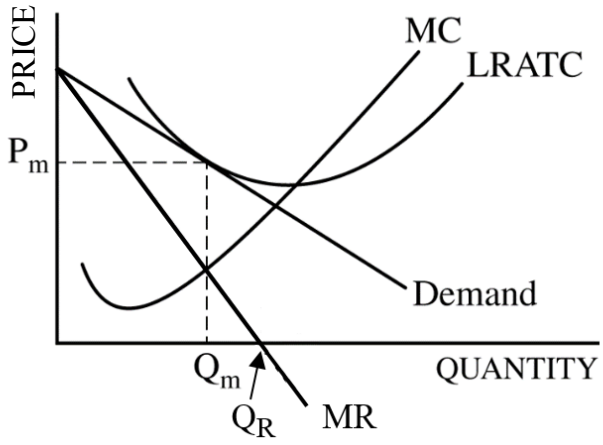
(e) 3 points:

- One point is earned for stating that the optimal quantity of good Y will decrease.
- One point is earned for stating that the optimal quantity of good Y will decrease.
- One point is earned for stating that the optimal quantity of good Y will stay the same.

2016 SCORING GUIDELINES

Question 3

6 points (4+1+1)



(a) 4 points:

- One point is earned for drawing a correctly labeled graph showing a downward sloping demand curve with MR curve below the demand curve.
- One point is earned for showing the quantity, Q_m, at MC=MR
- One point is earned for showing the price, P_m, on the demand curve above Q_m
- One point is earned for showing the long-run average total cost tangent to the demand curve at Q_m.

(b) 1 point:

- One point is earned for showing Q_R at MR=0.

(c) 1 point:

- One point is earned for stating that firms in this market are experiencing economies of scale in long-run equilibrium because **LRATC** is decreasing OR because Q_m is to the left of the minimum point of the LRATC.