

2023



AP[®] Microeconomics

Sample Student Responses and Scoring Commentary Set 2

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Free-Response Question 2

- Scoring Guidelines**
- Student Samples**
- Scoring Commentary**

Question 2: Short**5 points**

- (a)** Calculate the marginal revenue product (MRP) of the 2nd worker as \$55 and show your work. **1 point**

$$\text{MRP}_{(2\text{nd worker})} = (\text{Marginal Product} \times \text{Marginal Revenue})$$

$$= (20 - 9) \times \$5 = 11 \times \$5 = \$55$$

- (b)** State that diminishing marginal returns will begin with the hiring of the 3rd worker. **1 point**

- (c)** State that the profit-maximizing number of workers is 4 and explain that the MRP of the 4th worker (\$25) is greater than the marginal factor cost (MFC) of the 4th worker (wage = \$15), and that the hiring of the 5th worker would decrease profits because the MRP (\$10) is less than the MFC of the 5th worker (\$15). **1 point**

- (d)** Calculate the economic profit as \$60 and show your work. **1 point**

$$\text{Economic Profit} = \text{Total Revenue} - \text{Total Cost}$$

$$\text{Economic Profit} = \text{Total Revenue} - \text{Total Fixed Cost} - \text{Total Variable Cost}$$

$$\text{Economic Profit} = (\$5 \times 32) - \$40 - (\$15 \times 4)$$

$$= \$160 - \$40 - \$60 = \$160 - \$100 = \$60$$

- (e)** State that the number of workers hired will stay the same and explain that the increase in fixed cost does not affect the marginal factor cost of producing rain jackets. **1 point**

Total for question 2 5 points

Question 2 Sample A Page 1 of 1

Important: Completely fill in the circle that corresponds to the question you are answering on this page.

Question 1

Question 2

Question 3



Begin your response to each question at the top of a new page.

a: $MPP = 20 - 9 = 11$ jackets $MRP = MPP \cdot P$ $P = \$5$
 $MRP = 11 \cdot 5 = \boxed{\$55}$

b: Diminishing marginal returns begins with the hiring of the third worker because the MPP of the second worker was 11, but the MPP of the third worker is only 7.

c: $MRP \geq MFC$ $MFC = \text{wage} = \$15$
 The profit-maximizing firms should hire 4 workers because the MRP of the fourth worker is $5 \cdot 5 = 25 > MFC$, but the MRP of the 5th worker is $2 \cdot 5 = 10 < MFC$. Therefore, the profit maximizing firms should hire 4 workers because that is the last number of workers where the $MRP \geq MFC$.

d: Total cost = Total fixed cost + total variable costs = $\$40 + 4 \cdot \$15 = \$40 + \$60 = \$100$
 Total revenue = $P \cdot Q = 32 \cdot \$5 = \160
 Economic profit = Total revenue - total cost = $\$160 - \$100 = \boxed{\$60}$

e: The profit-maximizing number of workers hired in the short-run will remain the same because fixed costs don't affect MRP or MFC. Therefore, fixed costs don't change the value where $MRP = MFC$, so the profit-maximizing firms will still hire 4 workers.

Use a pen with black or dark blue ink only. Do NOT write your name. Do NOT write outside the box.

- Important: Completely fill in the circle that corresponds to the question you are answering on this page.

Question 1

Question 2

Question 3



Begin your response to each question at the top of a new page.

a) $(20-9) \times 5 = 55$

b) The 3rd worker

c) The profit maximizing number of workers the firm should hire is ~~4~~ 4 because the MRP is greater than the MFC. The firm will not hire 5 workers because the MRP is less than the MFC. At 4 workers the MRP is 25 and the MFC is 15. 25 is greater than 15. At 5 workers the MRP is 10 and the MFC is 15. 10 is less than 15.

d) $(4 \times 15) + 40 = \$100$

e) The profit maximizing number of workers will stay the same because fixed costs have no effect on marginal values, so ^{the} MRP and MFC curves will not shift.

Use a pen with black or dark blue ink only. Do NOT write your name. Do NOT write outside the box.

● **Important:** Completely fill in the circle that corresponds to the question you are answering on this page.

Question 1

Question 2

Question 3



Begin your response to each question at the top of a new page.

a) $20 - 9 = 11$ $11 \cdot 5 = 55$ ($\$55$)

b) Diminishing marginal returns will begin with the hiring of the third worker.

c) The profit-maximizing number of workers that the firm should hire is two. Two workers produce the most marginal revenue product.

d) $\$55 - \$40 = \$15$

e) The profit maximizing number of workers will increase because Keepdry's fixed costs increased. So, they will attempt to cover those costs.

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Use a pen with black or dark blue ink only. Do NOT write your name. Do NOT write outside the box.

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Question 2

Note: Student samples are quoted verbatim and may contain spelling and grammatical errors.

Overview

The question assessed students' understanding of how firms make decisions to maximize profits in a labor market and how firms decide to hire labor in a perfectly competitive labor market.

The question stated that Keepdry sold rain jackets in a perfectly competitive market for a price of \$5 each and hired labor from a perfectly competitive labor market at a wage rate of \$15. A table was provided indicating the total production of rain jackets for each number of workers hired by the firm.

In part (a) students were asked to calculate the marginal revenue product of the second worker. Students were expected to calculate the marginal product of the second worker as the difference in total production between employing two workers and employing one worker and to multiply the difference by the marginal revenue for the rain jackets.

In part (b) students were asked to state the number of workers with which diminishing marginal returns began. Students were expected to calculate the marginal product of each worker and to recognize that diminishing marginal returns begins when the addition of another unit of an input, labor in this case, resulting in less marginal product than the unit before it.

In part (c) students were asked to identify the profit-maximizing number of workers Keepdry should hire and to explain the profit-maximizing behavior of this firm using marginal analysis. Students were expected to identify how many units of labor Keepdry would hire in a perfectly competitive labor market and explain how Keepdry would determine this number of workers to maximize profits.

In part (d) students were asked to calculate Keepdry's economic profit at its profit-maximizing level of employment given a particular fixed cost. Students were expected to state Keepdry's economic profit as the difference between the total revenue generated by a particular number of workers for the firm and the sum of the provided fixed cost and variable cost (the labor costs for that number of workers).

In part (e) students were asked to explain if Keepdry's decision to hire its profit-maximizing number of workers would be affected by a change to the firm's fixed costs. Students were expected to recognize a firm's hiring decisions are only affected by changes to worker productivity, output price, or labor cost.

Question 2 (continued)

Sample: 2A

Score: 5

Part (a): 1 point

The response earned the point in part (a) because the response calculates the marginal revenue product of the 2nd worker as \$55 and shows the work.

Part (b): 1 point

The response earned the point in part (b) because the response states diminishing marginal returns begin with the hiring of the 3rd worker.

Part (c): 1 point

The response earned the point in part (c) because the response states the profit-maximizing number of workers is 4 and explains the MRP of the 4th worker is greater than the MFC of the 4th worker, but the MRP of the 5th worker is less than the MFC of the 5th worker.

Part (d): 1 point

The response earned the point in part (d) because the response calculates the economic profit as \$60 and shows the work.

Part (e): 1 point

The response earned the point in part (e) because the response states the number of workers hired will stay the same and explains the fixed cost does not affect marginal factor cost.

Sample: 2B

Score: 4

Part (a): 1 point

The response earned the point in part (a) because the response calculates the marginal revenue product of the 2nd worker as \$55 and shows the work.

Part (b): 1 point

The response earned the point in part (b) because the response states diminishing marginal returns begin with the hiring of the 3rd worker.

Question 2 (continued)

Part (c): 1 point

The response earned the point in part (c) because the response states the profit-maximizing number of workers is 4 and explains the MRP of the 4th worker is greater than the MFC of the 4th worker, but the MRP of the 5th worker is less than the MFC of the 5th worker.

Part (d): 1 point

The response did not earn the point in part (d) because the response does not calculate the economic profit as \$60.

Part (e): 1 point

The response earned the point in part (e) because the response states the number of workers hired will stay the same and explains the fixed cost does not affect marginal factor cost.

Sample: 2C

Score: 2

Part (a): 1 point

The response earned the point in part (a) because the response calculates the marginal revenue product of the 2nd worker as \$55.

Part (b): 1 point

The response earned the point in part (b) because the response states diminishing marginal returns will begin with the hiring of the third worker.

Part (c): 1 point

The response did not earn the point in part (c) because the response states the profit-maximizing number of workers is 2.

Part (d): 1 point

The response did not earn the point in part (d) because the response incorrectly calculates the economic profit when 2 workers are hired as \$15.

Part (e): 1 point

The response did not earn the point in part (e) because the response states the number of workers will increase.