IB Economics – Theory of the Firm

1.15 Production and Costs HL

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1.15 PRODUCTION AND COSTS HL: STUDENT LEARNING ACTIVITY

Answer the questions that follow.

1. DEFINITIONS

Define the following terms: **[10 marks]**

- Short run
- Factors of production
- Long run
- Capital
- Productive capacity
- Manufacturer
- Specialised
- Variable factor
- Total product
- Average product
- Marginal product
- Production
- Labour productivity
- Fixed cost
- Economic cost of production
- Opportunity cost
- Resources
- Explicit costs
- Implicit costs
- Accounting cost
- Variable costs
- Total fixed cost
- Output
- Total variable cost
- Total cost
- Average total cost
- Average fixed cost
- Average variable cost
- Marginal cost
- Increasing marginal returns to a variable factor
- Diminishing marginal returns to a variable factor
- Economies of scale
- Output per head
- Productivity
- Diseconomies of scale
- Increasing returns to scale
- Constant returns to scale
- Decreasing returns to scale

2. SHORT-ANSWER QUESTIONS

1. Distinguish between short run and long run production. **[5 marks]**

2. Explain why marginal product must decrease in the short run. **[5 marks]**

3. Explain what happens to average product when: **[5 marks]**
   i. Marginal product > average product
   ii. Marginal product < average product

4. Calculate the missing values in the following table.

Table 1: Law of diminishing returns

Variable input (units of labour)	Total product	Average product	Marginal product
0	0		
1	9		
2	21		
3	34		
4	45		
5	53		
6	58		
7	61		
8	60		

5. Use the information contained in Table 1 above to plot the total product, average product and marginal product curves. **[5 marks]**

6. Explain how the law of diminishing returns is reflected in the marginal and average product data in Table 1 above, **and** the curves plotted in Question 5. **[5 marks]**

7. Explain why the law of diminishing marginal returns holds true only in the short run. **[5 marks]**

8. On your diagram in Question 5 above, identify the point associated with the variable input where diminishing marginal returns initially occurs. **[1 mark]**

9. On your diagram in Question 5 above, identify the point associated with the variable input where negative returns occurs. **[1 mark]**

10. Explain how the marginal product and average product curves are related. **[5 marks]**

Table 2: Diminishing marginal returns

Variable input (units of labour)	**Total product**	**Average product**	**Marginal product**
0			-
1			20
2			40
3			50
4			40
5			30
6			10
7			0
8			-20

11. Use the data in Table 2 above to: **[5 marks]**

    i. Plot curves for the total product, average product and marginal product.
    ii. Identify the point associated with the variable input where diminishing marginal returns initially occurs (show this in your diagram).
    iii. Identify the point associated with the variable input where negative returns occurs (show this in your diagram.

12. Calculate the missing values in the following table. **[3 marks]**

Table 3: Diminishing marginal returns

Variable input (units of labour)	Total product	Average product	Marginal product
0			-
1			5.00
2			5.50
3			5.33
4			4.75
5			4.00
6			3.33

13. Using examples, distinguish between explicit costs and implicit costs. **[5 marks]**

14. Explain why both explicit **and** implicit costs represent opportunity costs a firm needs to consider in their decision-making. **[5 marks]**

15. Explain why economic costs are always higher than explicit costs (accounting costs). **[5 marks]**

16. Using each of the following concepts, explain economic cost:
    - Explicit costs
    - Implicit costs
    - Opportunity cost

17. Explain how fixed costs, variable costs and total costs can be used to distinguish between production in the short run and in the long run. **[5 marks]**

18. Identify which of the following expenses of a firm are fixed costs and which are variable costs. **[5 marks]**
    - Insurance
    - Interest payments on a long-term loan
    - Wages for workers on casual employment contracts
    - Raw materials

19. Explain how ATC, AVC and AFC can be found from each of the different total costs of a firm. **[4 marks]**

20. Explain how a firm's marginal cost is related to its total variable cost **and** the total cost. **[5 marks]**

21. If the price of one unit of labour (i.e., a single full-time worker) is $4000 per month and fixed costs are 3000 a month, and using data from the table in Question 4, calculate the following costs up to, and including, the point of maximum output (61 units): **[14 marks]**
    i. TC
    ii. TVC
    iii. TFC
    iv. ATC
    v. AVC
    vi. AFC
    vii. MC

22. Explain the relationship between MC and the shape of the AVC and ATC curves. **[5 marks]**

23. Explain why the AFC declines as output increases. **[3 marks]**

24. Explain why the vertical distance between the TC and TVC curves becomes less and less as output increases. **[5 marks]**

25. Explain how the law of diminishing marginal product determines the shape of the marginal cost curve. **[5 marks]**

26. Explain why the MC curve intersects both the ATC and AVC at their minimum points. **[5 marks]**

27. Show the relationship between the MP and AP curves, **and** the MC and AVC curves. **[5 marks]**

28. Explain the relationship between the product curves and the cost curves illustrated in Question 29 above. **[5 marks]**

3. INTERACTIVE QUIZZES

Choose the best answer to each question. **[50 marks]**

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