ECONOMICS

BOOKS - SANDEEP GARG ECONOMICS (HINGLISH)

PRODUCTION FUNCTION

Example

1. Calculate Average Product (AP) and Marginal Product (MP):

Variable Factors	0	1	2	3	4	6
Total Product (TP)	0	8	20	28	28	25

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2. Calculate AP and MP from the following particulars :

Land		1	1	1	1	1	1	1	1	1	1
Labour		0	1	2	3	4	5	6	7	8	9
TP (units)		0	20	50	90	120	140	150	150	140	120

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3. Calculate TP and AP :

Variable Factor	1	2	3	4	5	6	7
MP (in units)		24	20	16	12	8	0	-8

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4. Find out the values of TP and MP :

Variable Factor	1	2	3	4	5
AP (in units)		8	10	8	6	4

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5. Find out the missing values from the following table :

Variable Factor	0	1	2	3	4	5	6	7
TP (in units)	—	—	—	—	25	—	—	—
AP (in units)	—	5	—	—	—	—	—	—
MP (in units)	—	—	8	4	—	5	0	−4

6. Complete the following table :

Units of Labout (Units)	Average Product (Units)	Marginal Product (Units)
1	8	—
2	10	—
3	—	10
4	9	—
5	—	4
6	7	—

7. Identify the different output levels, which mark the three phases of the operation of the low of Variable Proportions, from the following table :

Units of variable factor	0	1	2	3	4	5
TP (in units)	0	8	20	28	28	20

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8. Calculate the MP of variable factor and indicate the various phases of Law of variable Proportions from the following schedule :

Units of variable factor	0	1	2	3	4	5	6
TP (in units)	0	50	110	150	180	180	150

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9. Identify different phases of the Law of Variable Proportions from the following schedule. Give reasons for your answer.

Variable Input (Units)	Total Physical Product (Units)
1	4
2	9
3	13
4	15
5	12

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10. Idnentify the three phases of the Law of Variable Proportions from the following and also give reason behind each phase.

Units of Variable Input	Total physical Product (Units)
1	10
2	22
3	30
4	35
5	30

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1. What type of changes take place in total product and marginal product when there are :

(a) increasing returns to a factor ?

(b) diminising returns to a factor ?

why do these changes take place

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2. Why MP curve cuts AP curve at its maximum point ?

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3. Can AP rise when MP starts declining ?

4. What is the reaction of AP, when, (i) MP is more than AP, (ii) MP is less than AP, (iii) MP is equal to AP ?

5. What is the behaviour of TP, when: (i) MP rises, (ii) MP falls, but remains positive, (iii) MP is zero, (iv) MP becomes negative.

6. State the behaviour of marginal product in the Law of Variable Proportions. Explain the causes of this behaviour.

7. What are the different phases in the Law of Variable Proportions in terms of Total Product ? Give reason behind each phase. Use diagram.

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8. Explain the changes that take place in total product and marginal product under increasing returns to a factor.

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9. Give the behaviour of marginal product and total product as more and more units of only one input are employed while keeping other inputs as constant.

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1. When there are diminishing returns to a factor, total product always decreases.

2. Tota product will increase only when marginal product increases.

3. Increase in total product always indicates that there are increasing returns to a factor.

4. When marginal product falls, average product will also falls.

5. The distinction between short and long run is based on a fixed time period.

6. When there are diminishing returns to a factor, marginal and total product both always fall.

7. Production function estabilishes a relation between inputs and output, which is technical and not economical in nature.

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8. When matginal product is zero, total product is at its maximum point.

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9. Both average product and marginal product can be negative.

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10. Both average product and marginal product can be zero.

▶ View Text Solution

11. In the operation of the Law of variable Propertions, all the factors are assumed to be variable.

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12. TP, MP and AP are U-shaped curves.

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13. In the long run, all factors of production are variable.

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14. Only variable factors are used for production in the short period.

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15. Both variable and fixed factors exist in case of zero output.

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16. A rational producer aims to operate in first phase of Law of vaiable Proportions as total product increases at increasing rate.

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17. When average product is maximum, marginal product is greater than average product.

18. Under 'Law of Variable Proportions', factor ratio keeps on changing.

19. Average product can rise even when marginal product starts declining.

20. Marginal product cuts average product from its top.

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21. When marginal product is less than average product, average product falls.

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22. Rising average product is possible only when MP is more than AP.

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23. Marginal product always rises when average product is increasing.

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24. The production function does not depend on the state of technology.

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25. Average product will increase only when marginal product increases.

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26. Under diminishing returns to a factor, total product continue to increase till marginal product reaches zero.

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27. Under diminishing returns to a factor, marginal product and total product both increase at a diminishing rate.

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28. When total product is constant, average product will fall.

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29. Average Product falls only when marginal product is less than average product.

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30. Law of Variable Proportions' operates in the long period.

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Guidelines To Ncert Questions

1. Explain the concept of a production function.

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2. What is the total product of an input ?

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3. What is the average product of an input ?

> ▶ View Text Solution

4. What is the marginal product of an input ?

> ▶ View Text Solution

5. Explain the relationsphip between the marginal products (MP) and the total product (TP) of an input.

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6. Explain the concepts of the short run and the long run.

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7. What is the law of diminishing marginal product ?

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8. What is the Law of Variable Proportions ?

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9. The following table gives the total product schedule of labour.

Find the corresponding product and marginal product schedules

of labour.

Labour	0	1	2	3	4	5
TP of labour (units)	0	15	35	50	40	48

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10. The following table gives the average product schedule of labour. Find the total product and marginal product schedules. It is given that the total product is zero at zero level of labour employment.

Labour	1	2	3	4	5	6
AP of labour (units)	2	3	4	4.25	4	3.50

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11. The following table gives the marginal product schedule of labour. It is also given that total product of labour is zero at zero level of employment. Calculate the total and average product

schedules of labour.

Labour	1	2	3	4	5	6
MP of labour (units)	3	5	7	5	3	1

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12. Let the production function of a firm be : $Q = 5L^{½}K^{½}$. Find

out the maximum possible output that the firm can produce with

100 units of L and 100 units of L and 100 units of K.

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13. Let the production function of a firm be : $Q = 2L^2K^2$. Find

out the maximum possible output that the firm can produce with

5 units of L and 2 units of K. What is the maximum possible

output that the firm can produce with zero unit of L and 10 units

of K ?

14. Find out the maximum possible output for a firm with zero unit of L and 10 units of K when its production function is :

$Q = 5L + 2K.$

Very Short Answer Type Question

1. What is meant by production ?

2. Give the meaning of production function.

3. What is short run ?

4. What is Long run ?

5. In which period, some factors of production are fixed and others variable ?

6. What do you mean by variable factors ?

7. What do you mean by fixed factors ?

8. Can Average product be zero or negative ?

9. Define marginal physical product

10. Can marginal product be zero or negative

11. What change will take place in marginal product, when total product increases at a diminishing rate ?

12. As the variable input increased by one unit, total output falls. What can you say about the marginal productivity of variable input ?

13. Four units of labour produce 100 unit of output and 5 units of labour produce 120 units of output. Calculate MP of the labour.

14. Name the law expressing the relationship between the quantities of a variable factor and the quantities of output.

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15. In which phase pf Law of Variable Proportions, a rational firm aims to operate ?

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16. Mention two reasons for occurrence of the phase of increasing returns to a factor.

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17. What is meant by diminishing returns to a factor ?

> ▶ View Text Solution

18. What is the general shape of the TP, AP and MP curves ?

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19. What will happen to MP, when TP increases at an increasing rate ?

> ▶ View Text Solution

20. How will MP react, when TP rises at a diminishing rate ?

> ▶ View Text Solution

21. When MP is zero, what can you say about TP?

View Text Solution

22. Define Average Product.

View Text Solution

23. Give meaning of "Returns to a Factor".

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24. Define short-run production function.

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25. Give the meaning of 'Long run production function'.

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Revision Exercise

1. Which of the following staements accurately describe the relationship between AP and MP ?

    A. AP rises when MP is above it and falls when MP is below it.

    B. MP intersects AP at its minimum point.

    C. AP and MP are always parallel to each other.

    D. AP is always rising when MP is falling and vice-versa.

Answer: A

2. When MP is zero, what can you say about TP?

A. TP is increasing

B. TP is maximum

C. TP is falling

D. None of these

Answer: B

3. Marginal Product refers to addition to total output when one more :

A. Unit is prosuced

B. Unit is sold

C. Unit is consumed

D. Unit of variable factor factor is employed

Answer: D

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4. The period of time in which the plant capacity can be varied is known as :

A. Short run

B. Long run

C. Both (a) and (b)

D. Neither (a) nor (b)

Answer: B

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5. _____ is the extension of "Law of Diminishing Returns".

    A. Law of Variable Proportions

    B. Law of Demand

    C. Law of Equi-marginal utility

    D. Law of Diminishing Marginal Utility

Answer: A

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6. Law of Variable Proportions is also known as :

A. Law of Returns

B. Returns to Variable Factor

C. Law of Returns to Factor

D. All of these

Answer: D

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7. The maximum possible output for a firm with two units of labour (L) and ten units of capital (K), if its production function is given as : $5L + 2K$

A. 0 units

B. 30 units

C. 200 units

D. 50 units

Answer: B

8. Identify the phase in which TP increases at an increasing rate and MP also increases.

A. Increasing returns to a factor

B. Diminishing returns to a factor

C. Negative returns to a factor

D. None of these

Answer: A

9. Which of the following is not a reason for operation of increasing returns to a factor ?

A. Better utilization of fixed factor

B. Limitation of fixed factor

C. Increase in efficiency if variable factor

D. Indivisibility of fixed factor

Answer: B

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10. When average product increases, the marginal product is :

A. Less than average product

B. Equal to the average product

C. More tha average product

D. None of these

Answer: C

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11. What happens to AP, when MP is more than AP ?

A. AP rises

B. AP falls

C. AP remains constant

D. None of these

Answer: A

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12. What is the behaviour of TP, when MP becomes negative ?

A. TP increases at an increasing rate

B. TP increases at diminishing rate

C. TP is at its maximum point

D. TP decreases

Answer: D

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13. According to Law of Variable Proportions, there are _____ phases.

A. 1

B. 3

C. 2

D. 4

Answer: B

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14. Average product cannot be negative because :

A. Total product can never be zero

B. Total product can never be negative

C. Neither (a) nor (b)

D. Both (a) and (b)

Answer: B

15. The law diminishing retuns refers to an eventual fall in :

    A. Productivity of factors of production

    B. Total earnings of the firm

    C. Marginal product of the variable factor

    D. None of these

Answer: C

16. The 2nd phase (diminishing returns to a factor) is exhibited by the following total product sequence:

A. 50, 50, 50, 50

B. 50, 110, 180, 260

C. 50, 100, 150, 200

D. 50, 90, 120, 140

Answer: D

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17. Which phase of Law of Viriable Proportions has been ruled out on the grounds of technical inefficiency :

A. Increasing returns to a factor

B. Diminishing returns to a factor

C. Negative returns to a factor

D. None of these

Answer: C

18. A rational producer always aims to operate in _____ of Law of

Variable Proportions:

    A. 1st Phase (Increasing returns to a factor)

    B. 2nd Phase (Diminishing returns to a factor)

    C. 3rd Phase (Negative returns to a factor)

    D. Either 1st Phase or 2nd Phase

Answer: B

19. In general, most of the production functions measures :

A. Productivity of factors of production

B. Economical relation between the factors of production

C. Technical relation between inputs and output.

D. None of these

Answer: C

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20. Product per unit of labour employed is termed as :

A. Average product

B. Marginal product

C. Total product

D. None of these

Answer: A

21. When AP is maximum, MP is equal to:

A. AP

B. TP

C. Zero

D. One

Answer: A

22. Variable factors refer to those factors of production :

A. Which can be only changed in the long run

B. Which can be changed in the short run

C. Which can never be changed

D. None of these

Answer: B

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23. Both AP and MP curves are generally :

A. U-shaped

B. Inversely U-shaped

C. Rising

D. Falling

Answer: B

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24. In describing a given production technology, the short run is best described as lasting :

A. Up to six months from now

B. Upto five years from now

C. As long as all inputs are fixed

D. As long as at least one input is fixed

Answer: D

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25. _____ is the period of time in which all the factors of production are variable.

    A. Short-run

    B. Long-run

    C. Medium-run

    D. None of these

Answer: B

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26. The 'Marginal Product' of a variable input is best described as :

    A. Product divided by the number of units of variable input

B. Additional output resulting from a unit increase in the avriable input

C. Additional output resulting from a unit increase in both variable and fixed inputs

D. Additional output resulting from a unit increase in the units produced

Answer: B

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27. On the basis of following schodule, answer the following questions :

Units of Labour	Total Product (TP)	Marginal Product (MP)
1	10	10
2	?	12
3	36	?

(i) What TP at 2 units of labour ?

A. 10

B. 12

C. 22

D. 20

Answer: C

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28. On the basis of following schodule, answer the following questions :

Units of Labour	Total Product (TP)	Marginal Product (MP)
1	10	10
2	?	12
3	36	?

(ii) What is MP at 3rd unit of labour ?

A. 22

B. 12

C. 36

D. 14

Answer: D

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29. On the basis of following schodule, answer the following questions :

Units of Labour	Total Product (TP)	Marginal Product (MP)
1	10	10
2	?	12
3	36	?

The given schedule indicates the phase of :

A. Diminishing Returns to a Factor

B. Increasing Returns to a factor

C. Negative Returns to a Factor

D. None of these

Answer: B

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30. What is the maximum point of TP ?

A. When AP becomes zero

B. When MP becomes zero

C. When MP cuts AP

D. None of these

Answer: B

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31. Average Product can have :

A. Positive values only

B. Negative values only

C. Both positive as well as negative values

D. Neither positive nor negative values

Answer: A

32. Which of the following is correct ?

A. When MP is positive and falling, TP rises at a decreasing

rate.

B. When MP is rising, TP rises at an increasing rate.

C. When MP is negative and falling, TP falls.

D. All of these

Answer: D

33. At the Point of Inflexion :

A. Total Product is maximum

B. Average Product is maximum

C. Marginal Product is maximum

D. Marginal Product is zero

Answer: C

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34. When AP falls due to increase in quantity of variable input :

A. $MP < AP$

B. $MP = AP$

C. $MP > AP$

D. None of these

Answer: A

35. The Law of _____ deals with input-output relationship, when the output is increased by variying the quantity of one input.

    A. Variable Proportions

    B. Supply

    C. Demand

    D. Equi-marginal utility

Answer: A

36. According to Law of Variable Proportions, when we increase quantity of only one input keeping other inputs fixed, _____ initially increases at an increasing rate, then at a decreasing rate and finally at a negative rate.

A. Total Product

B. Average Product

C. Marginal Product

D. None of these

Answer: A

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37. Which of the following is not a phase in the Law of Variable Proportions ?

A. Increasing returns to a factor

B. Constant returns to a factor

C. Diminishing returns to a factor

D. Negative returns to a factor

Answer: B

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38. The total output generated by the first four units of variable input is 200 units, 350 units, 450 units and 500 units. The marginal product of the third unit of input is :

A. 50 units

B. 100 units

C. 150 units

D. 200 units

Answer: B

39. If TP of employing one unit of variable factor is 12 units and that of 2 units of variable factor is 16 units, the marginal product of 2 units of variable factor is :

A. 3 units

B. 4 units

C. 8 units
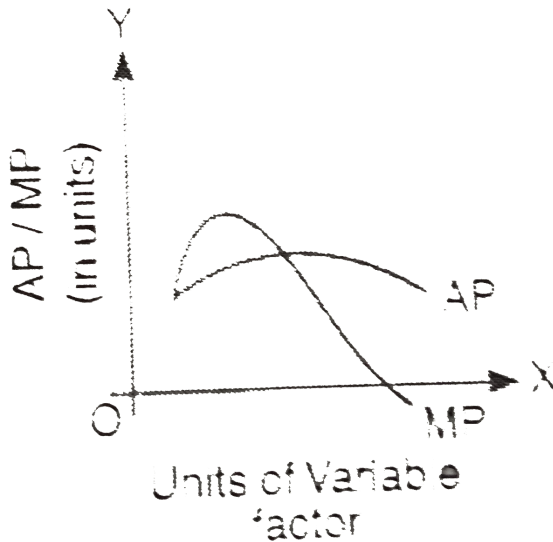
D. 16 units

Answer: B

40. Which of the following is correct statement showing showing the relationship between AP and MP ?

A. When $MP > AP$, AP increases

B. When $MP = AP$, AP is constant

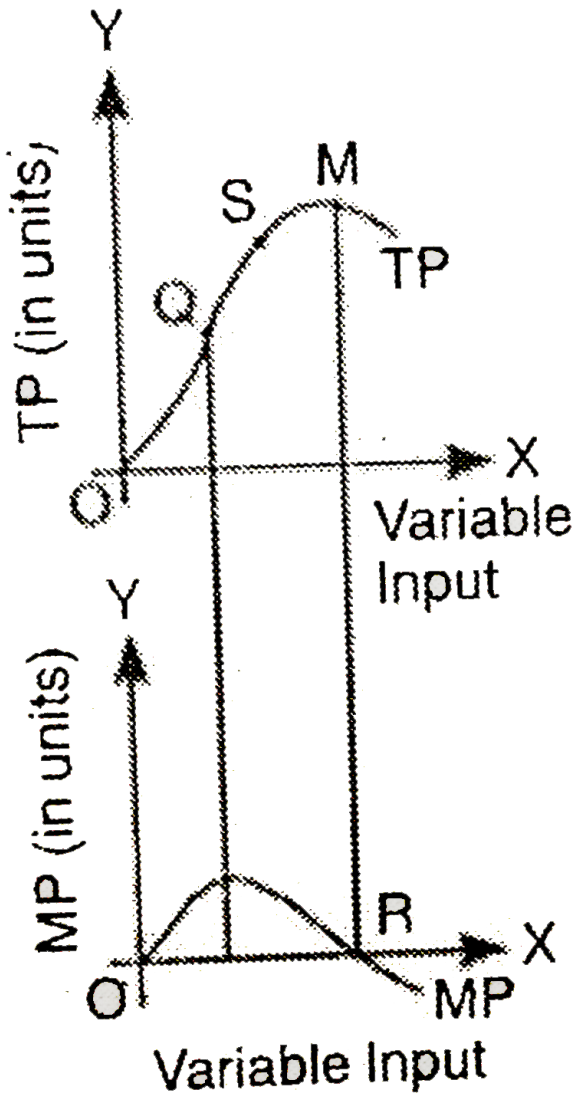C. When $MP < AP$, AP falls

D. All of these

Answer: D

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Short Answer Type Questions

1. Point of Inflexion' is represented by :

A. Point M

B. Point Q

C. Point R

D. Point S

Answer: B

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2. When marginal product rises, total product : (Choose the correct alternative)

A. Falls

B. Rises

C. Can rise or cn fall

D. Remains constant

Answer: B

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3. What is meant by variable factor and fixed factor ? Give two examples of each.

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4. Define the following terms : (i) Total product, (ii) Average product, (iii) Marginal product.

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5. What is meant by returns to a factor? State the law of diminishing returns to a factor.

6. State the relation between Marginal Product and Average Product. Use diagram.

7. What is meant by returns to a factor ? What leads to increasing returns to a factor ? Explain.

8. What is meant by diminishing returns to a factor ? Why does it occur ?

9. In which phase a rational producer will operate in the short run ?

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10. What does the Law of Variable Proportions show ? State the behaviour of total product according to this law.

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11. What does the Law of Variable Proportions show ? State the behaviour of marginal product according to this law.

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12. State the phases in the behaviour of Total Product as per the Law of Variable Proportions. Use diagram.

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13. Giving reasons, explain the 'Law of Variable Proportions'.

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14. Discuss the concepts of Short Run Production Function and Long Run Production Function

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15. What type of production function is this in which only one input is increased and others kept constant ? State the behaviour of total product in this production function.

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1. Define production function. Distinguish between short run and long run production functions.

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2. Define marginal marginal product. State the behaviour of marginal product when only one input is increased and other

inputs are held constant.

OR

State the behaviour of Marginal physical Product under Returns to a Factor.

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3. Explain the Law of Variable Proportions with the help of total and marginal physical product curves.

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4. Explain the likely behaviour of Total Product and Marginal Product when for increasing production only one input is increased while all other inputs are kept constant.

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5. Explain the law of diminishing returns with the help of a hypothetical schedule and diagram.

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6. Explain reasons for : (i) Increasing returns to a factor, (ii) Diminishing returns to a factor.

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7. Discuss the relationship between : (i) MP and TP, (ii) AP and MP.

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8. Distinguish between : (i) Variable factors and Fixed factors, (ii) Short-run and Long run.

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9. What are the diiferent phases in the Law of Variable Proportions in terms of marginal product ? Give reason behind each phase. Use diagram.

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10. Explain the changes that take place in total product and mariginal product under diminishing returns to a factor.

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11. State with the help of a marginal product schedule the different phases of the Law of Variable Proportions.

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12. Explain the law of variable proportions with the help of a numerical example.

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Practicals On Tp Ap And Mp

1. Calculate Average Product (AP) and Marginal Product (MP) :

Variable Factor (units)	1	2	3	4	5	6
TP (units)	8	16	24	29	29	25

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2. Calculate Average Product (AP) and Marginal Product (MP):

Variable Factor (units)	0	1	2	3	4	5	6	7
TP (units)	0	3	8	12	15	17	17	16

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3. Calculate TP and AP :

Variable Factor (units)	1	2	3	4	5	6	7
MP (units)	20	16	12	8	4	0	−4

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4. Calculate TP and AP from the following data :

Variable Factor (units)	1	2	3	4	5
MP (units)	10	11	10	9	8

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5. Calculate the values of TP and AP :

Variable Factor (units)	1	2	3	4	5	6
MP (units)		10	12	14	12	7	5

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6. Compute TP and MP :

Variable Factor (units)	1	2	3	4	5
AP (units)		50	45	40	35	30

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7. Calculate TP and MP :

Variable Factor (units)	1	2	3	4	5	6
AP (units)		50	48	45	42	39	35

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8. Find out the missing values from the following table :

Variable Factor (units)	0	1	2	3	4	5
TP (units)	–	–	10	–	24	–
AP (units)	–	–	–	6	–	5
MP (units)	–	4	–	–	–	–

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9. Complete the following table :

Units of Labour (units)	Average Product (Units)	Marginal Product
1	16	–
2	20	–
3	–	20
4	18	–
5	–	8
6	14	–

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10. Complete the following schedule :

Units	TPP (units)	APP (Units)	MMP (Units)
1	100		
2			140
3		140	
4	480		

11. Calculate MP of the variable factor and identify the various phases of change in total product, from the following schedule :

Units of variable factor (VF)	0	1	2	3	4	5	6
TP (units)	0	10	28	45	52	52	48

12. Identify the three phases of the Law of Variable Proportions from the following schedule :

Units of Labour	1	2	3	4	5
Total Physical Product (units)	20	50	70	80	60

13. From the following table, find out the phase during which there are increasing retuns to a factor. Give reasons for your answer.

Units of variable factor	1	2	3	4	5
Average Product (units)	10	12	14	14.5	14

14. Identify the three phases of the law of variable proportions. Give reasons.

Variable Input (units)	Total Product (units)
1	5
2	11
3	15
4	17
5	15

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