Total Product

The output derived when variable inputs are mixed with a fixed input in the short run. In other words total product is the maximum production derived from a certain input mix. This is measured by units.

Average product

Average product means the output derived by one unit of variable input in the short run. Since this only shows the output derived by variable input it doesn't show the average of all inputs. Therefore average product can be derived using following equation;

$$\text{Average Product} = \frac{\text{Total Product}}{\text{Variable input}}$$

$$\mathbf{AP} = \frac{\mathbf{TP}}{\mathbf{V}}$$

If the variable input is labour, AP = TP / L

If total production is 40 at 5 units of Variable input Calculate the Average Product of one Variable input.

Marginal Product

If variable input is changed by one unit in the short run, the change in total product or the additional amount of output added total production is Marginal product. Therefore it can be calculated as follows;

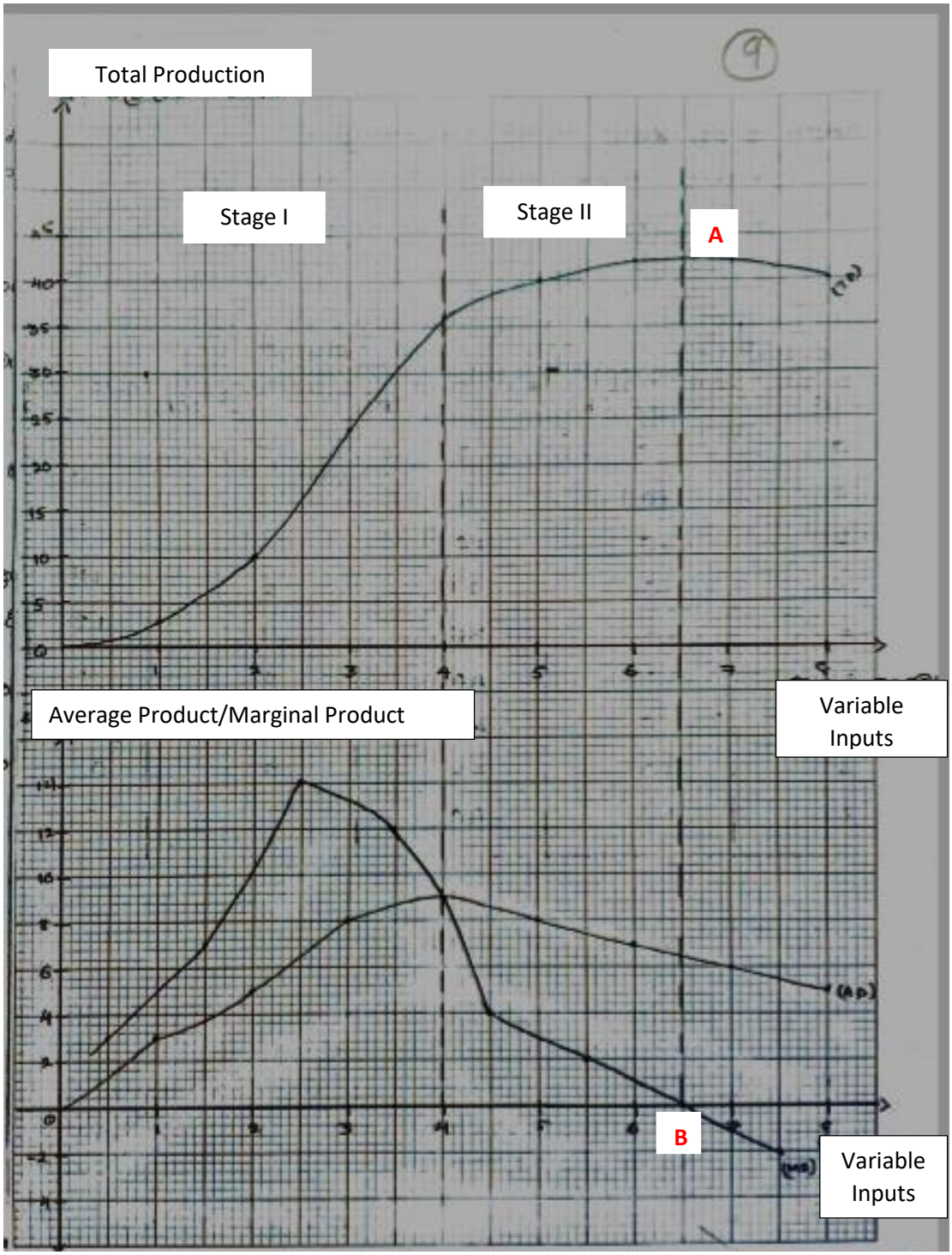
$$\text{Marginal Product} = \frac{\text{Change in total product}}{\text{Change in variable input}}$$

$$MP = \frac{\triangle TP}{\triangle V}$$

When variable input increase from 4 units to 5 units, total production increases from 36 – 40.

Calculate the Marginal Product.

Your graph should look like this. (yesterday's note)



The stage I in this graph shows growth of TP in an increasing rate as fixed input remains same while variable input increase. In Stage II; after 4 units of variable inputs as inputs are increased total production increases in a slow rate/ decreasing rate. This indicates the diminishing returns of the variable input. At Stage II if variable input is further increased, (if input increases from 5, 6) total product starts to reduce, there will be negative value for MP.

- When MP is higher than AP the MP curve is above the AP during stage I
- When AP is higher than MP, MP curve is below the AP curve during Stage II
- When TP is at the highest point (**A**) MP will be Zero (**B**)

Thus, there will be diminishing marginal returns in the short run as the producer cannot change all inputs used in the production process. Diminishing marginal returns could be overcome if …… ?