

# **AP Dojo**

## **AP Microeconomics Unit 5 - Cheat Sheet**

# Unit 5 - Cheat Sheet

## 5.1 Introduction to Factor Markets

**1.A** Describe economic concepts, principles, or models.

## 5.2 Changes in Factor Demand and Factor Supply

**3.B** Determine the effect(s) of one or more changes on other economic markets.

## 5.3 Profit-Maximizing Behavior in Perfectly Competitive Factor Markets

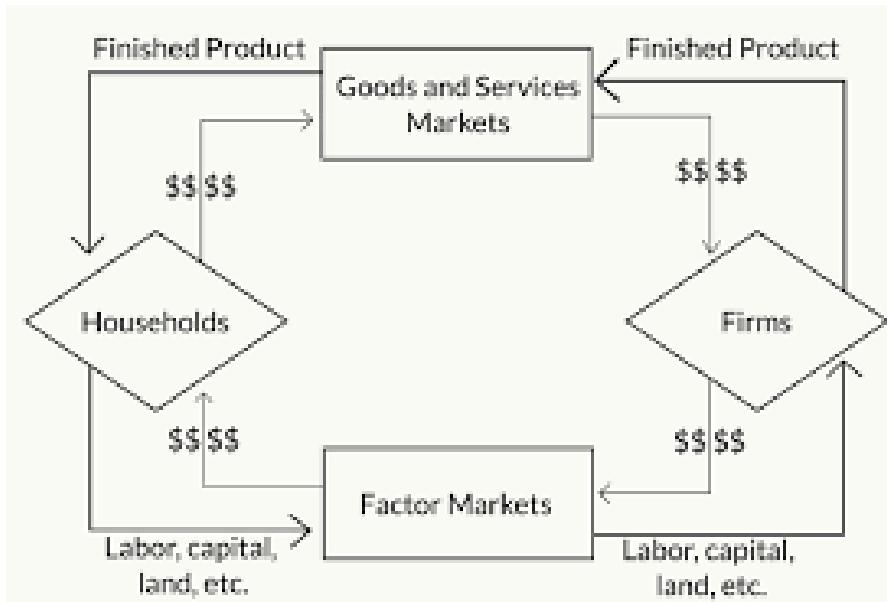
**2.C** Interpret a specific economic outcome using quantitative data or calculations.

## 5.4 Monopsonistic Markets

**2.A** Using economic concepts, principles, or models, explain how a specific economic outcome occurs or what action should be taken in order to achieve a specific economic outcome.

## Topic 5.1 - Introduction to Factor Markets

**Factor Market** - where the factors of production (land, labor, capital) are sold by households to businesses



**Derived Demand** - the idea that the demand for the factors of production is determined (derived) by the amount of demand that exists for the products they help to produce

- how much demand exists for coffee machines is highly dependent on how much demand exists for coffee
- how much demand exists for coffee farmer labor is also highly dependent of how much demand exists for coffee

**Demand for Labor** - refers to the number of workers that businesses are willing to hire at different wage rates

- The demand curve is downward sloping, because at higher wages, firms are willing to hire fewer workers

**Supply of Labor** - refers to the number of workers that are willing to supply their labor at different wages rates

- The supply of labor is upward sloping, because at higher wages, more people are willing to supply their labor

**Marginal Revenue Product (MRP)** - The additional revenue generated by employing one more unit of a factor of production (like one more employee) ( $MP \times MR = MRP$ )

Number of Workers	Total Product
1	15
2	20
3	24
4	27
5	29

If the product price is \$5, what is the marginal revenue product of the 3rd worker hired?

Keep hiring additional workers until  $MRP = MRC$

Hire the next worker if  $MRC$  is less than  $MRP$

$$MRP = 4 \text{ pizzas} * \$5 = \$20$$

$$MRC = \$25$$

- Step 1: Find the total revenue when two workers are employed
- Step 2: Find the total revenue when three workers are employed
- Step 3: Find the difference between Step 2 and Step 1

**Marginal Physical Product (MPP)** - refers to the additional output produced by using one more unit of a factor of production

Labor	Total Product	Marginal Physical Product
0	0	
1	20	20
2	50	
3	75	
4	95	
5	110	
6	120	
7	125	
8	125	
9	120	
10	110	

**Marginal Factor (or Resource) Cost (MFC or MRC)** - refers to the additional cost paid by a firm when it hires an additional worker or resource

Hiring inputs to the point where  $MRP = MRC$  will produce the profit maximizing quantity where  $MR = MC$

<b>Q</b>	<b>S=Wage</b>	<b>TRC</b>	<b>MRC</b>
1	\$10	\$10	\$10
2	\$11	\$22	\$12
3	\$12	\$36	\$14
4	\$13	\$52	\$16

**Profit Maximization Rule:** firms should hire additional workers until  $MRP = MRC$

- When  $MRP > MRC$ , we gain additional revenue by hiring another worker, so we should continue hiring
- When  $MRP < MRC$ , our total revenue decreases by hiring another worker, so we should not hire that worker

## 5.2 - Changes in Factor Demand and Factor Supply

**Shifts in Factor Demand:** non-price factors affecting the willingness and ability of firms to hire workers or buy other factors of production

- An increase in the productivity of a factor of production can lead to an increase in the demand for that factor
- If the price of the final product increases, the demand for the factors of production used to produce that product is likely to increase as well

### **Determinants of Factor Demand:**

- 1) Prices of related inputs
- 2) Changes in productivity
- 3) Changes in demand for the product

**Shifts in Factor Supply:** non-price factors affecting the willingness and ability of individuals to supply factors of production

- An increase in the retirement age means more workers are willing to work for a longer number of years (supply of labor increases)
- The price of mangoes increase, meaning the wage rate for mango farm labor increases. As a result, more coffee farm laborers switch the working on mango farms (supply of labor decreases due to substitute factors)

### **Determinants of Factor Supply:**

- 1) Number of qualified workers
- 2) Government regulations
- 3) Personal preferences related to work and leisure

## **5.3 - Perfectly Competitive Labor Markets**

### **Characteristics of Perfectly Competitive Labor Markets:**

1. Many firms buying labor and many people selling their labor
2. Wage Takers
3. Can be a perfect competitor in labor market  
even if an imperfect competitor in the product market



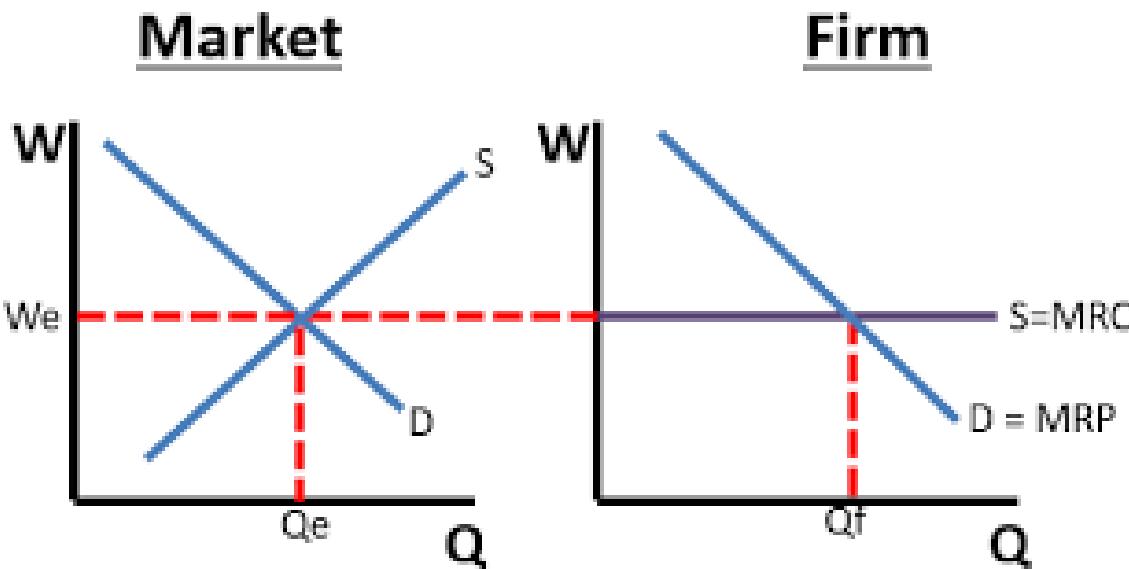
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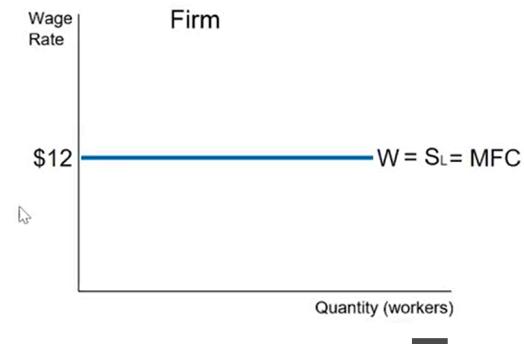
### **Perfectly Competitive Labor Market Graph:**

- The graphs for perfectly competitive labor markets look very similar to the cost curves for perfectly competitive firms, with a few key differences
- The market demand curve (firms willing to hire) and market supply curve (people willing to work) meet to create an equilibrium wage
- This wage gives us the supply curve on the firm graph. If the equilibrium wage is \$10, workers must accept that wage. No one will be willing to hire them for a higher wage.
- Furthermore, the supply curve is also the **MARGINAL RESOURCE COST CURVE**



Total Factor Cost = # of Workers x Wage Rate       $MFC = \frac{\Delta TFC}{\Delta QR}$

Quantity of Workers	Wage Rate	Total Factor Cost	MFC
0	\$12	\$0	--
1	\$12	\$12	\$12
2	\$12	\$24	\$12
3	\$12	\$36	\$12
4	\$12	\$48	\$12
5	\$12	\$60	\$12



### Profit Maximization in Perfectly Competitive Factor Markets:

- Firms typically employ (use) a combination of labor and capital (ex: a car manufacturer uses both labor and machines)
- Firms must decide what combination of labor and capital to use (ex: how many employees and how many machines)

**Flashback:** Remember the utility maximization problems we learned in Unit 2?

- An art student spends all of her income on pencils and drawing pads. The student currently buys 30 pencils at \$1 each and 10 pads at \$5 each. If the marginal utility of the 30th pencil is 100 utils and the marginal utility of the 10th pad is 400 utils, to maximize utility the student should change her purchases of pencils and pads in which of the following ways?
- To answer this question, find the **marginal utility per dollar** for the 30th pencil and the 10th pad
- 30th pencil:  $100 / \$1 = 100$
- 10th pad:  $400 / \$5 = 80$
- **Answer:** The student should buy more pencils and fewer pads to maximize utility
- WHEN IN COMES TO EMPLOYING MORE LABOR AND CAPITAL, FIRMS ARE FOCUSED ON **MINIMIZING THEIR COSTS** (RATHER THAN MAXIMIZING UTILITY). But we can solve these questions the same way, by comparing the **marginal product per dollar** of labor and capital)

**Cost Minimization Rule:** Cost is minimized at the levels of capital and labor when the marginal product of labor divided by the price of labor is equal to the marginal product of capital divided by the price of capital

$$\frac{MP_c}{P_c} = \frac{MP_L}{P_L}$$

$MP_c = 60$ ,  $P_c = 30$  and the  
 $MP_L = 36$ ,  $P_L = 12$

Marginal Product Labor / Price Labor = Marginal Product Capital / Price Capital

- Remember that marginal product decreases (and marginal cost increases) as we add additional units of labor or capital
- So if our marginal product of labor per dollar is higher than the marginal product of capital per dollar, what should the firm do?

Robots - \$10 each			Workers - \$5 each		
Units of Resource X	MP	MP/Px	Units of Resource X	MP	MP/Px
1	30	3	1	20	4
2	20	2	2	15	3
3	10	1	3	10	2
4	5	.50	4	5	1

**The cost-minimizing ratio for this firm is 2 robots and 3 workers**

## 5.4 - Monopsonistic Markets

**Monopsony** - a market structure in which a single buyer substantially controls the market as the major purchaser of goods and services

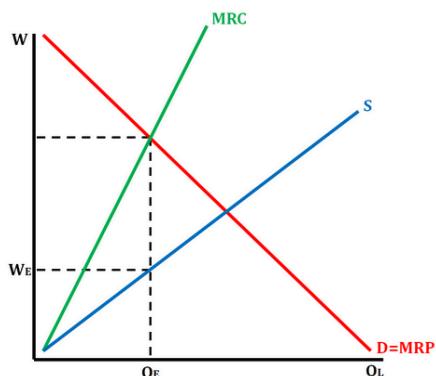
### Characteristics of Monopsonistic Labor Market:

- 1) Form of imperfect competition
- 2) Only one firm hiring labor
- 3) Wage maker
- 4) Firm must raise wages if it wants to hire more workers
- 5) If it raises wages for one worker, it must raise wages for all workers  
(MRC is greater than wage)
  - a) This is like the flipped version of a monopoly!

CHARACTERISTIC	PERFECTLY COMPETITIVE	MONOPSONY
SUPPLY & MRC	Supply = MRC	Supply < MRC
NUMBER OF WORKERS HIRED	Hires workers at a quantity where $MRP = MRC$	Hires fewer workers than perfectly competitive market because $MRC > Supply$
WAGE V. MRP	$Wage = MRP$	$Wage < MRP$

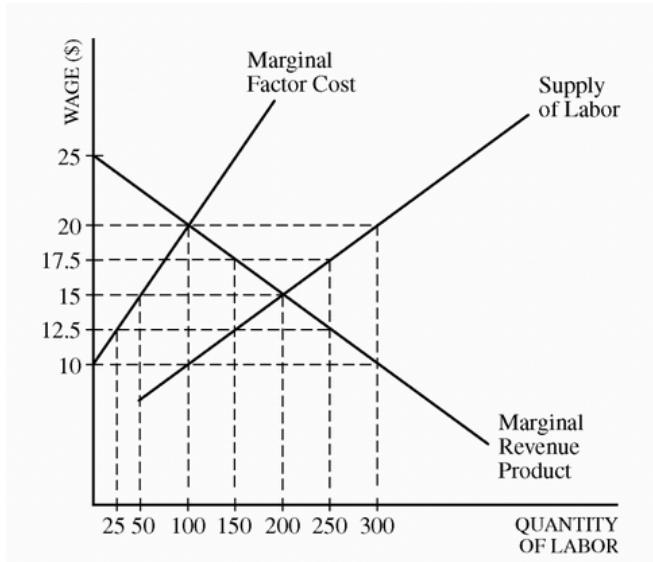
$$MFC = \frac{\Delta TFC}{\Delta Q_R}$$

Quantity of Workers	Wage Rate (W)	Total Factor Cost (Workers x W)	Marginal Factor Cost (MFC)
0	\$7	\$0	--
1	\$8	\$8	\$8
2	\$9	\$18	\$10
3	\$10	\$30	\$12
4	\$11	\$44	\$14
5	\$12	\$60	\$16



- $MRC > S$  in a monopsony because the firm cannot wage discriminate. All workers must be paid the same
- **How to Find Number of Workers:** find where  $MRP = MRC$  and then go down to the X-axis.
- **How to Find Wage Rate:** find  $MRP = MRC$  and then go down to the supply curve and over to Y-axis

### Practice Problem



- a) Identify the profit-maximizing quantity of labor for TreeMart
- b) Identify the wage rate TreeMart pays to hire the profit-maximizing quantity of labor
- c) Identify the quantity of labor hired in each of the following scenarios:
  - i) TreeMart operates in a competitive labor market
  - ii) The government imposes a minimum wage of \$12.50.

