

Week 23

# AP Microeconomics

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Homework bundle for this week

本周作业合集

exercises.lol

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AP Microeconomics

Name: \_\_\_\_\_ Score: \_\_\_\_\_

1. Factor demand is a "derived demand" because it comes from:
  - ☐ the value of the product the factor helps make
  - ☐ how much workers enjoy their jobs
  - ☐ the government
  - ☐ the number of factories
2. The product a firm sells becomes more valuable. The firm's demand for workers:
  - ☐ shifts right (higher MRP)
  - ☐ shifts left
  - ☐ does not change
  - ☐ becomes vertical
3. A firm in a competitive factor market is a **wage taker**, so its marginal factor cost is:
  - ☐ constant and equal to the market wage
  - ☐ above the market wage
  - ☐ below the market wage
  - ☐ always zero
4. A monopsony is a factor market with:
  - ☐ a single buyer of the factor
  - ☐ a single seller of the factor
  - ☐ many identical buyers
  - ☐ no buyers at all
5. For a competitive seller, MRP equals marginal product times the product \_\_\_\_\_.  
\_\_\_\_\_
6. Select **all** that shift factor (labour) **demand**.
  - ☐ a change in the product's price
  - ☐ a change in worker productivity
  - ☐ a change in the price of a related input
  - ☐ more workers immigrating

*Tick every correct option.*

7. In a competitive factor market the hiring rule simplifies to  $MRP =$  \_\_\_\_\_.
- \_\_\_\_\_
8. For a monopsony, the marginal factor cost of one more worker is above the wage on the supply curve.
- ☐ True      ☐ False
9. A worker adds 8 loaves a day, and each loaf sells for 5. What is this worker's marginal revenue product?
- \_\_\_\_\_
10. A wave of immigration into a country tends to shift the labour supply curve:
- ☐ right (more workers available)
- ☐ left
- ☐ not at all
- ☐ vertical

**1. the value of the product the factor helps make**

Firms want a factor only for the goods it produces, so demand is derived from the product.

**2. shifts right (higher MRP)**

A higher output price raises each worker's MRP, shifting factor demand right.

**3. constant and equal to the market wage**

It can hire any number at the market wage, so each extra worker costs exactly that wage.

**4. a single buyer of the factor**

It is the mirror image of a monopoly — one buyer instead of one seller.

**5. price**

$MRP = MP \times P$  — the extra output valued at the price it sells for.

**6. a change in the product's price; a change in worker productivity; a change in the price of a related input**

Output price, productivity and related-input prices shift demand; more workers shifts supply.

**7. W**

Since MFC equals the wage  $W$ , the firm hires where  $MRP = W$ .

**8. True**

To hire one more it must raise the wage for every worker, so MFC exceeds the wage.

**9. 40**

$MRP = MP \times P = 8 \times 5 = 40$ .

**10. right (more workers available)**

More available workers increase labour supply, shifting the curve right.

# 5.1 Introduction to Factor Markets

Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

Total: 9 marks

**KEY WORDS** derived demand 派生需求 • factor market 要素市场 • marginal factor cost (mfc) 边际要素成本  
• marginal revenue product (mrp) 边际收益产品

## Objective

Build the skills to answer exam questions on **factor markets**.

**You must be able to:**

- explain that the demand for a **factor of production** is a **derived demand** 派生需求
- calculate the **marginal revenue product (MRP)** 边际收益产品
- calculate the **marginal factor cost (MFC)** 边际要素成本
- state the profit-maximizing hiring rule: employ a factor until  $MRP = MFC$

## 1 Worked examples

Study these first. Each one shows the method for a question type used later.

### ■ Derived demand

A firm demands a factor (like labour) only because of the demand for the **good it helps produce**.

### ■ MRP and MFC

$MRP = MP \times \text{price of the good}$  — the extra revenue from one more unit of the factor.  $MFC$  is the extra cost of hiring one more unit (the wage, in a competitive factor market).

### ■ Hiring rule

Hire until  $MRP = MFC$ . The factor demand curve is the firm's **MRP** curve.

## 2 Practice

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**2.1** State what “derived demand” means for a factor of production. [1]

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**2.2** A worker’s marginal product is 5 units, and each unit sells for \$4. Find the worker’s MRP. [2]

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**2.3** State the profit-maximizing hiring rule. [1]

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## 3 Exam-style questions

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**3.1** The marginal revenue product of labour is [1]

- **A** marginal product  $\times$  price
  - **B** the wage
  - **C** total revenue
  - **D** marginal cost
- 

**3.2** A firm hires labour until [1]

- **A**  $MRP > MFC$
  - **B**  $MRP = MFC$
  - **C**  $MRP < MFC$
  - **D** the wage is zero
- 

**3.3** A worker adds 8 units of output, each selling for \$5; the wage is \$30.

(a) Find the worker’s MRP. [1]

(b) State whether the firm should hire this worker. [1]

(c) Explain why.

[1]

## Solutions

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**2.1** the demand for it comes from the demand for the good it helps produce.

**2.2**  $MRP = MP \times P = 5 \times 4 = \$20$ .

**2.3** hire the factor until its marginal revenue product equals its marginal factor cost.

**3.1 A.**

**3.2 B.**

**3.3** (a)  $MRP = 8 \times 5 = \$40$ . (b) yes, hire the worker. (c) the MRP (\$40) exceeds the wage (\$30), so the worker adds more revenue than cost.

## 5.2 Changes in Factor Demand and Factor Supply

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Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

Total: 9 marks

**KEY WORDS** factor demand 要素需求 • factor supply 要素供给

### Objective

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Build the skills to answer exam questions on **changes in factor demand and factor supply**.

**You must be able to:**

- identify the determinants that shift **factor demand** 要素需求, including the output price and worker **productivity**
- explain how the price of a related input shifts factor demand
- identify the determinants of **factor supply** 要素供给
- predict the effect of a shift on the equilibrium **wage** and quantity

### 1 Worked examples

---

Study these first. Each one shows the method for a question type used later.

#### ■ Factor demand shifters

Since demand for a factor is derived from its MRP, it rises when the **output price** rises or workers become more **productive**. A change in the price of a related input can also shift it.

#### ■ Factor supply shifters

The **number of available workers**, and their willingness to work at each wage.

#### ■ Equilibrium effects

More labour **demand** → higher wage and quantity. More labour **supply** → lower wage, higher quantity.

## 2 Practice

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**2.1** State one determinant that shifts factor demand. [1]

---

**2.2** State how an increase in worker productivity affects factor demand. [1]

---

**2.3** State the effect of an increase in the number of available workers on the equilibrium wage. [2]

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## 3 Exam-style questions

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**3.1** Factor demand rises when the price of the good it helps make [1]

- **A** falls
  - **B** rises
  - **C** is zero
  - **D** is fixed by law
- 

**3.2** An increase in labour supply, other things equal, [1]

- **A** raises the wage
  - **B** lowers the wage
  - **C** raises MRP
  - **D** has no effect
- 

**3.3** The demand for a product rises sharply.

(a) State the effect on the MRP of the labour making it. [1]

(b) State the effect on the demand for that labour. [1]

(c) State the effect on the equilibrium wage.

[1]

## Solutions

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**2.1** any one of: the output price, worker productivity, the price of a related input.

**2.2** it increases factor demand (higher MRP).

**2.3** the wage falls and the quantity of labour rises.

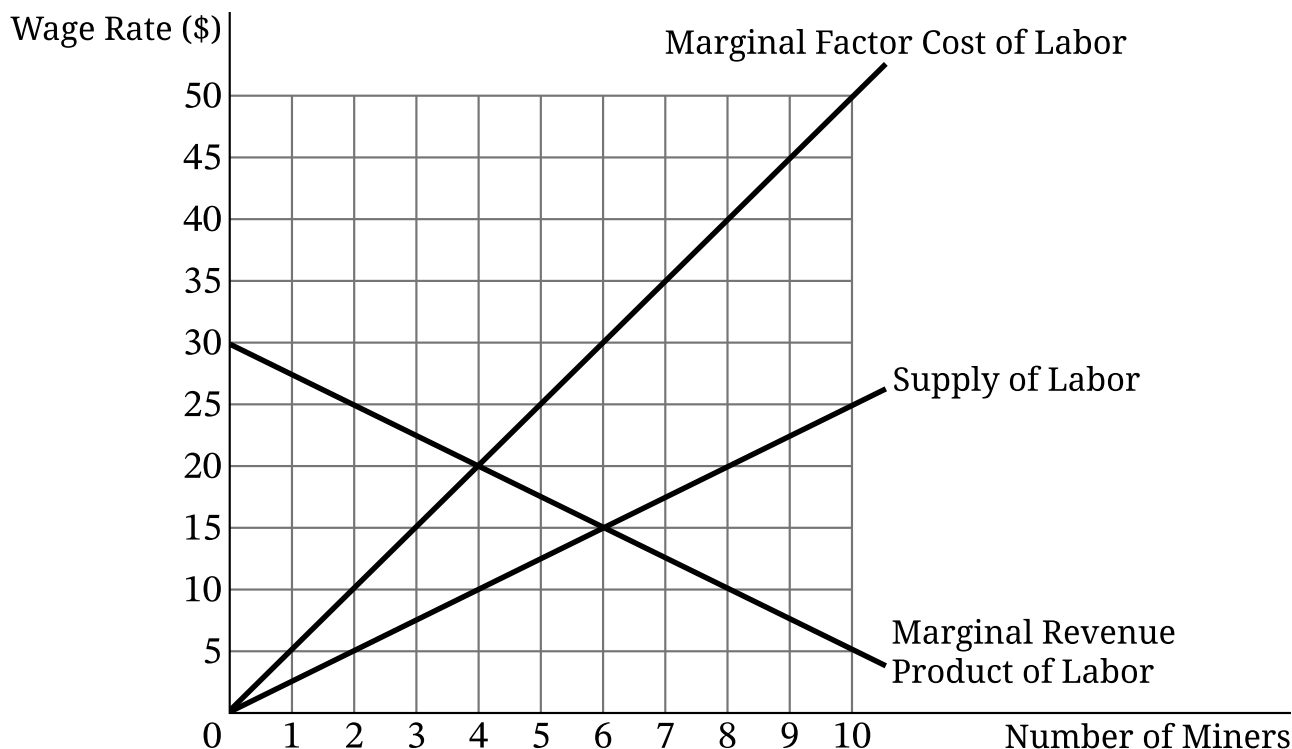
**3.1** B.

**3.2** B.

**3.3** (a) it rises. (b) labour demand rises. (c) the equilibrium wage rises.

1. Voda Reservoir is a profit-maximizing firm and the only producer of bottled water in a country. Currently, Voda Reservoir is earning negative economic profit.
- A. Draw a correctly labeled graph for Voda Reservoir and show each of the following.
- The profit-maximizing quantity, labeled  $Q_M$
  - The profit-maximizing price, labeled  $P_M$
  - The average total cost curve consistent with Voda Reservoir earning negative economic profit, labeled ATC
  - The area of deadweight loss, shaded completely
- B. Suppose the government requires Voda Reservoir to produce the socially optimal quantity of bottled water. On your graph in part A, show the socially optimal quantity of bottled water, labeled  $Q_S$ .
- C. Suppose instead the government grants a per-unit subsidy to Voda Reservoir. What will happen to Voda Reservoir's profit-maximizing quantity of bottled water? Explain.
- D. Suppose new producers have entered the bottled-water market and Voda Reservoir continues to operate in the bottled-water market. Will the demand for Voda Reservoir's bottled water become more elastic, become less elastic, or stay the same as new producers enter the market?
- E. Voda Reservoir hires workers in a perfectly competitive labor market.
- If the demand for bottled water increases, what will happen to Voda Reservoir's demand for labor? Explain.
  - The government implements a new regulation that increases the minimum age required for a worker to be employed in a bottled-water factory. What will happen to the market wage in the short run? Explain.

2. Quartz Excavations is a profit-maximizing firm and the only employer of miners of quartz in a small town. The graph provided shows the labor market for miners.



- A. Identify Quartz Excavations' profit-maximizing number of miners to hire.
- B. Will Quartz Excavations pay its profit-maximizing number of miners a wage rate that is equal to \$15, greater than \$15, or less than \$15? Explain using numbers.
- C. Suppose the government sets a minimum wage (a price floor on wages) at \$25. Calculate the total wage bill for Quartz Excavations at the resulting profit-maximizing number of miners. Show your work.
- D. Suppose that instead of a minimum wage, there is now an increase in the demand for quartz.
- Will the marginal revenue product of miners increase, decrease, or remain the same? Explain.
  - After the demand for quartz increases, Quartz Excavations hires the new profit-maximizing number of miners. Will the marginal factor cost of the last miner hired be greater than, less than, or equal to the marginal factor cost of the last miner hired before the demand for quartz increased?

1. RKB is a profit-maximizing monopoly that produces a new, patented electronic device. RKB is earning positive economic profit.

(a) Draw a correctly labeled graph for RKB, and show each of the following.

- (i) The profit-maximizing quantity, labeled  $Q_M$
- (ii) The profit-maximizing price, labeled  $P_M$
- (iii) The average total cost curve consistent with RKB earning positive economic profit
- (iv) The area representing the deadweight loss, shaded completely

(b) The government wants RKB to produce the allocatively efficient quantity. Would the government impose a binding price ceiling, a binding price floor, a per-unit tax, or a lump-sum tax?

(c) Suppose that the government does not impose the policy you identified in part (b). Consumers now become aware of research that confirms the use of this new device harms users' vision. Given widespread consumer awareness of this research, what will happen to RKB's profit-maximizing quantity in the short run? Explain.

(d) Assume that RKB hires workers in a perfectly competitive labor market.

- (i) Draw a correctly labeled graph for the labor market, showing the equilibrium wage and quantity of labor, labeled  $W_E$  and  $Q_E$ , respectively.
- (ii) Suppose immigration increases the number of workers in this labor market. On your graph in part (d)(i), show the new equilibrium wage and quantity of labor, labeled  $W_2$  and  $Q_2$ , respectively.
- (iii) RKB uses the optimal combination of capital and labor in its production process. The firm rents capital at \$500 per unit, and the last unit of capital rented has a marginal product of 2,500 units. If the marginal product of the last unit of labor hired is 1,000 units, calculate the wage rate. Show your work.

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**Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.**

| Number of Workers | Number of Parked Cars |
|-------------------|-----------------------|
| 0                 | 0                     |
| 1                 | 8                     |
| 2                 | 20                    |
| 3                 | 34                    |
| 4                 | 45                    |
| 5                 | 54                    |
| 6                 | 60                    |
| 7                 | 63                    |

2. Assume that Schmitt Inc. provides car parking services in a perfectly competitive output market and hires labor in a perfectly competitive input market. The market price per car parked is \$10, the daily market wage per worker is \$100, and fixed costs are \$50 per day. The table above shows the number of workers required to park different quantities of cars per day.

(a) Calculate the marginal revenue product of the second worker. Show your work.

(b) How many workers will Schmitt Inc. hire to maximize profit? Relative to this number of hired workers, explain why Schmitt Inc. will not hire one additional worker. Your answer must use marginal analysis and numbers from the table.

(c) Calculate the daily profit for Schmitt Inc. at the profit-maximizing quantity identified in part (b). Show your work.

(d) Suppose new legislation requires each worker in the parking industry to purchase an individual insurance policy at the worker's expense in order to legally park cars.

- (i) Will the market wage paid by a typical firm in this industry increase, decrease, or stay the same in the long run?
- (ii) For a typical firm in the industry, will the number of workers hired in the short run increase, decrease, or stay the same? Explain.

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**Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.**

**MICROECONOMICS****Section II****Total Time—1 hour****Reading Period—10 minutes****Writing Period—50 minutes**

**Directions:** You are advised to spend the first 10 minutes reading all of the questions and planning your answers. You will then have 50 minutes to answer all three of the following questions. You may begin writing your responses before the reading period is over. It is suggested that you spend approximately half your time on the first question and divide the remaining time equally between the next two questions. Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. Use a pen with black or dark blue ink.

1. Gigantic Pharmaceutical Corporation has a patent on a prescription drug, making it the only manufacturer of that prescription drug. Gigantic is currently earning a positive economic profit.
  - (a) Draw a correctly labeled graph for Gigantic and show each of the following.
    - (i) The profit-maximizing quantity, labeled  $Q_G$
    - (ii) The profit-maximizing price, labeled  $P_G$
    - (iii) The average total cost curve, labeled ATC
    - (iv) The area representing the consumer surplus, shaded completely
  - (b) Suppose the demand for the prescription drug increases, and Gigantic hires its warehouse workers in a perfectly competitive labor market.
    - (i) What will happen to Gigantic's demand for warehouse workers? Explain.
    - (ii) What will happen to the wage rate Gigantic pays its warehouse workers and the number of warehouse workers it hires?
  - (c) After Gigantic's patent expires, another firm enters the prescription drug market and produces an identical drug that sells for a lower price.
    - (i) What will happen to Gigantic's producer surplus?
    - (ii) What will happen to the consumer surplus in this prescription drug market? Explain.

**MICROECONOMICS****Section II****Total Time—1 hour****Reading Period—10 minutes****Writing Period—50 minutes**

**Directions:** You are advised to spend the first 10 minutes reading all of the questions and planning your answers. You will then have 50 minutes to answer all three of the following questions. You may begin writing your responses before the reading period is over. It is suggested that you spend approximately half your time on the first question and divide the remaining time equally between the next two questions. Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. Use a pen with black or dark blue ink.

1. In the early twentieth century, limited transportation options and the lack of effective substitutes gave Single Cinema monopoly power in a small town. Assume that Single Cinema is a profit-maximizing firm and currently operates at a negative economic profit in the short run.
  - (a) Draw a correctly labeled graph for Single Cinema, and show each of the following.
    - (i) The profit-maximizing price and quantity of tickets, labeled as  $P_m$  and  $Q_m$ , respectively
    - (ii) The area representing the negative economic profit, shaded completely
  - (b) Explain why Single Cinema continues to operate in the short run despite earning negative economic profit in the short run.
  - (c) Would Single Cinema's total revenue increase, decrease, or stay the same if it decides to sell one fewer ticket than  $Q_m$ ? Explain.
  - (d) Single Cinema hires workers in a perfectly competitive labor market with a downward-sloping demand curve. Suppose the number of workers available in the market decreases.
    - (i) What will happen to the wage rate? Explain.
    - (ii) What will happen to the marginal revenue product of the last worker hired? Explain.

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

Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

Total: 8 marks

**KEY WORDS** cost-minimizing rule 成本最小化法则 • wage takers 工资接受者 • factor market 要素市场

### Objective

Build the skills to answer exam questions on **profit-maximizing behaviour in perfectly competitive factor markets**.

You must be able to:

- describe a **perfectly competitive factor market** in which firms are **wage takers** 工资接受者
- relate the market wage to an individual firm's hiring decision
- determine the profit-maximizing quantity of labour where  $MRP = W$
- apply the **cost-minimizing rule** 成本最小化法则

### 1 Worked examples

Study these first. Each one shows the method for a question type used later.

#### ■ Wage taker

In a competitive factor market, each firm is too small to affect the wage, so it takes the market wage  $W$  as given (its  $MFC = W$ ).

#### ■ Hiring rule

Hire labour up to the point where  $MRP = W$ .

#### ■ Cost-minimizing rule

Combine two inputs efficiently by equalizing the marginal product per dollar:

$$\frac{MP_L}{P_L} = \frac{MP_K}{P_K}.$$

## 2 Practice

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**2.1** State what a wage taker is. [1]

---

**2.2** State the rule for how much labour a competitive firm hires. [1]

---

**2.3** State the cost-minimizing rule for combining two inputs. [1]

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## 3 Exam-style questions

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**3.1** In a competitive factor market, a firm is a [1]

- **A** wage maker
  - **B** wage taker
  - **C** price maker
  - **D** monopsonist
- 

**3.2** A competitive firm hires labour up to where [1]

- **A**  $MRP = W$
  - **B**  $MRP > W$
  - **C**  $MRP < W$
  - **D**  $W = 0$
- 

**3.3** The market wage is \$40. A firm's MRP for the 1st to 4th workers is \$70, \$55, \$40, \$25.

(a) State how many workers it hires. [1]

(b) Explain why it does not hire the 4th worker. [2]

## Solutions

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**2.1** a firm too small to affect the wage, which it takes as given.

**2.2** hire until the marginal revenue product equals the wage ( $MRP = W$ ).

**2.3** set  $\frac{MP_L}{P_L} = \frac{MP_K}{P_K}$  (equal marginal product per dollar for each input).

**3.1 B.**

**3.2 A.**

**3.3** (a) 3 workers. (b) the 4th worker's MRP (\$25) is below the wage (\$40), so hiring them would add more cost than revenue.

1. Voda Reservoir is a profit-maximizing firm and the only producer of bottled water in a country. Currently, Voda Reservoir is earning negative economic profit.
- A. Draw a correctly labeled graph for Voda Reservoir and show each of the following.
- The profit-maximizing quantity, labeled  $Q_M$
  - The profit-maximizing price, labeled  $P_M$
  - The average total cost curve consistent with Voda Reservoir earning negative economic profit, labeled ATC
  - The area of deadweight loss, shaded completely
- B. Suppose the government requires Voda Reservoir to produce the socially optimal quantity of bottled water. On your graph in part A, show the socially optimal quantity of bottled water, labeled  $Q_S$ .
- C. Suppose instead the government grants a per-unit subsidy to Voda Reservoir. What will happen to Voda Reservoir's profit-maximizing quantity of bottled water? Explain.
- D. Suppose new producers have entered the bottled-water market and Voda Reservoir continues to operate in the bottled-water market. Will the demand for Voda Reservoir's bottled water become more elastic, become less elastic, or stay the same as new producers enter the market?
- E. Voda Reservoir hires workers in a perfectly competitive labor market.
- If the demand for bottled water increases, what will happen to Voda Reservoir's demand for labor? Explain.
  - The government implements a new regulation that increases the minimum age required for a worker to be employed in a bottled-water factory. What will happen to the market wage in the short run? Explain.

2. The table provided shows the short-run production function for Lowen Feline, a profit-maximizing firm that produces cat food.

| Number of Workers | Total Quantity of Cat Food (bags) |
|-------------------|-----------------------------------|
| 0                 | 0                                 |
| 1                 | 5                                 |
| 2                 | 12                                |
| 3                 | 18                                |
| 4                 | 23                                |
| 5                 | 27                                |
| 6                 | 30                                |
| 7                 | 32                                |
| 8                 | 33                                |
| 9                 | 32                                |

Lowen Feline sells as many bags of cat food as it wants at a market price of \$10 per bag and hires as many workers as it wants at a market wage of \$18.

(a) Lowen Feline's fixed cost is \$90. Calculate the average fixed cost if Lowen Feline hires 6 workers. Show your work.

(b) Assume labor is the only variable input to Lowen Feline. Calculate the marginal cost if Lowen Feline increases output from 27 to 30 units. Show your work.

(c) With the hiring of which worker do diminishing marginal returns begin? Explain using numbers.

(d) Determine the profit-maximizing number of workers Lowen Feline will hire. Explain using marginal analysis.

(e) In the long run, a rival company, Gato Food, increases its production from 40 to 50 units, and its total cost increases from \$600 to \$900. Over the output range of 40 to 50 units, is Gato Food experiencing economies of scale, diseconomies of scale, or constant returns to scale? Explain using numbers.

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**Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.**

1. RKB is a profit-maximizing monopoly that produces a new, patented electronic device. RKB is earning positive economic profit.

(a) Draw a correctly labeled graph for RKB, and show each of the following.

- (i) The profit-maximizing quantity, labeled  $Q_M$
- (ii) The profit-maximizing price, labeled  $P_M$
- (iii) The average total cost curve consistent with RKB earning positive economic profit
- (iv) The area representing the deadweight loss, shaded completely

(b) The government wants RKB to produce the allocatively efficient quantity. Would the government impose a binding price ceiling, a binding price floor, a per-unit tax, or a lump-sum tax?

(c) Suppose that the government does not impose the policy you identified in part (b). Consumers now become aware of research that confirms the use of this new device harms users' vision. Given widespread consumer awareness of this research, what will happen to RKB's profit-maximizing quantity in the short run? Explain.

(d) Assume that RKB hires workers in a perfectly competitive labor market.

- (i) Draw a correctly labeled graph for the labor market, showing the equilibrium wage and quantity of labor, labeled  $W_E$  and  $Q_E$ , respectively.
- (ii) Suppose immigration increases the number of workers in this labor market. On your graph in part (d)(i), show the new equilibrium wage and quantity of labor, labeled  $W_2$  and  $Q_2$ , respectively.
- (iii) RKB uses the optimal combination of capital and labor in its production process. The firm rents capital at \$500 per unit, and the last unit of capital rented has a marginal product of 2,500 units. If the marginal product of the last unit of labor hired is 1,000 units, calculate the wage rate. Show your work.

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**Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.**

2. Keepdry produces and sells rain jackets in a perfectly competitive product market at the price of \$5 per jacket and hires all the workers it needs in a perfectly competitive labor market at the wage rate of \$15. Labor is the only variable input, and the firm's production schedule is provided in the table.

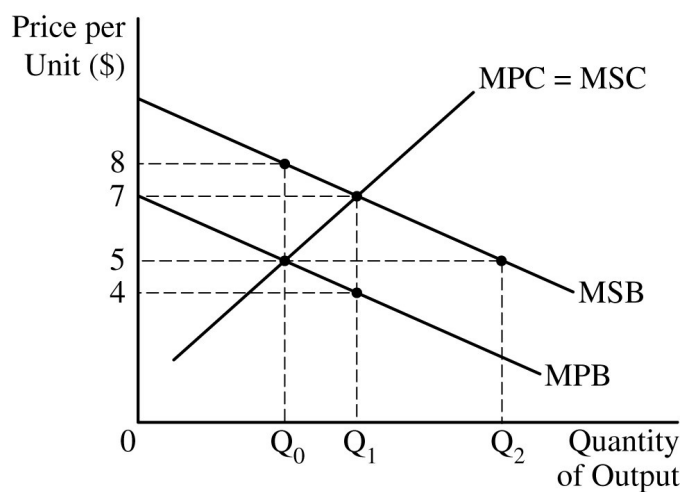
| Number of Workers | Quantity of Output |
|-------------------|--------------------|
| 0                 | 0                  |
| 1                 | 9                  |
| 2                 | 20                 |
| 3                 | 27                 |
| 4                 | 32                 |
| 5                 | 34                 |
| 6                 | 35                 |

- (a) Calculate the marginal revenue product of the second worker. Show your work.
- (b) Diminishing marginal returns will begin with the hiring of which worker?
- (c) Determine the profit-maximizing number of workers the firm should hire. Explain using marginal analysis.
- (d) Assuming Keepdry's fixed cost is \$40, calculate Keepdry's economic profit when hiring the profit-maximizing number of workers. Show your work.
- (e) Suppose Keepdry's fixed cost increases to \$80. Will the profit-maximizing number of workers hired in the short run increase, decrease, or stay the same? Explain.

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**Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.**

2. Bueno is a firm that produces and sells guava, a type of fruit. The market for guava is perfectly competitive. The marginal private benefit (MPB), marginal private cost (MPC), marginal social benefit (MSB), and marginal social cost (MSC) curves are illustrated in the graph provided.



- (a) Identify the kind of market failure represented by this graph.
- (b) Using numbers from the graph, identify the marginal external benefit.
- (c) Assume the guava market is in short-run equilibrium and Bueno hires workers in a perfectly competitive labor market at a wage of \$20 per hour. The marginal product of the last worker hired was 6 units of guava per hour.
- Calculate the change in Bueno's profit per hour from the last worker hired. Show your work.
  - Suppose that the government decides to provide a per-unit subsidy to consumers who buy guava. How would the per-unit subsidy affect Bueno's marginal revenue product curve? Explain.
- (d) Instead of hiring workers in a perfectly competitive labor market, assume Bueno hires workers in a monopsony labor market. Will the number of workers hired increase, decrease, or stay the same? Explain.

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**Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.**

| Number of Workers | Number of Parked Cars |
|-------------------|-----------------------|
| 0                 | 0                     |
| 1                 | 8                     |
| 2                 | 20                    |
| 3                 | 34                    |
| 4                 | 45                    |
| 5                 | 54                    |
| 6                 | 60                    |
| 7                 | 63                    |

2. Assume that Schmitt Inc. provides car parking services in a perfectly competitive output market and hires labor in a perfectly competitive input market. The market price per car parked is \$10, the daily market wage per worker is \$100, and fixed costs are \$50 per day. The table above shows the number of workers required to park different quantities of cars per day.

(a) Calculate the marginal revenue product of the second worker. Show your work.

(b) How many workers will Schmitt Inc. hire to maximize profit? Relative to this number of hired workers, explain why Schmitt Inc. will not hire one additional worker. Your answer must use marginal analysis and numbers from the table.

(c) Calculate the daily profit for Schmitt Inc. at the profit-maximizing quantity identified in part (b). Show your work.

(d) Suppose new legislation requires each worker in the parking industry to purchase an individual insurance policy at the worker's expense in order to legally park cars.

- (i) Will the market wage paid by a typical firm in this industry increase, decrease, or stay the same in the long run?
- (ii) For a typical firm in the industry, will the number of workers hired in the short run increase, decrease, or stay the same? Explain.

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**Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.**

**MICROECONOMICS****Section II****Total Time—1 hour****Reading Period—10 minutes****Writing Period—50 minutes**

**Directions:** You are advised to spend the first 10 minutes reading all of the questions and planning your answers. You will then have 50 minutes to answer all three of the following questions. You may begin writing your responses before the reading period is over. It is suggested that you spend approximately half your time on the first question and divide the remaining time equally between the next two questions. Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. Use a pen with black or dark blue ink.

1. Gigantic Pharmaceutical Corporation has a patent on a prescription drug, making it the only manufacturer of that prescription drug. Gigantic is currently earning a positive economic profit.
  - (a) Draw a correctly labeled graph for Gigantic and show each of the following.
    - (i) The profit-maximizing quantity, labeled  $Q_G$
    - (ii) The profit-maximizing price, labeled  $P_G$
    - (iii) The average total cost curve, labeled ATC
    - (iv) The area representing the consumer surplus, shaded completely
  - (b) Suppose the demand for the prescription drug increases, and Gigantic hires its warehouse workers in a perfectly competitive labor market.
    - (i) What will happen to Gigantic's demand for warehouse workers? Explain.
    - (ii) What will happen to the wage rate Gigantic pays its warehouse workers and the number of warehouse workers it hires?
  - (c) After Gigantic's patent expires, another firm enters the prescription drug market and produces an identical drug that sells for a lower price.
    - (i) What will happen to Gigantic's producer surplus?
    - (ii) What will happen to the consumer surplus in this prescription drug market? Explain.

**MICROECONOMICS****Section II****Total Time—1 hour****Reading Period—10 minutes****Writing Period—50 minutes**

**Directions:** You are advised to spend the first 10 minutes reading all of the questions and planning your answers. You will then have 50 minutes to answer all three of the following questions. You may begin writing your responses before the reading period is over. It is suggested that you spend approximately half your time on the first question and divide the remaining time equally between the next two questions. Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. Use a pen with black or dark blue ink.

1. In the early twentieth century, limited transportation options and the lack of effective substitutes gave Single Cinema monopoly power in a small town. Assume that Single Cinema is a profit-maximizing firm and currently operates at a negative economic profit in the short run.
  - (a) Draw a correctly labeled graph for Single Cinema, and show each of the following.
    - (i) The profit-maximizing price and quantity of tickets, labeled as  $P_m$  and  $Q_m$ , respectively
    - (ii) The area representing the negative economic profit, shaded completely
  - (b) Explain why Single Cinema continues to operate in the short run despite earning negative economic profit in the short run.
  - (c) Would Single Cinema's total revenue increase, decrease, or stay the same if it decides to sell one fewer ticket than  $Q_m$ ? Explain.
  - (d) Single Cinema hires workers in a perfectly competitive labor market with a downward-sloping demand curve. Suppose the number of workers available in the market decreases.
    - (i) What will happen to the wage rate? Explain.
    - (ii) What will happen to the marginal revenue product of the last worker hired? Explain.

2. The table below shows the output a firm produces using different amounts of capital (K) and labor (L). The markets for capital and labor are perfectly competitive. The rental rate of capital is \$75 per unit, and the wage rate is \$200 per unit. In the short run, capital is fixed and labor is variable.

| Labor | Output with K=1 | Output with K=2 |
|-------|-----------------|-----------------|
| 0     | 0               | 0               |
| 1     | 10              | 20              |
| 2     | 25              | 50              |
| 3     | 38              | 75              |

- (a) If the firm uses one unit of capital and one unit of labor, will it be operating with constant, increasing, or decreasing returns to scale? Explain using numbers from the table.
- (b) Assume now that the firm currently has two units of capital and is using three units of labor.
- Calculate the marginal product for the third unit of labor. Show your work.
  - Did the firm experience diminishing marginal returns with the addition of the third unit of labor? Explain using numbers from the table.
  - Calculate the firm's average total cost for its current level of production. Show your work.
  - If the firm's output is sold in a competitive market, what is the lowest output price at which the third unit of labor would be hired?

- (c) Now assume that the monopolist produces 10 units. Using the numbers given in the graph, calculate each of the following. Show your work.
- (i) The monopolist's economic profit
  - (ii) The consumer surplus
  - (iii) The deadweight loss
- (d) At what quantity is demand unit elastic?
- (e) Suppose the monopolist perfectly price discriminates and chooses the quantity that maximizes profit. Determine the dollar value of each of the following.
- (i) The monopolist's profit
  - (ii) The consumer surplus
- 

2. Ray's Stable hires workers in a perfectly competitive factor market for unskilled labor.

- (a) Using correctly labeled side-by-side graphs for the labor market and Ray's Stable, show each of the following.
- (i) The equilibrium wage and quantity for unskilled labor, labeled  $W_E$  and  $Q_E$ , respectively
  - (ii) The wage paid by Ray's Stable and the quantity of unskilled labor hired, labeled  $W_R$  and  $Q_R$ , respectively
- (b) Is the marginal factor cost of unskilled labor for Ray's Stable greater than, less than, or equal to  $W_E$ ? Explain.
- (c) Now assume that the government imposes an effective minimum wage for unskilled labor.
- (i) Show the minimum wage on your graphs in part (a), labeled  $W_{MIN}$ .
  - (ii) On the labor market graph in part (a), show the quantity of unskilled labor supplied in the labor market as a result of the minimum wage, labeled  $Q_S$ .
  - (iii) As a result of the new minimum wage, will the marginal revenue product of the last worker hired by Ray's Stable increase, decrease, or stay the same?

## 5.4 Monopsonistic Markets

Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

Total: 8 marks

**KEY WORDS** monopsony 买方垄断 • marginal factor cost 边际要素成本 • factor market 要素市场

### Objective

Build the skills to answer exam questions on **monopsonistic markets**.

**You must be able to:**

- define a **monopsony** 买方垄断 as a factor market with a single buyer
- explain why a monopsonist's **marginal factor cost** lies above the supply curve
- determine the monopsonist's quantity of labour and the wage it pays
- explain why a monopsony hires **fewer** workers at a **lower** wage than a competitive market

### 1 Worked examples

Study these first. Each one shows the method for a question type used later.

#### ■ Monopsony

A factor market with a **single buyer** (e.g. the only employer in a town).

#### ■ MFC above supply

To hire one more worker it must raise the wage for **all** workers, so its **marginal factor cost** rises **above** the labour supply curve.

#### ■ Outcome

It hires where  $MRP = MFC$ , then pays the lower wage from the **supply** curve — so **fewer** workers at a **lower** wage than a competitive market. A well-set **minimum wage** can raise both the wage and employment.

## 2 Practice

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**2.1** Define a monopsony. [1]

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**2.2** State why a monopsonist's marginal factor cost lies above the supply curve. [1]

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**2.3** State how a monopsony's wage compares with a competitive market's wage. [1]

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## 3 Exam-style questions

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**3.1** A monopsony is a factor market with a single [1]

- **A** seller
  - **B** buyer
  - **C** worker
  - **D** union
- 

**3.2** Compared with a competitive market, a monopsony hires [1]

- **A** more workers at a higher wage
  - **B** fewer workers at a lower wage
  - **C** the same workers at the same wage
  - **D** no workers at all
- 

**3.3** A single large employer dominates a town's labour market.

(a) Name this market structure. [1]

(b) State whether it pays more or less than a competitive wage. [1]

(c) State how a well-set minimum wage could affect employment. [1]

## Solutions

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**2.1** a factor market with only one buyer of the factor.

**2.2** to hire one more worker it must raise the wage for all workers, so the extra cost exceeds that worker's wage.

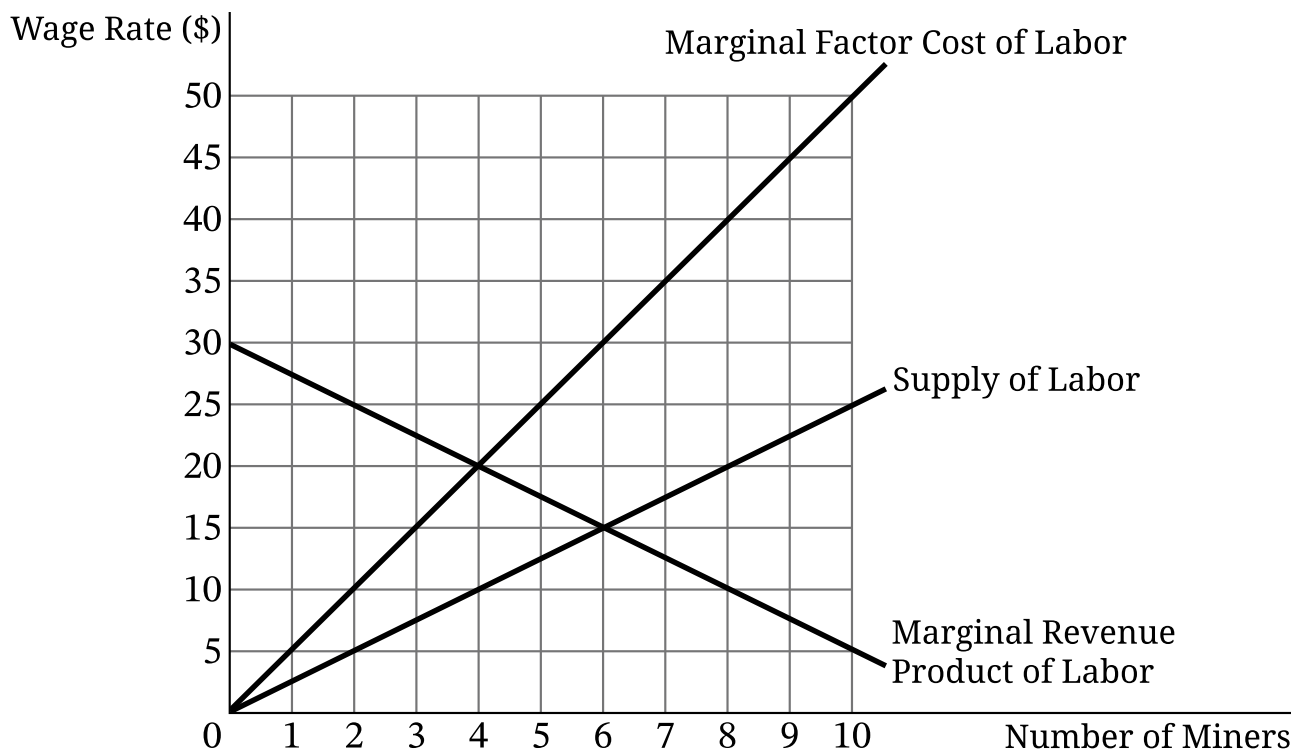
**2.3** it is lower.

**3.1** B.

**3.2** B.

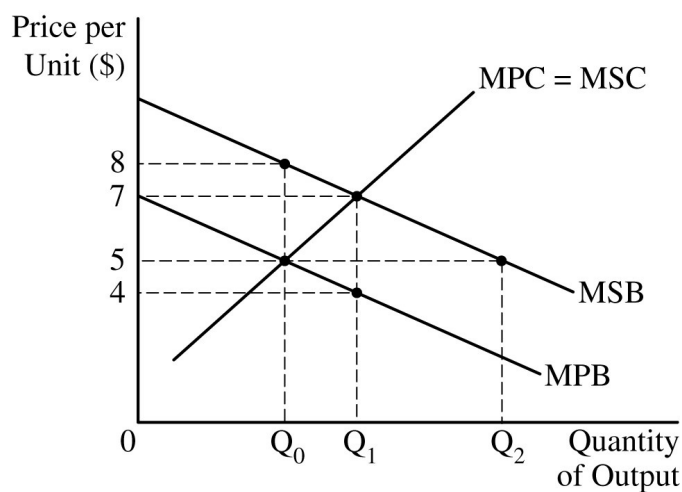
**3.3** (a) a monopsony. (b) less. (c) it can raise both the wage and employment.

2. Quartz Excavations is a profit-maximizing firm and the only employer of miners of quartz in a small town. The graph provided shows the labor market for miners.



- A. Identify Quartz Excavations' profit-maximizing number of miners to hire.
- B. Will Quartz Excavations pay its profit-maximizing number of miners a wage rate that is equal to \$15, greater than \$15, or less than \$15? Explain using numbers.
- C. Suppose the government sets a minimum wage (a price floor on wages) at \$25. Calculate the total wage bill for Quartz Excavations at the resulting profit-maximizing number of miners. Show your work.
- D. Suppose that instead of a minimum wage, there is now an increase in the demand for quartz.
- Will the marginal revenue product of miners increase, decrease, or remain the same? Explain.
  - After the demand for quartz increases, Quartz Excavations hires the new profit-maximizing number of miners. Will the marginal factor cost of the last miner hired be greater than, less than, or equal to the marginal factor cost of the last miner hired before the demand for quartz increased?

2. Bueno is a firm that produces and sells guava, a type of fruit. The market for guava is perfectly competitive. The marginal private benefit (MPB), marginal private cost (MPC), marginal social benefit (MSB), and marginal social cost (MSC) curves are illustrated in the graph provided.



- (a) Identify the kind of market failure represented by this graph.
- (b) Using numbers from the graph, identify the marginal external benefit.
- (c) Assume the guava market is in short-run equilibrium and Bueno hires workers in a perfectly competitive labor market at a wage of \$20 per hour. The marginal product of the last worker hired was 6 units of guava per hour.
- Calculate the change in Bueno's profit per hour from the last worker hired. Show your work.
  - Suppose that the government decides to provide a per-unit subsidy to consumers who buy guava. How would the per-unit subsidy affect Bueno's marginal revenue product curve? Explain.
- (d) Instead of hiring workers in a perfectly competitive labor market, assume Bueno hires workers in a monopsony labor market. Will the number of workers hired increase, decrease, or stay the same? Explain.

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**Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.**