

CH 2

# Financial Mathematics

(workbook)



Goal:.....

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Student Name : .....

Student ID : .....

Class : .....

## الخطة الدراسية

KINGDOM OF BAHRAIN  
Ministry of Education



مملكة البحرين  
وزارة التربية والتعليم

المسار: توحيد المسارات والتعليم الفني والمهني  
الصف : المستوى الثاني (توحيد المسارات)  
المستوى الثالث (التعليم الفني والمهني)

المادة /اسم المقرر ورمزه: رياضة مالية مال 111 – مال 805  
اسم الكتاب: Financial Mathematics

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الطبعة المعتمدة: 2022م

وزارة التربية والتعليم – الفصل الدراسي الأول 2022 – 2023م

## **2.1 System of Payment**

There are many ways of calculating salary and wages. The following are payment methods that can be used by an organization:

- ▶ Payment by the hour, week, month and annually.
- ▶ Piece-rate system and Bonus systems.
- ▶ Commission based upon quantity sold.
- ▶ Annual salary.

**Activity 2-1-1:** What method of payment that has been used in the Kingdom of Bahrain for the following sectors:

- ▶ Ministries. ( .....)
- ▶ Banks. ( .....)
- ▶ Companies and small businesses. ( .....)

“You should know that the terms ‘wages’ and ‘salaries’ have the same meaning, but wages is usually applied to hourly-paid or weekly-paid staff, while salaries is used for employees paid monthly”.

## 2.2 Payroll by Hour and Week

**Payment per hour or week;** in which an employee is paid according to the number of hours or weeks worked together with any overtime or bonus payment.

### **Noted That :**

articles (51,53) stated a worker may not be effectively employed for more than **48 hours** per week for more than **eight hours** per day. Unless otherwise agreed upon, provided the effective working hours do **not exceed ten hours per day**, and the Muslim worker may not be employed during the month of **Ramadan for more than six hours per day**, or 36 hours per week

Article (54) of the Labor Law stipulates the worker shall receive for each additional working hour a wage equivalent to his due wage plus at **least 25 % for hours** worked during the day, and **at least 50% for hours worked during the night**.

An employer may require a worker to work on his weekly day of rest if so, required by the circumstances of the work and in this case the worker shall have the choice between receiving an additional wage equivalent to **150%** of his normal wage or another day for rest

<b>Normal</b>	8 hours per day 48 hours per week
<b>Ramadan time</b>	6 hours per day 36 hours per week
<b>Additional working hour</b>	25%
<b>Worked during the night</b>	50%

### **Exercises 2-2-1:**

An employee is engaged for **47 hours during a week** at a basic rate of **BHD3.500**. Calculate the wage received during the period?

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**Exercises 2-2-2:**



**Exercises 2-2-2:**

Faisal worked the following hours during the week in:

Days	FRI	SAT	SUN	MON	TUE	WED	THU
Hours	0	7	8	6	8	7	8
O.T during the day	0	0	0	2.5	0	3.5	1
O.T during the night	0	0	3	0	2	3	2

Calculate the total wage during the week, if you know that the average hourly wage is BHD 3.750.

**Solution:**

• Regular Wage =

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• Over Time of during the day =

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• Over Time of during the night =

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• Total Wages =

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### Exercises 2-2-3:



#### Exercises 2-2-3:

Mohammed worked the following hours during the month of Ramadan from 13 April 2021 to 12 May 2021:

Week	FRI	SAT	SUN	MON	TUE	WED	THU
1	09 APR	10 APR	11 APR	12 APR	13 APR	14 APR	15 APR
	8	8	8	8	6	6	6
2	16 APR	17 APR	18 APR	19 APR	20 APR	21 APR	22 APR
	0	6	6	6	6	5	6
3	23 APR	24 APR	25 APR	26 APR	27 APR	28 APR	29 APR
	0	6	6	6	6	6	6
4	30 APR	01 MAY	02 MAY	03 MAY	04MAY	05 MAY	06 MAY
	0	5	6	6	6	6	6
5	07 MAY	08 MAY	09 MAY	10 MAY	11 MAY	12 MAY	13 MAY
	0	6	6	6	6	4	0

Calculate the wage for the month of Ramadan, if you know that the average hourly wage is BHD 4.200.

#### Number of hours:

week 1 = .....

week 2 = .....

week 3 = .....

week 4 = .....

week 5 = .....

**Total Working Hours = .....**

**Total Regular Wage : .....**

### 2.3 Payroll by Piece & Rate System

Piece-rate system; in which the employee is paid for each unit of output (piece) produced. Article No (38). of the Labor Law stipulates wages may be calculated by the hour, day, week, month, on a piece-rate or per production. Wages shall not be deemed to be calculated on a piece-work or production basis unless expressly specified in the labor contract.

#### Exercises 2-3-1:

A- Fatima an employee at Manama co. is given **BHD 0.750** as piece of work.

If she produced **300 pieces**. How much she received?

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B- Ebrahim is an employee of the ABC Co. He is entitled to a monthly salary of **BHD 400** addition to **BHD0.250 each piece** produced per month. If he produced **450 pieces** in this month, how much is his total monthly salary?

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C- Find his total pay for Sep 2021, if his total production for that month was **320 pieces** and **BHD0.800** a piece rate.

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D- Fill in the missing value in the following table:

no	Employee	No produced	Rate per piece	Total Pay
1	Sami	900	.....	BHD 405.000
2	Ahmed	.....	0.850	BHD 382.500
3	Zaid	600	1.450	.....

- 1- .....
- 2- .....
- 3- .....

E- Mona an employee at Al-Jazeera Company, earned BHD300 in one month.

If, in this month, she produced **360 pieces**, what is the rate for each piece of work she's given?

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## 2.4 Payroll by Commission & Bonuses

**(1) Straight Commission.** This means that the employees are paid a certain amount (as a percentage) of sales made or business transacted. Commissions act as an incentive to salesman that allow them to earn more money if they sell more.

**(2) Graduated Commission.** This means that the employees are paid a certain amount (or as a percentage or increasing steps) according to the grades or the steps that the organization keeps.

**(3) Volume Commission and Value Commission.** This means that the employees are paid a certain amount on the number of sales items made or the range of the business transactions. The commission amount depends on the total value of the goods sold.

**(4) Bonuses.** This means that the employees are paid a certain basic salary, get a quota to be sold and if they sell it they will gain the bonus. The bonus is always been fixed as a percentage of the extra sales made.

### Exercises 2-4-1:

A. Salman should be refined a basic salary of **BHD250**, and a commission of **5%** of goods sold, if the total sales for **BHD722**. What was his total income this month?

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B. Waleed works as salesman with **5%** of sales and it increases to **7%** if he

sells **more than BHD25,000** - what is his total commission if the sales BHD 48000?

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 .....  
 .....  
 .....

C. Lyla work with basic salary monthly **BHD 500** and commission takes **2%** of the **first BHD 20,000** of sales arranged, and **1% thereafter**. If she sells BHD175,580 of goods in total, what is the gross salary for this month?

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 .....  
 .....  
 .....

**Exercises 2-4-2:**

**Find the missing value in the following table:**

no	Employee	Salary BHD	Total Sales BHD	Commission		Total Salary
				Rate	BHD	
1	Khalid	400	3000	5%	.....	.....
2	Jamal	350	.....	2%	100	.....
3	Manal	300	4000	.....	160	.....

- 1- .....
- 2- .....
- 3- .....

## 2.5 Deductions

(a) **6%** Pension Fund Contribution Deduction (Basic Salary + Social Allowance)

**Public** Sector.

(b) **7%** as social insurance. (Basic Salary + Fixed allowances) **Private** sector.

(c) **1%** Unemployment Insurance Deduction.

(d) Housing Bank Loan Repayment Deduction.

(e) Law Court Deduction.

### Exercises 2-5-1:

A- Fawaz Moh'd, an accountant at an engineering company, earns **BHD 450** per month and **BHD 50** social allowance monthly and **BHD 20 telephone allowance**. Find how much he receives each month, if **the housing bank loan BD 100**.

#### **Solution:**

Total allowances = Social allowance + Telephone allowance + living standard improving

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Social Insurance = (basic salary + Social allowance) × 7%

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Unemployment Insurance = (basic salary + Social allowance) × 1%

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Total deduction = Pension Fund Contribution + Unemployment Insurance + Housing bank loan

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Net salary =

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**B- Complete the following payroll blanks with the solution steps:**

PERSONEL INFORMATION	
Ministry	Ministry of Health
CPR	XXXXXXXXXX
Name	Yasser Salman Juma
Position Title	X-ray specialist
Month	Sep- 2021
Grade-Step	B8- 5
Bank-name	National Bank of Bahrain
Acc.No.	002969721563400
PAYMENT INFORMATION	
Basic Salary	850.000
ALLOWANCES	
Social Allowance	50.000
Living Standard Improving Allowance	50.000
GROSS PAY	???
DEDUCTIONS	
Social Pension Deduction	???
Unemployment Insurance Deduction	???
Pension Fund Contribution Deduction	???
GROSS DEDUCTION	???
NET PAY	???

**Solution:**

◆ Gross pay = basic salary + Social allowance + living standard improving

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◆ Social pension deduction = Social allowance × 6%

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◆ Pension Fund Contribution = (basic salary) × 6%

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.....

◆ Unemployment Insurance = (basic salary + Social allowance) × 1%

.....

.....

◆ Total deduction = Pension Fund Contribution + Unemployment Insurance

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.....

◆ Net salary =

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C- Majed works in the Moon Co. He receives monthly a basic salary BHD 525, BHD 40 phone allowances and deducted per month BHD 120 law court. What is his net salary?

**Solution:**

◆ Total allowances =

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◆ Pension Fund Contribution = (basic salary + Social allowance) × 7%

.....  
.....

◆ Unemployment Insurance = (basic salary + Social allowance) × 1%

.....  
.....

◆ Total deduction = Pension Fund Contribution + Unemployment Insurance + law court

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.....

◆ Net salary=

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.....

**Exercises 2-5-2:**

A- Khalid Salem is an assistant manager at one of the **government ministries**. Calculate his net monthly salary if you know that he is due for the following month:

- ◆ Basic salary **BHD 1250**
- ◆ Social allowance **BHD 70**
- ◆ living standard improving allowance **BHD 50**
- ◆ Travel allowance **BHD 120**

**Solution:**

- ◆ Total allowances = Social allowance + Travel allowance + living standard improving

.....  
.....

- ◆ Pension Fund Contribution = (basic salary + Social allowance) × 6%

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.....

- ◆ Unemployment Insurance = (basic salary + Social allowance) × 1%

.....  
.....

- ◆ Total deduction = Pension Fund Contribution + Unemployment Insurance

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- ◆ Net salary =

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B- Taha worked on the hourly system in the **Kingdom Co.** For **BHD 3.000** per hour **BHD 30** social allowance monthly and deducted **BHD90** for the housing bank loan. If the working hours during the month of September 2022 are as follows:

- ◆ **46 hours** of normal work.
- ◆ **10 hours** of work during the day.
- ◆ **6 hours** of work a night.
- ◆ **6 hours** of work on Friday.

**Calculate the net wage of September 2022**

**Solution:**

- ◆ Regular Wage = .....
- ◆ Wage of Weekly rest day (Friday) =.....
- ◆ Over Time of during the day =.....
- ◆ Over Time of during the night = .....
- ◆ Total Wages = .....

**Solution:**

- ◆ Total allowances = Social allowance  
.....  
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- ◆ Pension Fund Contribution = (basic salary + Social allowance) × 7%  
.....  
.....
- ◆ Unemployment Insurance = (basic salary + Social allowance) × 1%  
.....  
.....
- ◆ Total deduction = Pension Fund Contribution + Unemployment Insurance + Housing bank loan  
.....  
.....
- ◆ Net salary =  
.....  
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## General Questions

1Q: An employee is engaged for **46 hours** during a week at a basic rate of **BHD4.500**. Calculate the wage received during the period?

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 .....

2Q: Ahmed worked the following hours during the month of Ramadan from 13 April 2021 to 12 May 2021:

Week	FRI	SAT	SUN	MON	TUE	WED	THU
	09 APR	10 APR	11 APR	12 APR	13 APR	14 APR	15 APR
1	0	8	8	8	6	6	6
	16 APR	17 APR	18 APR	19 APR	20 APR	21 APR	22 APR
2	6	4	6	6	6	5	0
	23 APR	24 APR	25 APR	26 APR	27 APR	28 APR	29 APR
3	0	6	5	6	6	6	5
	30 APR	01 MAY	02 MAY	03 MAY	04MAY	05 MAY	06 MAY
4	6	0	6	6	6	6	6
	07 MAY	08 MAY	09 MAY	10 MAY	11 MAY	12 MAY	13 MAY
5	0	6	6	6	4	6	0

Calculate the wage for the month of Ramadan, if you know that the average hourly wage is BHD 3.500.

**Number of hours:**

week 1 = .....

week 2 = .....

week 3 = .....

week 4 = .....

week 5 = .....

◆ **Total Working Hours = ..... hours**

◆ **Total Regular Wage : .....**

◆ **Wage of Weekly rest day (Friday) = .....**

◆ **Total wages: .....**



3Q: Find his total pay for Dec 2021, if his total production for that month was 415 pieces and BHD0.750 a piece rate

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 .....  
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4Q: Munira an employee at Sky Co. earned BHD 450 in one month. If, in this month, she produced 750 pieces, what is the rate for each piece of work she's given?

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 .....  
 .....  
 .....

5Q- Fill in the missing value in the following table:

no	Employee	No produced	Rate per piece	Total Pay
1	Najm	1200	.....	BHD 405.000
2	Najlaa	.....	0.775	BHD 387.500
3	Amer	800	1.200	.....

- 1- .....
- 2- .....
- 3- .....

6Q: Aisha works as a salesperson a monthly salary of **BHD 4500**, with a commission of **1.5%** on the first **BHD 3000** of merchandise sold, and 2% thereafter. If the total sales for the month **BHD 5500**. What is her total salary?

◆ Commission on the first

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 .....

◆ Balance =

.....  
 .....

◆ Commission on the balance =

.....  
 .....

◆ Total gross wage =

.....  
 .....

**7Q: Find the missing value in the following table:**

no	Employee	Salary BHD	Total Sales BHD	Commission		Total Salary
				Rate	BHD	
1	Tariq	500	5000	1%	.....	.....
2	Majed	320	.....	2%	200	.....
3	Awatef	610	5000	.....	150	.....

1- .....

2- .....

3- .....

8Q: Waleed works as salesman with 5% of sales and it increases to 7% if he sells more than BHD25,000 - what is his total commission if the sales BHD 48000?

.....  
 .....

**9Q:** Lyla work with basic salary monthly BHD 500 and commission takes 2% of the first BHD 20,000 of sales arranged, and 1% thereafter. If she sells BHD175,580 of goods in total, what is the gross salary for this month?

◆ Commission on the first

.....  
.....

◆ Balance =

.....  
.....

◆ Commission on the balance =

.....  
.....

◆ Total gross wage =

.....  
.....

**10Q:** A clerk earns a gross salary of **BHD3,600** p.a. (per annum) and receives an increase of **8%** on 1st Jan 2021. What will be the amount of gross salary paid at the end of each month?

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**11Q:** Alaa works in a private hospital. He receives monthly a basic salary BHD 450, BHD 50 social allowances and deducted per month BHD 100 loan installment from social insurance organization. What is her net salary?

◆ Total allowances = Social allowance

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.....

◆ Pension Fund Contribution = (basic salary + Social allowance) × 7%

.....  
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◆ Unemployment Insurance = (basic salary + Social allowance) × 1%

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.....

◆ Total deduction = Pension Fund Contribution + Unemployment Insurance + loan installment from social insurance

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◆ Net salary

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**12Q:** Yahia is an assistant manager at one of the government ministries. Calculate his net monthly salary if you know that he is due for the following month:

◆ Basic salary **BHD 1850**

◆ Social allowance **BHD 50**

◆ living standard improving allowance **BHD 80**

◆ Total allowances = Social allowance + living standard improving

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◆ Pension Fund Contribution = (basic salary + Social allowance) × 6%

.....  
.....

◆ Unemployment Insurance = (basic salary + Social allowance) × 1%

.....  
.....

◆ Total deduction = Pension Fund Contribution + Unemployment Insurance

.....  
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◆ Net salary =

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**13Q:** Mohamed Adel worked on the hourly system in the Alsalam Co. BHD 4.500 per hour BHD 50 social allowance monthly. If the working hours during the month of Dec 2021 are as follows:

- ◆ **47 hours** of normal work.
- ◆ **8 hours** of work during the day.
- ◆ **4 hours** of work a night.
- ◆ **3 hours** of work on Friday.

**Calculate the net wage of Dec 2021.**

- ◆ Regular Wage = .....
- ◆ Wage of Weekly rest day (Friday) = .....
- ◆ Over Time of during the day = .....
- ◆ Over Time of during the night = .....
- ◆ Total Wages = .....

:

◆ Total allowances = Social allowance  
 .....  
 .....

◆ Pension Fund Contribution = (basic salary + Social allowance) × 7%  
 .....  
 .....

◆ Unemployment Insurance = (basic salary + Social allowance) × 1%  
 .....  
 .....

◆ Total deduction = Pension Fund Contribution + Unemployment Insurance  
 .....  
 .....

◆ Net salary =  
 .....  
 .....

End 😊

**14Q: Use the following link to answer the questions:**



**1. Bader worked the following hours during the week in:**

Days	FRI	SAT	SUN	MON	TUE	WED	THU
Hours	0	8	8	8	8	8	8
Over Time	0	2	0	2	3	1	2

(during the day)

If you know that the average hourly wage is BHD 5.000. The total wage during the week are:

- BHD302.500
- BHD240
- BHD177.500

2. Mostafa co. is given a worker BHD0.800 as piece rate of work. If his total production for that month was 500 pieces. the total wage received are:

- BHD40
- BHD400
- BHD440

3. Hadi works as a salesman in a company for a base salary of BHD450 per month plus a commission of 6% of sales. If he has made sales of BHD5000 at the end of the May 2021. The gross salary received are:

- BHD450
- BHD750
- BHD300

4. Ahmed, an employee, is paid a basic salary of BHD 380 per month, followed by a graduated commission of 3% on the first BHD2,000 of sales and 4% thereafter. If his total sales this month BHD5000, the total gross salary are:

- BHD605
- DHD650
- BHD560

5. Danah works as a sales employee with a monthly salary of BHD600 per month in addition bonus to 2% of annual sales, which are over BHD10000. If its annual sales reach 50000. The annual salary is:

- BHD8000
- BHD7200
- BHD6400

6. Fatmah works in a private sector in the Bahrain Co., with a basic monthly salary of BHD 500 and BD70 a monthly qualification allowance. Fatmah's net salary for the month is:

- BHD524.400
- BHD570
- BHD615.600

7. An employee is worked for 48 hours during a week at a basic rate BHD3.750.

The gross wage received this week are:

- BHD188
- BHD108
- BHD180

8. Salem worked this month 160 basic hours at rate BHD4.250 per hours, in addition 20 hours over time during the night. The gross wages received are:

- BHD765
- BHD680
- BHD807.500

9. Mohammed is an employee of ALHuda Co. He is entitled to a monthly salary of BHD350 addition to BHD0.400 each piece produced per month. If he produced 500 pieces in this month, His total salary this month are:

- BHD550
- BDH350
- BHD505

10. Abdulla is an a doctor in the Ministry of Healthy earning BHD1450 basic salary, BHD70 social allowance, BHD20 Transport allowance and BHD50 living standard improving allowance. His net salary are:

- BHD1483.600
- BHD1438.600
- BHD1590



# Extra Exercise

A- Complete the following payroll blanks with the solution steps:



KINGDOM OF BAHRAIN  
Civil Service Bureau

## PAYMENT INFORMATION

- Basic Salary 488.000

## ALLOWANCES

- Social Allowance 50.000
- Transport Allowance 20.000
- Living Standard Improving Allowance 60.000
- Regular Overtime 51.000 BD
- GROSS PAY .....

## DEDUCTIONS

- Social Pension Deduction .....
- Unemployment Insurance Deduction .....
- Pension Service Purchase Deduction 54.037
- Pension Fund Contribution Deduction .....
- GROSS DEDUCTION .....
- NET PAY .....

◆ Gross pay = basic salary + Social allowance + living standard improving

◆ Social pension deduction = Social allowance  $\times$  6%

◆ Pension Fund Contribution = (basic salary)  $\times$  6%

◆ Unemployment Insurance = (basic salary + Social allowance)  $\times$  1%

◆ Total deduction = Pension Fund Contribution + Unemployment Insurance

◆ Net salary =

## Answers

PAYMENT INFORMATION	
Basic Salary	488.000
ALLOWANCES	
Social Allowance	50.000
Transport Allowance	20.000
Living Standard Improving Allowance	60.000
Regular Overtime	51.000 BD
GROSS PAY	
	669.000
DEDUCTIONS	
Social Pension Deduction	3.000
Unemployment Insurance Deduction	5.380
Pension Service Purchase Deduction	54.037
Pension Fund Contribution Deduction	29.280
GROSS DEDUCTION	
	91.697
NET PAY	
	577.303

## PAYMENT INFORMATION

- **Basic Salary** 615.000

## ALLOWANCES

- **Social Allowance** 50.000
- **Transport Allowance** 20.000
- **Living Standard Improving Allowance** 60.000
- **Regular Overtime** 84.000
- **GROSS PAY** .....

## DEDUCTIONS

- **Social Pension Deduction** .....
- **Unemployment Insurance Deduction** .....
- **Pension Fund Contribution Deduction** .....
- **GROSS DEDUCTION** .....
- **NET PAY** .....

◆ Gross pay = basic salary + Social allowance + living standard improving

.....

◆ Social pension deduction = Social allowance  $\times$  6%

.....

◆ Pension Fund Contribution = (basic salary)  $\times$  6%

.....

◆ Unemployment Insurance = (basic salary + Social allowance)  $\times$  1%

.....

◆ Total deduction = Pension Fund Contribution + Unemployment Insurance

.....

◆ Net salary =

.....

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## Answers

<b>PAYMENT INFORMATION</b>	
Basic Salary	615.000
<b>ALLOWANCES</b>	
Social Allowance	50.000
Transport Allowance	20.000
Living Standard Improving Allowance	60.000
Regular Overtime	84.000 BD
<b>GROSS PAY</b>	
	829.000
<b>DEDUCTIONS</b>	
Social Pension Deduction	3.000
Unemployment Insurance Deduction	6.650
Pension Fund Contribution Deduction	36.900
<b>GROSS DEDUCTION</b>	
	46.550
<b>NET PAY</b>	
	782.450