



LESSON SUMMARY

CXC CSEC MATHEMATICS

Lesson

UNIT FOUR:
Consumer Arithmetic

6

Earning Money, Paying Bills and Taxes and Currency
Conversion

Textbook: Mathematics, A Complete Course by Raymond Toolsie, Volume 1

(Some helpful exercises and page numbers are given throughout the lesson, e.g. Ex 5b page 171)

INTRODUCTION

This lesson looks at calculating salaries and wages. It also looks at paying bills and taxes and currency conversion. These computational tasks are presented to consumers daily. Therefore a development of these concepts will assist the consumers in the accurate completion of their everyday transactions.

OBJECTIVES

At the end of this lesson you will be able to:

- solve problems involving: rates and taxes; utility bills, salaries and wages.
- solve problems involving foreign exchange.



4.4 Salaries and Wages

Salary

A salary is a fixed amount of money employers pay to their employees for services rendered. This is usually paid monthly. The gross monthly salary is the salary before any deductions such as taxes. The net monthly salary is the monthly salary the worker receives after deductions.

Note the following:

$$\text{The gross annual salary} = \text{The gross monthly salary} \times 12$$

$$\text{The gross monthly salary} = \text{The gross annual salary} \div 12$$

$$\text{The net monthly salary} = \text{The gross monthly salary} - \text{The monthly deductions}$$

$$\text{The net annual salary} = \text{The net monthly salary} \times 12$$

Example:

The gross monthly salary of a manager is \$5 875. Calculate her net annual salary after deductions of \$976 were made monthly. (Ex 5a page 170)

Solution:

$$\begin{aligned} \text{The net monthly salary} &= \$5\,875 - \$976 \\ &= \$4\,899. \end{aligned}$$

$$\begin{aligned} \text{Therefore, the net annual salary} &= \$4\,899 \times 12 \\ &= \$58\,788. \end{aligned}$$

Wages

The basic rate is the amount of money normally paid to a worker for each hour worked. Normally a 40-hour week is worked and this is called the basic week. The amount of money the worker receives at the end of the basic week is called the basic wage. Two basic week is called a basic fortnight.

$$\text{The basic wage} = \text{The basic rate} \times \text{The basic week or fortnight}$$

Example:

1. A girl works a basic week of 40 hours and her basic rate is \$6.25 per hour. Calculate her basic wage for the week. (Ex 5b page 171)

Solution:

$$\begin{aligned} \text{The basic wage} &= \$6.25 \times 40 \\ &= \$250. \end{aligned}$$

2. A man works a basic week of 32 hours and earns \$172.48. Find his basic rate of pay.

Solution:

$$\text{The basic rate} = \frac{\text{The basic wage}}{\text{The basic week or fortnight}}$$

$$\begin{aligned} \text{The basic rate} &= \frac{\$172.48}{32} \\ &= \$5.39 \end{aligned}$$

Overtime Wage

Workers who are paid hourly are paid overtime wage for extra hours worked.

$$\text{The overtime wage} = \text{The overtime rate} \times \text{The overtime worked}$$

Example:

A secretary works a 35-hour week for which she is paid \$262.50. She works 6 hours overtime on Saturday which is paid for at time –and –a-half, and 4 hours overtime on Sunday which is paid for at double-time. Calculate her gross wage for the week. (Ex 5c, page 173).

Solution:

$$\text{The basic rate} = \frac{\$262.50}{35}$$

$$= \$7.50$$

$$\text{The overtime rate at time - and - a - half} = 1.5 \times \$7.50$$

$$= \$11.25$$

$$\text{The overtime rate at double - time} = 2.0 \times \$7.50$$

$$= \$15.00$$

$$\text{The overtime wage for Saturday} = \$11.25 \times 6$$

$$= \$67.50$$

$$\text{The overtime wage for Sunday} = \$15.00 \times 4$$

$$= \$60.00$$

$$\text{The gross wage for the week} = \$262.50 + \$67.50 + \$60.00$$

$$= \$390.00$$



In an engineering firm all employees work a basic week of 40 hours. Any overtime worked from Monday to Friday is paid for at time-and-a-quarter. Overtime worked on Saturday is paid for at time-and-a-half, whilst on Sunday it is paid for at double-time. If the basic rate is \$14.80 per hour, find the gross wage of a man who worked 12 hours overtime from Monday to Friday, 2 hours overtime on Saturday and 5 hours overtime on Sunday.

4.5 Rates and Taxes

Income Tax

This is paid by workers to the government. The amount of tax paid by a worker depends on the salary he earns.

$$\textit{The taxable income} = \textit{The gross income} - \textit{The allowances}$$

$$\textit{The net income} = \textit{The gross income} - \textit{The tax paid}$$

Example:

Single person's allowance \$1 800

Married man's allowance \$2 500

Child under 11 years old \$700

Child 11-16 years old \$900

Child over 16 years old, if in full time education \$1 100

Dependent relatives \$400

National insurance \$150

A married man with one child aged 15 years and a second child aged 18 years who is attending college full time, earns \$48 120 per annum. He has a dependent relative whom he helps to support. If he also gets an allowance of \$150 for national insurance, calculate the amount he pays in income tax per annum if it is levied at 25%. (Ex 5e page 178)

Solution:

$$\textit{Total allowances} = \$2\,500 + \$900 + \$1\,100 + \$400 + \$150$$

$$= \$5\,050$$

$$\textit{Taxable income} = \$48\,120 - \$5\,050$$

$$= \$43\,070$$

$$\textit{Amount paid in tax} = 25\% \textit{ of } \$43\,070$$

$$0.25 \times \$43\,070$$

$$= \$10\,767.50$$

Rates-Land and Building Taxes

Rates are yearly taxes paid by owners of land and building to the local government. The taxes are paid on the rateable value of the property which is less than the actual value of the property.

The rates payable per annum = The rate charged \times The rateable value

Example:

The rateable value of a house is \$4 500. Calculate the rates payable by a householder, for a particular year, when the rates are \$0.21 in the \$1. (Ex 5I page 193)

Solution: 21 cents is charged for every \$1. of the rateable value. Therefore 21% of the rateable value is charged.

The rate charged = 0.21 \times \$4 500

= \$945



The total rateable value of the property in a city is \$80 000 000.

- (a) What amount of money would be obtained from a rate of 5%?
- (b) What value of rate is needed to collect \$16 000 000?

Utility Bills

As consumers we use water, electricity and telephone services. The company sends a bill for the services. The following example shows some of the calculation involved. Calculate the quarterly electricity bill for the following household:

Name	Number of units used		Cost per peak unit
	Peak	Off-peak	
Mr. Forde	576	1 420	12 ¢

Assume that there is a standing charge of \$31.50, and that off-peak units are sold at half price. (Ex 5p page 200)

Solution:

$$\text{charges for peak units} = \$576 \times 0.12$$

$$= \$69.12$$

$$\text{charges for off - peak units} = \$1\,420 \times \frac{0.12}{2}$$

$$= \$85.20$$

$$\text{Total charges} = \$31.50 + \$69.12 + \$85.20$$

$$= \$185.82$$



Calculate the quarterly telephone bill for the following household.

Name	Number of units used	Standing charge	Cost per unit
Mr. Forde	1 745	\$35.00	15¢

Foreign Exchange

Often we are required to convert from one currency to another e.g. from US currency to TT currency. The conversion is usually carried out according to some predetermined exchange rate. The following example will be helpful in developing this concept.

An American tourist changed US \$925 into Trinidad and Tobago currency at the exchange rate US\$1.00 = TT \$6.30.

(a) Calculate the amount of TT dollars he received.

- (b) The tourist spent TT \$2 677.50 and changed the remaining TT dollars into American currency at the same exchange rate. Calculate the amount of US dollars he received. (Ex 5r page 208)

Solution:

- (a) The tourist will get \$6.30 for every US dollar therefore to obtain the amount of TT dollars he receives multiply the US currency by 6.30:

$$\text{The amount of TT received} = \$925 \times 6.30$$

$$= \$5\,827.50$$

$$\text{The amount of TT left over} = \$5\,827.50 - \$2\,677.50$$

$$= \$3\,150.00$$

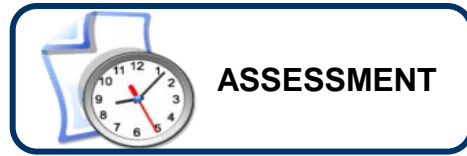
To convert this back to US currency divide by 6.30:

$$\text{The amount of US received} = \$3\,150.00 \div 6.30$$

$$= \$500.$$



A bank gives two dollars and seventy-five cents in Eastern Caribbean currency (EC \$2.75) for one United States dollar (US \$1.00). Given that 1% tax is charged on all foreign exchange transactions, calculate the amount, in E.C. currency, which a tourist receives in exchange for US \$1 200.00 (Ex 5r page 208)



CXC questions

- (1) A man's wage for a 35-hour week is \$262.50. Calculate, without using tables, his hourly rate of payment.
- (2) The water authority charges \$10.00 per month for the meter rent, \$2.50 for the first 1 000 litres and \$0.10 for each additional 100 litres. What is the total bill for 2 500 litres used in one month?

CONCLUSION

In this lesson we have looked at a number of calculations that will assist the consumers in their everyday activities. Another important area in Mathematics is Algebra. The next lesson deals with solving for variables in various algebraic expressions.