

By studying this lesson you will be able to

- identify different types of taxes and solve related problems
- solve problems on simple interest.

Do the following exercise to recall what you have learnt so far about percentages.

Review Exercise

1. Complete the table by writing a suitable value in each empty box.

Fractional form	Decimal form	Percentage form
$\frac{1}{2}$	0.5	50%
$\frac{3}{5}$	0.6	
	0.8	80%
$\frac{1}{4}$		25%
	0.06	
		8%

2. Represent as a percentage.

- (i) Rs. 50 as a percentage of Rs. 200 (ii) 25 cents as a percentage of one rupee
 (iii) 8 cm as a percentage of 2 m (iv) 50 g as a percentage of 1 kg
 (v) 300 ml as a percentage of 1 l (vi) 15 students as a percentage of 40 students

3. Find the quantity.

- (i) 60% of Rs. 500 (ii) 20% of 250 km (iii) 25 % of 24 hours
 (iv) 3% of 2 l (v) 15% of 1 kg (vi) 12% of 1.5 m

14.1 Taxes

The government of each country collects money from its citizens to meet recurrent expenses. This money is called taxes. Different types of taxes are collected in different ways and in varying amounts. The method that is used most to collect taxes is charging a percentage of the amount involved. Taxes that an individual has to pay directly to the government are called direct taxes. Several types of direct taxes are given below.

- Rates
- Customs duty
- Income tax

Taxes that are not charged directly are called indirect taxes. Value added tax (VAT) is one such tax that is charged at present.

Rates

Rates are taxes charged by urban councils, municipal councils, provincial councils etc., from households and businesses that come within their administrative domain. These taxes are used for various purposes such as the maintenance of roads and street lights, garbage collection and disposal etc. Properties owned by individuals and businesses are assessed annually by the government, and the relevant council charges a percentage of the assessed annual value of the property as rates. This is calculated annually and can be paid in total at the beginning of the year, or in 4 equal quarterly installments once every three months.

Example 1

A house of assessed annual value Rs. 36 000 is charged annual rates of 4%. Calculate the rates that have to be paid for a quarter.

$$\begin{aligned}\text{Annual rates} &= \text{Rs. } 36\,000 \times \frac{4}{100} \\ &= \text{Rs. } 1\,440\end{aligned}$$

$$\begin{aligned}\therefore \text{The rates that have to be paid for a quarter} &= \text{Rs. } 1\,440 \div 4 \\ &= \underline{\underline{\text{Rs. } 360}}\end{aligned}$$

Example 2

The assessed annual value of a shop within the administrative domain of a certain urban council is Rs. 24 000. The quarterly rates payable on this property is Rs. 300. Calculate the rates percentage charged by the council.

Assessed annual value of the shop = Rs. 24 000

Rates charged for a quarter = Rs. 300

∴ Rates charged for the year = Rs. 300 × 4
= Rs. 1 200

Accordingly, the rates percentage charged = $\frac{1\,200}{24\,000} \times 100\%$
= 5%

Customs Duty

When certain items are imported or exported, a certain percentage of the value of the item has to be paid as taxes to the government. Such taxes are called customs duty. This tax is charged by Sri Lanka Customs.

Individuals who have worked abroad are entitled to a duty free quota on their return, which may be used to purchase certain items without paying customs duty, from the duty free shops housed in the international airport.

Further, certain government servants are entitled to a reduction in customs duty when importing vehicles.

Example 1

If customs duty of 10% of the value of the item has to be paid when a certain type of clock is imported, how much duty has to be paid when a clock of this type of value Rs. 5 000 is imported?

Customs duty that has to be paid = Rs. 5 000 × $\frac{10}{100}$
= Rs. 500

Example 2

When a car is imported, 60% of its value has to be paid as customs duty. Find the total amount with the duty included, that it costs a person to import a car worth Rs. 2 000 000.

Method 1

$$\begin{aligned}\text{Amount of customs duty that has to be paid} &= \text{Rs. } 2\,000\,000 \times \frac{60}{100} \\ &= \text{Rs. } 1\,200\,000\end{aligned}$$

$$\begin{aligned}\text{Cost of the vehicle with the customs duty included} &= \text{Rs. } 2\,000\,000 + 1\,200\,000 \\ &= \underline{\underline{\text{Rs. } 3\,200\,000}}\end{aligned}$$

Method 2

$$\begin{aligned}\text{Cost of the vehicle with the customs duty included} &= \text{Rs. } 2\,000\,000 \times \frac{160}{100} \\ &= \underline{\underline{\text{Rs. } 3\,200\,000}}\end{aligned}$$

Example 3

If Rs. 18 000 was charged as customs duty when a stock of fruits worth Rs. 300 000 was exported to the Middle East, find the percentage of the value of the stock that the exporter had to pay as customs duty.

$$\begin{aligned}\text{The value of the stock of fruits} &= \text{Rs. } 300\,000 \\ \text{Customs duty that was paid} &= \text{Rs. } 18\,000 \\ \text{Percentage charged as customs duty} &= \frac{18\,000}{300\,000} \times 100\% \\ &= \underline{\underline{6\%}}\end{aligned}$$

Example 4

The value of a television set with a 15% customs duty added to it is Rs. 28 750. What is the value of the television set without the duty?

$$\begin{aligned}\text{The value of the television set without the customs duty} &= \text{Rs. } 28\,750 \times \frac{100}{115} \\ &= \underline{\underline{\text{Rs. } 25\,000}}\end{aligned}$$

Income Tax

The government imposes a tax on the annual income of an individual, which is earned as salary, from property or through a business, and which exceeds a certain limit. Such taxes are called income taxes.

The income tax for a particular year can either be paid annually or in quarterly installments. A table with the information on how the taxes are calculated, which was implemented in 2011 by the Inland Revenue Department is given below. (These values may change in the future)

Annual Income	Tax Percentage
Initial Rs. 500 000	Tax free
Next Rs. 500 000	4%
Next Rs. 500 000	8%
Next Rs. 500 000	12%
Next Rs. 500 000	16%
Next Rs. 500 000	20%
Balance taxable income	24%

(Table 13.1)

This table is used to perform calculations related to the examples and problems on income tax in this lesson.

Example 1

If the annual income of an individual is Rs. 575 000, calculate the income tax he has to pay for the year.

$$\begin{aligned}\text{The annual income} &= \text{Rs. } 575\,000 \\ \text{Tax free income} &= \text{Rs. } 500\,000 \\ \text{Taxable income} &= \text{Rs. } 575\,000 - 500\,000 \\ &= \text{Rs. } 75\,000 \\ \text{Payable tax} &= \text{Rs. } 75\,000 \times \frac{4}{100} \\ &= \underline{\underline{\text{Rs. } 3\,000}}\end{aligned}$$

Example 2

If the annual income of a certain businessman is Rs. 1 650 000, calculate the total annual income tax he has to pay.

First let us separate the annual income as shown below.

$$\underbrace{1,650\,000}_{\text{Annual income}} = \underbrace{500\,000}_{\text{Tax free income}} + \underbrace{500\,000}_{4\% \text{ tax}} + \underbrace{500\,000}_{8\% \text{ tax}} + \underbrace{150\,000}_{12\% \text{ tax}}$$

$$\text{Tax free income} = \text{Rs. } 500\,000$$

$$\begin{aligned}\text{Tax charged on the next Rs. } 500\,000 &= \text{Rs. } 500\,000 \times \frac{4}{100} \\ &= \text{Rs. } 20\,000\end{aligned}$$

$$\begin{aligned}\text{Tax charged on the next Rs. } 500\,000 &= \text{Rs. } 500\,000 \times \frac{8}{100} \\ &= \text{Rs. } 40\,000\end{aligned}$$

$$\begin{aligned}\text{Tax charged on the next Rs. } 150\,000 &= \text{Rs. } 150\,000 \times \frac{12}{100} \\ &= \text{Rs. } 18\,000\end{aligned}$$

$$\begin{aligned}\text{Total income tax that has to be paid} &= \text{Rs. } 20\,000 + 40\,000 + 18\,000 \\ &= \underline{\underline{\text{Rs. } 78\,000}}\end{aligned}$$

Value Added Tax (VAT)

When a product or a service is bought, a percentage of its total value is charged as value added tax. The trader who sells the product and the service provider who are both bound to pay this tax, charge it from the consumer.

Example 1

A certain person's monthly telephone charges are Rs. 2 500. If a VAT of 15% is added to this charge, what is his monthly bill?

Method 1

$$\text{VAT} = \text{Rs. } 2\,500 \times \frac{15}{100}$$

$$= \text{Rs. } 375$$

$$\begin{aligned}\text{Total bill} &= \text{Rs. } 2\,500 + 375 \\ &= \underline{\underline{\text{Rs. } 2\,875}}\end{aligned}$$

Method 2

$$\text{Rs. } 2\,500 \times \frac{115}{100}$$

$$\text{Rs. } 2\,875$$

Example 2

The production cost of a pair of shoes produced by a certain organization is given below.

Raw materials	= Rs. 1 200
Labour	= Rs. 300
Other expenses	= Rs. 200
Total cost	= <u><u>Rs. 1 700</u></u>

The organization hopes to gain a profit of Rs. 250 from this product. A VAT of 15% has to be paid to the government on the price of the pair of shoes. Find the selling price of the pair of shoes with the VAT included.

$$\text{Price without VAT} = \text{Rs. } 1\,700 + 250 = \text{Rs. } 1\,950$$

$$\text{VAT that needs to be paid} = \text{Rs. } 1\,950 \times \frac{15}{100}$$

$$= \text{Rs. } 292.50$$

$$\begin{aligned}\text{Selling price of the pair of shoes} &= \text{Rs. } 1\,950 + 292.50 \\ &= \underline{\underline{\text{Rs. } 2\,242.50}}\end{aligned}$$

Method 2

$$\text{Rs. } 1\,950 \times \frac{115}{100}$$

$$\text{Rs. } 2\,242.50$$

Exercise 14.1

1. The assessed annual value of a certain house is Rs. 15 000. If the relevant provincial council institution charges 5% of the value of the house as rates, calculate the rates that have to be paid for a year.
2. If the rates that have to be paid by a shop of assessed annual value Rs. 18 000 is 6% of the value of the shop,
 - (i) how much has to be paid as rates for a year?
 - (ii) how much has to be paid as rates for a quarter?

3. If Rs. 270 has to be paid as quarterly rates for a house of assessed annual value Rs. 18 000, which lies within the limits of a certain urban council, calculate the percentage that the urban council charges as rates.
4. A canteen which lies within the limits of a certain municipal council which charges 8% of the assessed annual value of the property as rates, has to pay quarterly rates of Rs. 1 200. What is the assessed annual value of the canteen?
5. Mr. Silva who owns a house assessed to be of annual value Rs. 30 000, has rented it for a year to Mr. Perera. The monthly rent charged by Mr. Silva is Rs. 3 000. The relevant provincial council charges 4% of the assessed annual value of the house as rates. Mr. Silva has to spend 15% of the rent on maintenance. How much of the rent is Mr. Silva left with at the end of the year, after the relevant expenses are met?
6. The value of a refrigerator which is being imported is Rs. 40 000. If the customs duty that has to be paid is 20% of the value of the item, find the amount that has to be paid as duty.
7. If Rs. 3 000 had to be paid as customs duty when a camera worth Rs. 12 000 was imported, what is the percentage that was charged as customs duty?
8. The percentage charged as customs duty when a three wheeler is imported is 50% of its value. If the value of the three wheeler with the customs duty included is Rs. 450 000, what is the value of the three wheeler without the customs duty?
9. If customs duty of 12% of the value of the items is charged when a stock of ready-made garments worth Rs. 50 000 is exported, what is the value of the stock of garments after the customs duty has been paid?
10. When a certain type of motorcycle is imported, customs duty of 15% of its value has to be paid. The value of a motorcycle of this type which was imported is Rs. 175 000.
 - (i) What is the value of the motorcycle after the customs duty is paid?
 - (ii) At what price should the motorcycle be sold to make a profit of 10%?
11. The annual income of a certain individual is Rs. 550 000. How much income tax does he have to pay according to the income tax rates implemented in year 2011 (table 13.1)?
12. How much should a person whose annual income is Rs. 1 800 000 pay as income tax according to table 13.1?
13. If a businessman paid an annual income tax of Rs. 56 000 in 2012 according to the income tax rates implemented in 2011 (table 13.1), what is his annual income?

14. The monthly telephone charges of a certain household is Rs. 1 200. If the VAT charges are 10%, what is the total value of the bill?
15. The charges that had to be met by a person who imported a certain vehicle are as follows.
- | | |
|--------------------------------------|---------------|
| Import price of vehicle | = Rs. 600 000 |
| Customs duty | = Rs. 400 000 |
| Port charges and transportation cost | = Rs. 50 000 |
- If VAT of 15% was charged on all these expenses, how much did he have to pay in total for the vehicle?
16. VAT of 15% is added to the monthly water bill of a household. If Prathapa pays a total of Rs. 1 725 as his monthly water bill, find the value of the bill without the VAT.

14.2 Interest

When a loan has been taken from an individual or an institution, the extra amount that has to be paid when settling the loan after a period of time is called the **interest**. Similarly, when money has been deposited in a bank or some other financial institution for a period of time, the extra amount that is received at the end of the period is also called the **interest**.

Usually, the interest that has to be paid for a year is a percentage of the loan amount (or deposit amount). This percentage is called the annual **interest rate**. The interest rate can also be given monthly or semi-annually.

Simple Interest

When calculating the interest for a specific period, if only the initial amount (principal) is taken into consideration, then such interest is called **simple interest**.

Example 1

It took a man 2 years to settle a loan of Rs. 5 000 borrowed at an annual simple interest rate of 10%. How much interest did he pay in total?

$$\begin{aligned}\text{Simple interest paid for a year} &= \text{Rs. } 5\,000 \times \frac{10}{100} \\ &= \text{Rs. } 500\end{aligned}$$

$$\begin{aligned}\text{Simple interest paid for two years} &= \text{Rs. } 500 \times 2 \\ &= \underline{\underline{\text{Rs. } 1\,000}}\end{aligned}$$

Example 2

Find the total amount that Senal has to pay to settle a loan in three months, if he borrowed Rs. 8 000 at a monthly simple interest rate of 2%.

$$\begin{aligned}\text{Interest for a month} &= \text{Rs. } 8\,000 \times \frac{2}{100} \\ &= \text{Rs. } 160 \\ \text{Interest for three months} &= \text{Rs. } 160 \times 3 \\ &= \text{Rs. } 480 \\ \text{Since total amount} &= \text{Loan} + \text{Interest,} \\ \text{total amount to be paid in three months} &= \text{Rs. } 8\,000 + 480 \\ &= \underline{\underline{\text{Rs. } 8\,480}}\end{aligned}$$

Example 3

How long will it take for a person who gave a loan of Rs 10 000 at an annual simple interest rate of 12%, to receive an interest of Rs. 3 600?

$$\begin{aligned}\text{Simple interest received for a year} &= \text{Rs. } 10\,000 \times \frac{12}{100} \\ &= \text{Rs. } 1\,200 \\ \text{Number of years it takes to} &= \frac{3\,600}{1\,200} \\ \text{receive Rs. 3 600 as interest} &= \underline{\underline{3 \text{ years}}}\end{aligned}$$

Example 4

If the simple interest that had to be paid for two years, on a loan of Rs.7 500 was Rs.1 200, find the annual simple interest rate that was charged.

$$\begin{aligned}\text{Interest for two years} &= \text{Rs. } 1\,200 \\ \text{Interest for a year} &= \text{Rs. } 1\,200 \div 2 \\ &= \text{Rs. } 600 \\ \text{Annual simple interest rate} &= \frac{600}{7\,500} \times 100\% \\ &= \underline{\underline{8\%}}\end{aligned}$$

Example 5

How many years after taking a loan of Rs. 25 000 at an annual simple interest rate of 7.5%, does a person have to pay a total amount of Rs. 28 750 to settle the loan?

$$\begin{aligned}\text{Interest for a year} &= \text{Rs. } 25\,000 \times \frac{7.5}{100} \\ &= \text{Rs. } 1\,875 \\ \text{Loan} &= \text{Rs. } 25\,000 \\ \text{Total amount to be paid} &= \text{Rs. } 28\,750\end{aligned}$$

$$\begin{aligned}
 \text{Total interest to be paid} &= \text{Rs. } 28\,750 - 25\,000 \\
 &= \text{Rs. } 3\,750 \\
 \text{Time period for which interest has to be paid} &= \frac{3\,750}{1\,875} \\
 &= \underline{\underline{2 \text{ years}}}
 \end{aligned}$$

Example 6

If the total amount that had to be paid after 4 months to settle a loan borrowed at a monthly simple interest rate of 1.5% was Rs.5 300, find the loan amount.

The meaning of “A monthly simple interest rate of 1.5%” is that “Rs.1.50 has to be paid as interest for a month for a loan amount of Rs 100.

$$\begin{aligned}
 &\text{That is, interest paid for 1 month on a loan of Rs.100} = \text{Rs.1.50} \\
 \therefore \text{Interest paid for 4 months on a loan of Rs. 100} &= \text{Rs.1.50} \times 4 = \text{Rs.6} \\
 \therefore \text{Total amount paid in 4 months for a loan of Rs. 100} &= \text{Rs.100} + 6 = \text{Rs.106} \\
 \therefore \text{Loan amount for which the total amount of Rs.106} &\left. \begin{array}{l} \\ \text{has to be paid after 4 months} \end{array} \right\} = \text{Rs.100} \\
 \therefore \text{Loan amount for which the total amount of Rs. 5300} &\left. \begin{array}{l} \\ \text{has to be paid after 4 months} \end{array} \right\} = \frac{100}{106} \times 5300 \\
 &= \underline{\underline{\text{Rs.5000}}}
 \end{aligned}$$

Exercise 14.2

1. How much interest is received in three years when a loan of Rs.5 000 is given at an annual simple interest rate of 12%?
2. A man deposits Rs.50 000 in a bank at a monthly interest rate of 1.5%. If he withdraws the interest he receives monthly, how much interest does he get in total during a period of 6 months?
3. Find the simple interest that has to be paid for 1 year and 5 months on a loan of Rs.2 500 borrowed at a monthly interest rate of 3%.
4. If a person who borrowed Rs. 500 settled the loan in one year by paying back Rs.560, find the annual interest rate that was charged.
5. If a person who gave a loan of Rs. 6 000 at an annual simple interest rate, received Rs.3 600 as interest for four years, what is the annual simple interest rate that was charged?
6. If a person who borrowed Rs.600 paid Rs.135 as interest for 1 year and 3 months, find the monthly interest rate that was charged.

7. If a person who gave a loan of Rs.8 000 received a total amount of Rs.9 680 at the end of two years, find the annual simple interest rate that was charged.
8. At what annual simple interest rate should a loan of Rs.5 000 be given to receive the same interest that is received when a loan of Rs.6 000 is given at an annual simple interest rate of 8%?
9. For what period of time should an interest of Rs.540 be paid on a loan of Rs.1 500 taken at an annual simple interest rate of 12%?
10. In how many months will an interest of Rs.420 be earned on a loan of Rs.2 000 given at a monthly simple interest rate of 3%?
11. After how long is a person who has taken a loan of Rs.6 000 at an annual simple interest rate of 18% able to settle the loan by paying back Rs.9 240?
12. After how long has a person to pay a total amount of Rs.5 000 to settle a loan of Rs.2500 taken at an annual simple interest rate of 10%?
13. A person takes a loan of Rs.5 000, promising to pay interest at a monthly simple interest rate of 5%. How much does he have to pay in total to settle the loan in 6 months?
14. What is the total amount that has to be paid in three years to settle a loan of Rs.8 000 taken at an annual simple interest rate of 15%?
15. Calculate the loan amount if a total amount of Rs.3 100 had to be paid in 8 months to settle the loan taken at a monthly simple interest rate of 3%.
16. A person takes a loan on annual simple interest, promising to settle the loan in two years by paying Rs.5 000. However he was only able to settle the loan in 5 years, at which time he had to pay Rs.6 500.
 - (i) Calculate the interest he has paid for a year.
 - (ii) What was the amount he borrowed?
 - (iii) What was the annual simple interest rate that was charged?
17. If a person took a loan of Rs. P for a period of T years at an annual simple interest rate of R .
 - (i) Write down an expression for the interest he has to pay for a month.
 - (ii) Write down an expression for the total interest I that he has to pay for a period of T years.
 - (iii) Calculate I using the expression in (ii) above when $P = 4000$, $R = 8\%$ and $T = 5$.