Mathematics for Management

Chapter 5: Simple Interest

by
Nor Alisa Mohd Damanhuri and Farahanim Misni
Faculty of Industrial Sciences & Technology

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Expected Outcome:

Upon the completion of this course, students will have the ability to:

1. Obtain the simple interest and simple amount by using the formula.
2. Identify the four basic concepts of simple interest for a given numbers of days.
3. Obtain the present value by manipulating from the previous formula.

Simple Interest

Two definitions of interest

Definition 1: Interest is money earned when money is invested

Example : Siti invested RM1000 in a bank. After 2 years, the total investment becomes RM1500. Therefore, the total interest was RM500.

Definition 2: Interest is charge incurred when a loan or credit is obtained

Example : A personal loan made by Ahmad was RM20 000 and the interest charged by a bank was RM5000 for 7 years. So, the total payment for this loan is become RM25 000.

Formula Simple Interest

$$\mathbf{I = Prt}$$

where

I : the amount of interest in (RM)
P: the principal (the amount of money borrowed/invested) in (RM)
r: the interest rate in (%)
t: the length of time in years

Example 5.1.1:

If Fatimah borrowed RM100 for 3 years at a 10.5% interest rate. Calculate the simple interest.

Solution:

State the value of
$P = RM100$
$r = 10.5\%$
$t = 3$ years

By using the formula,
$I = Prt$
$= RM100 \times 0.105 \times 3$
$= RM31.50$

Exercises:

- Convert the loan period in years if the time given is:

  (i) 12 weeks

  (ii) 18 months

  (iii)180 days

- RM 1000 is invested for twenty seven months in a local bank with a simple interest rate offered at 8% per annum. Find the simple interest earned.

- Sarah invested RM5000 in a bank for 2 years 4 months. After that period, Sarah got dividend of RM1000. Find the interest rate?

- Muthu invested RM 10 000 in two different accounts. Some of the money invested was offered an interest at the rate of 10% per annum and the rest at 7% per annum. Muthu gained a total interest of RM 820 for one year from the two accounts. Find the amount invested at each rate.

Simple Amount

What is simple amount?

- Simple amount is the sum of the original principal and the interest earned

$$S = P + I$$
$$= P + Prt$$
$$= P(1+rt)$$

where

S: simple amount
P: the original principal
r: the interest rate (%)
t: the length of time in years

Example

Sofia invested an amount of RM 10 000 for 4 years 9 months in Oasis Bank earning a simple interest rate of 10% per annum. Find the simple amount earned at the end of the investment period.

Solution:

State the value of
$P = RM10\ 000$
$r = 10\%$
$t = 4.75$ years

By using the formula,
$S = P(1+rt)$
$= RM10\ 000\ (1 + (0.1)\ (4.75))$
$= RM14\ 750$

Exercises:

- Students may purchase a laptop from a simple interest loan. A laptop costs RM 1500 and the interest rate of the loan is 12%. If the loan is to be paid back within 1 year and 6 months, calculate the total amount to be paid back.

- Ali borrows RM6000 from a loan shark. If Ali will owe RM7200 in 26 weeks, what would be the simple interest rate?

Four Basic Concept

- There are 4 basic concepts to calculate the simple interest for a given numbers of days

(1) **Exact Time:**

it is the exact number of days between two given date

Example: Jan = 31 days
Feb = 28 days
Mar = 31 days

(2) **Approximate Time:**

it assumes a month has 30 days in the calculation of the number of days between two given dates

Example: Jan = 30 days
Feb = 30 days
Mar = 30 days

(3) **Ordinary Simple Interest:**
in calculating ordinary simple interest, we use a 360 day year

(4) **Exact Simple Interest:**
this use a 365/366 day year for interest computation

Tips: If the question did not give any one of these four basic concepts, then use **exact time and ordinary simple interest** to calculate your length of time (t).

If the problem did not mention any basic concept, use exact time and 360 days per year to calculate the length of time

Example 5.3.1

Find the numbers of days from 15 March to 29 August in the same year by using

(a) Exact Time

(b) Approximate Time

Solution:

(a) Exact Time

15 – 31 Mar = 16 days
1 – 30 Apr = 30 days
1 – 31 May = 31 days
1 – 30 June = 30 days
1 – 31 July = 31 days
1 – 29 Aug = 29 days
167 days

(b) Approximate Time

Exercise:

- RM 2000 was invested on 15 March 2014. If the simple interest rate offered was 10% per annum, find the interest received on 29 August 2014 using

(a) exact time and exact simple interest

(b) exact time and ordinary simple interest

(c) approximate time and exact simple interest

(d) approximate time and ordinary simple interest

Present Value

What is present value?

- Present value is the value now when invest or borrow today.
- It is also called as principal value.

$$P = S(1+rt)^{-1}$$

where

S: simple amount
P: the original principal
r: the interest rate (%)
t: the length of time in years

Example

A debt amount RM 3000 will be due in 10 months. What is the present value at a simple interest rate of 8%.

Solution:

State the value of

$S = RM3000$

$r = 8\%$

$t = \frac{10}{12}$ years

By using the formula,

$P = S(1+rt)^{-1}$

$= RM3000 \left(1 + 0.08\left(\frac{10}{12}\right)\right)^{-1}$

$= RM\ 2812.50$

Exercises:

- Bill is buying a camera. His April monthly interest at 12% was RM125. What was Bill's principal at the beginning of April?

- A certain sum of money is invested at 25% interest rate become RM25 000 after 5 years investment. What is the sum of that money?

THE END

~THANK YOU~

Author Information

noralisa@ump.edu.my
farahanim@ump.edu.my