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Math 9 – Unit 5: Financial Literacy

Lesson : Interests

Name: Date:

Learning Goal: We are learning to calculate interest and understand the differences between simple and compound interest.

When you put your money in a bank account or in an investment, you earn money. When you borrow money from a bank or other financial institution, you pay money. That money you earn or pay is called **interest**.

To calculate the amount of interest that you earn or pay, we can use Simple Interest or Compound Interest.

We will first start with Simple Interest. The formula is, well, simple!
$$SI = Prt$$

 $I = Simple Interest ($)$
 $P = Principal (Initial Amount buigg borrowed/lent) ($)$
 $r = Rate % (I. = \frac{1}{100} \rightarrow in decinals) \leftarrow Rote % per annum
 $t = Time (usually in grass)$$

Then A is the new amount that you have in your bank account or the total that you had to pay. It is calculated by adding the principal to the interest earned/paid. A = f + I

Examples:

Calculate the simple interest for the following situations:

a) \$10,000 invested at 5% for 6 years.

b) \$4000 borrowed at 4% for 4 years.

$$P = $10,000 ; T = 57. = 0.05; t = 67000
\therefore SI = Prt = (10,000)(0.05)(6)
= $3,000$$

$$P = $4000, r = \frac{4}{100} = 0.04, t = 4 \text{ provs.}$$

$$\therefore SI = Prt = (4000)(0.04)(4)$$

$$= $640$$

Now find the missing part:

t

c) How many years to earn \$500 interest when you invest \$1000 at 7.5%.

=?;
$$I = \$500; P = \$1000; r = \frac{7.5}{100} = 0.075$$

 $SI = Prt$
 $S00 = (1000)(0.075)t$
 $\frac{500}{75} = \frac{75t}{75}$
 $t = 6.67$ years.

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d) You borrowed \$1500. In 10 years, you paid back \$2400. What is the interest rate?

 $P = \$1500, t = 10, A = \$2400, \delta = ?$ $\therefore I = A - I = 2400 - 1500 = \900 $R^{\prime} = 0.06 \times 100$ = 67. I= 1rt 900 = (1500)(r)(10) $V = \frac{900}{15000} = \frac{9}{150} = 0.06$

Simple Interest has one flaw. It acts as a one-time payment at the end of the investment or loan. In an investment, you don't benefit from that interest until the end. There is a better way! Compound interest calculates interest throughout the life of the investment and adds that money into your bank account. Thus, whenever the next round of interest in calculated, there is more money in the account. You are earning interest on the interest! Let's compare:

If you have \$100 and you earn 10% interest:			A GE)	
Year	Start of year	Interest Earned (10%)	End of year.	
0	\$ 100	\$10	\$110 - Total	Amt in I year
1	\$110	\$11	\$ 121 - Total	Amt. in 2 years
2	\$121	\$12.1	\$ 33·1 ("	" in 3 years
3	\$13 ³ .1	\$ 13.31	\$ 146.41~	" years
4	\$146.41	\$14.641	9161.05 -	1 " 57ears.
5	\$161.05	\$ 16.105	\$177.155	

How much would you have in five years if you used simple interest?

.

$$SI = l \cdot t$$

$$SI = (10^{\circ})(0.1)(5)$$

$$Conclusion?$$

$$CI = 5 50$$

$$Conclusion?$$

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$$Conclusion?$$

$$CI = A - P$$

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a) \$750 invested at 4% interest for 7 years.

$$P = \$ 750, \ N = \frac{4}{100} = 0.04, \ t = 7 years.$$

$$A = P(1+n)^{t}$$

$$A = 750 (1+0.04)^{7}$$

$$= 750 (1.04)^{7}$$

$$\approx \$ 986.95$$

CI = A - P = 986.95 - 750 CI = \$236.95\$4350 invested at 2.5% for 50 years. (

b) \$4350 invested at 2.5% for 50 years. Carporded P = \$4350 ; r = 2.5 = 0.025 , t = 50 proves. $A = P(1+r)^{t}$ $= 4350 (1.025)^{50}$ A = \$14,951.42

How much interested did you earn?

$$CI = A - P$$

= 14,951.42 - 4350 = \$10,601.42

c) After investing for 12 years at 6%, you had \$13,682.94 in your bank account. How much did you invest?

$$t = 127 \cos , \quad n = \frac{6}{100} = 0.06 ; \quad A = \$13,682.94 ; \quad \beta = ?$$

$$A = \$(1+n)^{t}$$

$$13,682.94 = \$(1.06)^{12}$$

$$\frac{13,682.94}{2.01} = \$(2.01) \implies \$ = \frac{13,682.94}{2.01} \approx \$6807.43$$

How much interest did you earn?

$$CI = A - P = 13,682.94 - 6807.43 = $6875.51$$

Success Criteria:

• I can calculate the interest earned or paid using either simple or compound interest.

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Questions for you to do.

1. Emily inherits \$2000 and puts it in an investment earning 8% simple interest. How much money will she have in 25 years?

$$P = $2000, R = 8/. = 0.08, T = 25 \text{ perf.}$$

 $SI = PRT = 2000 \times 0.08 \times 25 = 4000$
 $\therefore A = 2000 + 4000 = 6000$
Emily will have \$6000 at The end of 25 years.

2. Luis borrows \$25000 for student loans from his parents. They ask him to pay it back in 10 years and charge him 3.5% compound interest. How much will he have to pay back and how much interest was he charged?

$$P = \$ 25000 ; T = 10 years ; R = 3.5 / = 3.5 = 0.035$$

$$A = P(1+R)^{T} = 25000 (1+0.035)^{10}$$

$$= 25000 (1.035)^{10}$$

$$= \$ 35264.97$$

$$\therefore CI = A - P = 35264.97 - 25000$$

$$= \$ 10264.97$$

Luis was charged \$10,264.97 as compound interest and had to pay back \$35,264.97.

3. Xiu needs \$8000 in 8 years. She obtains a compound interest rate of 7.5%. How much does she need to invest today to reach her goal?

$$A = \$8000 ; T = \$ years ; R = 7.5! ; P = ?$$

= 0.075
$$A = P(1+R)^{T}$$

$$\$000 = P(1.075)^{\$} \qquad \implies P = 4485.62$$

$$\$ Xin needs \$4485.62 \text{ to day}$$

$$\$ to reach her goal.$$

4. You come to me to borrow \$500 dollars. You plan to repay the money in two years. I offer you 5% simple interest and a 4.5% compound interest. Which is the better option for you?

$$\begin{array}{c} Sirple Interest \\ P = $500 \\ R = 5' = 0.05 \\ T = 2 years \\ SI = PRT \\ = $500 \times 0.05 \times 2 \\ = $50 \\ \end{array}$$

$$\begin{array}{c} A = P(1+R)^{T} \\ A = 500(1+0.045)^{2} \\ A = 500(1.045)^{2} \\ A = 500(1.045)^{2} \\ A = 546.01 \\ \therefore CI = 546.01 \\ \hline \\ $50 > $4601 \\ \hline \\ $50 > $4601 \\ \hline \\ $50 > $4601 \\ \hline \\ \hline \\ \end{tabular}$$