8.1 - Simple Interest

Year	Interest Earned	Amount
0	—	$2000
1		
2		
3		

- GOAL – Calculate Simple Interest

- Amanda wants to invest $2000. Her bank will pay her 6% of the **principal** per year each year the money is kept in a savings account that earns simple interest.

- What function can be used to model the growth of Amanda's money?

- Let's calculate the interest earned and the amount of the investment at the end of the first year:

Interest on the **principal** means that 6% is paid on $2000, not every new, higher amount.

Example #1

2.4%/a means 2.4% interest per annum (per year)

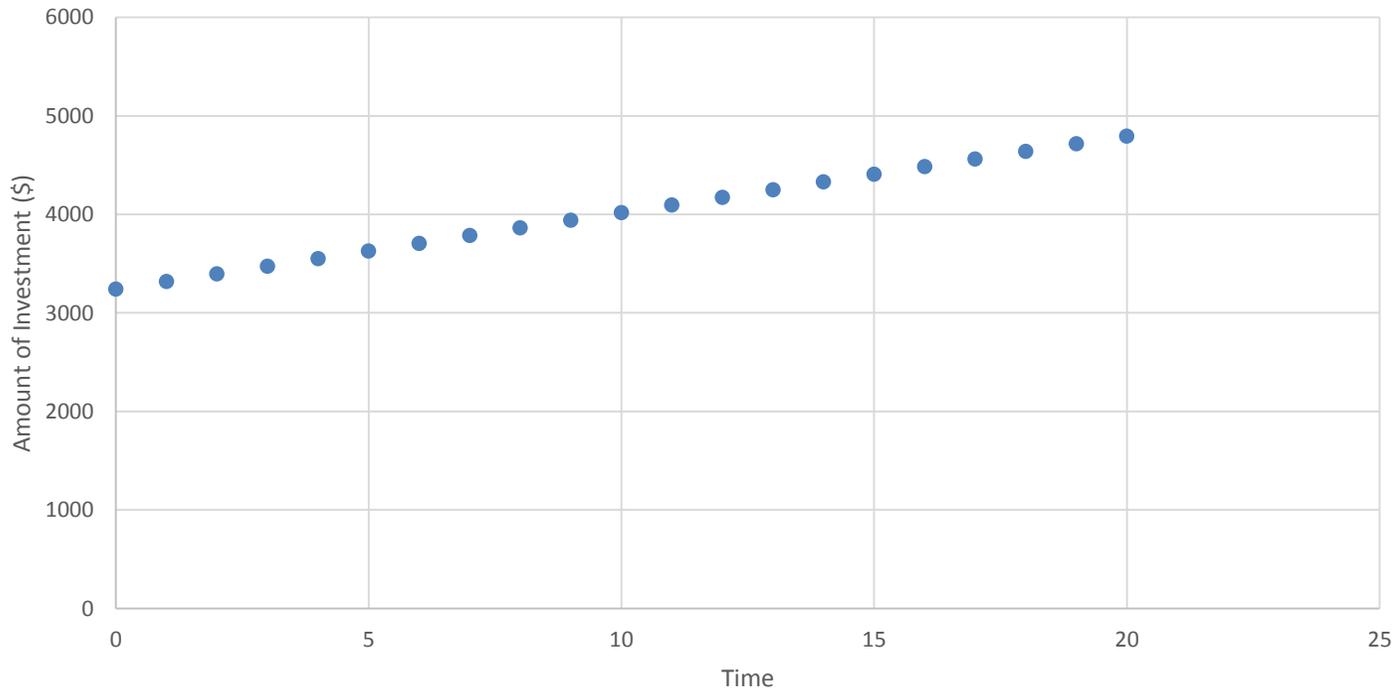**Simple Interest**: interest earned only on the principal

- Allen invests $3240 at 2.4%/a simple interest.
- A) Calculate the interest earned each year.
- $I = 0.024 \times \$3240$
-   $= \$77.76$

Year	Interest ($)	Amount ($)
0	0	3240
1	77.76	3240 + 77.76 = 3317.76
2	77.76	3317.76 + 77.76 = 3395.52
3	77.76	3395.52 + 77.76 = 3473.28
4	77.76	3473.28 + 77.76 = 3551.04

- B) Calculate the amount and the total interest earned after 20 years. If we make a table of Allen's investment over 4 years:
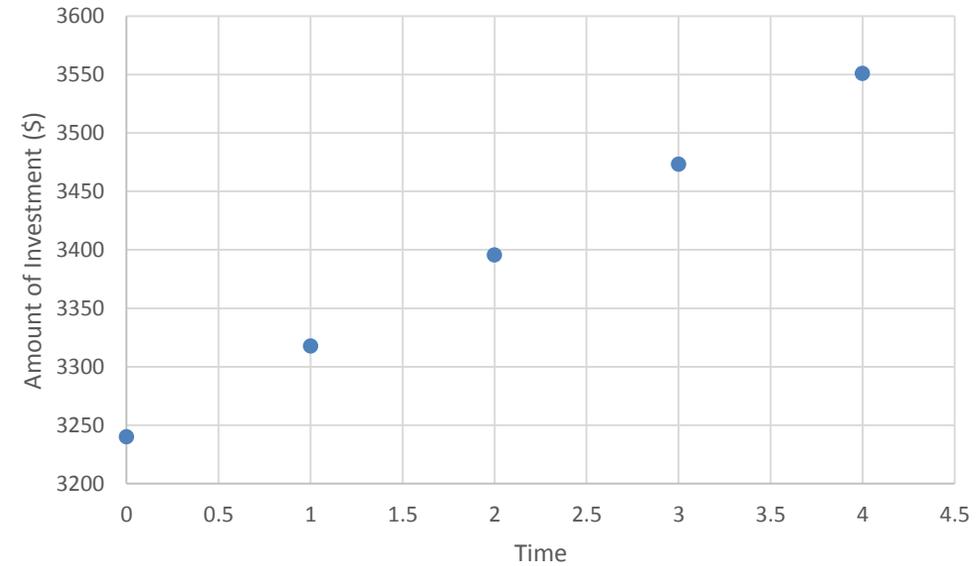
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Allen's Investment (Extrapolated to 20 years)

Allen's Investment (1st 4 years)

After 20 years, Allen will have: $4795.20 in his investment.

Example #1 cont'd

- C) Determine the total amount, *A*, and the interest, *I,* earned if he invested a principal \$P for *t* years at r% simple interest.
- At the end of the 1st year: I_1 = Pr
- At the end of the 2nd year: I_2 = Pr + Pr = 2Pr
- At the end of the 3rd year: I_3 = Pr + Pr + Pr = 3Pr
- At the end of the tth year: **I_t = Prt**
- Amount = Principal + Interest over time
- A = P + Prt
- **A = P(1 + rt)**

Example #2

- Tina borrows $15 000 at 6.8%/a simple interest. She plans to pay back the loan in 10 years. Calculate how much she will owe at the end of each year during this period.

	A	B	C
1	Time (Years)	Total Interest Charged	Total Amount of Loan
2			$15 000.00
3	1	"= C2* (6.8/100)"	"= C2 + B3"
4	2	"= C2* (6.8/100)"	"= C3 + B4"

Every year, 6.8% of $15 000, or $1020 will be charged in interest.

"I was adding up all the expenses I'll have, and time I won't have when I start nursing school. My calculator exploded."

	A	B	C
1	Time (Years)	Total Interest Charged	Total Amount of Loan
2			$15 000.00
3	1	$1 020.00	$16 020.00
4	2	$1 020.00	$17 040.00
5	3	$1 020.00	$18 060.00
6	4	$1 020.00	$19 080.00
7	5	$1 020.00	$20 100.00
8	6	$1 020.00	$21 120.00
9	7	$1 020.00	$22 140.00
10	8	$1 020.00	$23 160.00
11	9	$1 020.00	$24 180.00
12	10	$1 020.00	$25 200.00

This shows how much Tina has to pay back at the end of each year during the 10-year period.

Example #3

- Phillip borrows $540 for 85 days by taking a cash advance on his credit card. The interest rate is 26% plus simple interest. How much will he need to pay back at the end of his loan period, and how much interest will he have paid?

- First find out how much of 1 year 85 days is: t = $\frac{85}{365} = 0.2329$

- Principal P = $540

- Interest rate r = 26% = 0.26

- A = P(1 + rt)

-    = (540)(1 + 0.26*0.2329)

-    = ($540)(1.061)

-    = $572.70

Of the $572.70 that Phillip has to pay back, $32.70 is interest.

In Summary…

❖ Simple interest is calculated only on the principal

❖ The total amount, *A*, and the interest earned, *I*, are linear functions in terms of time, so their graphs are straight lines