Debt and Simple Interest

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Lending and Borrowing

- The **Principal** of a loan is the amount of money which is borrowed.
- The **Interest** of a loan is an additional amount which is paid by the lender.
- A lender makes profit by charge interest.
- Different loans have different terms of repayment.

Simple One-Time Interest

- P_0 is the principal of the loan.
- One type of loan is **Simple One-Time Interest**. This is where the interest is a flat rate applied to the principal.

  $$I = P_0 r$$

  Where r is the rate of interest on the loan.
- The total amount repaid is

  $$A = P_0 + I = P_0 + P_0 r = P_0(1 + r)$$

  Note that in the above, we write the rate as decimal.
- This type of loan is typically an agreement between friends.
- For example: Suppose a friend loans you $300.00 with an agreement that you will repay your friend a one time 5% interest rate. What is the total amount that you pay?

Simple Interest Over Time

- Another type of simple interest is when the interest is re-applied over time.
- One example of this is a bond which pays interest every year until it matures.
- Here the interest is:

$$I = P_0 rt$$

- The total value of the loan is:

$$A = P_0 + I = P_0 + P + 0rt = P_0(1 + rt)$$

- t is the number of time periods for which the loan is held.
- Example: You invest \$1000.00 in a savings bond that yields an annual percentage rate (APR) of 5% interest and matures after 10 years. How much total money will you have at the end of 10 years?