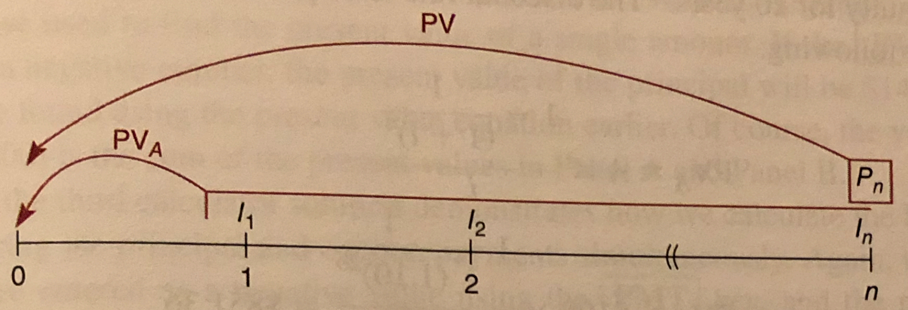
The price of a bond is thus equal to the present value of regular interest payments discounted by the yield to maturity added to the present value of the principal (also discounted by the yield to maturity).

The following timeline depicts a bond's cashflows:



This relationship can be expressed mathematically as follows:

$$P_b = \sum_{t=1}^{n} \frac{I_t}{(1+Y)^t} + \frac{P_n}{(1+Y)^n} \tag{10-1}$$

where

P_b = Price of the bond

I_t = Interest payments

P_n = Principal payment at maturity

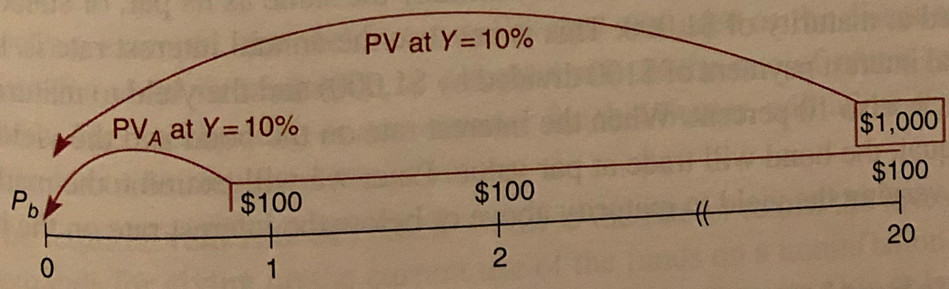
t = Number corresponding to a period; running from 1 to n

n = Number of periods

Y = Yield to maturity (or required rate of return)

The first term in the equation says to take the sum of the present values of the interest payments (I_t); the second term directs you to take the present value of the principal payment at maturity (P_n). The discount rate used throughout the analysis is the yield to maturity (Y). The answer derived is referred to as P_b (the price of the bond). The analysis is carried out for n periods.

Let's look at an example:



In this timeline, each interest payment (I_t) equals \$100; P_n (principal payment at maturity) equals \$1,000; Y (yield to maturity) is 10 percent; and n (total number of periods) equals 20. We could say that P_b (the price of the bond) equals:

$$P_b = \sum_{t=1}^{n} \frac{\$100}{(1+0.10)^t} + \frac{\$1{,}000}{(1+0.10)^{20}}$$