What's Going On?

Checking In

Minds on   What's a Present Value Annuity?

Action!   Finding the Formula

Consolidation   Using the Formula

Learning Goal - I will be able to determine the present value of an annuity.
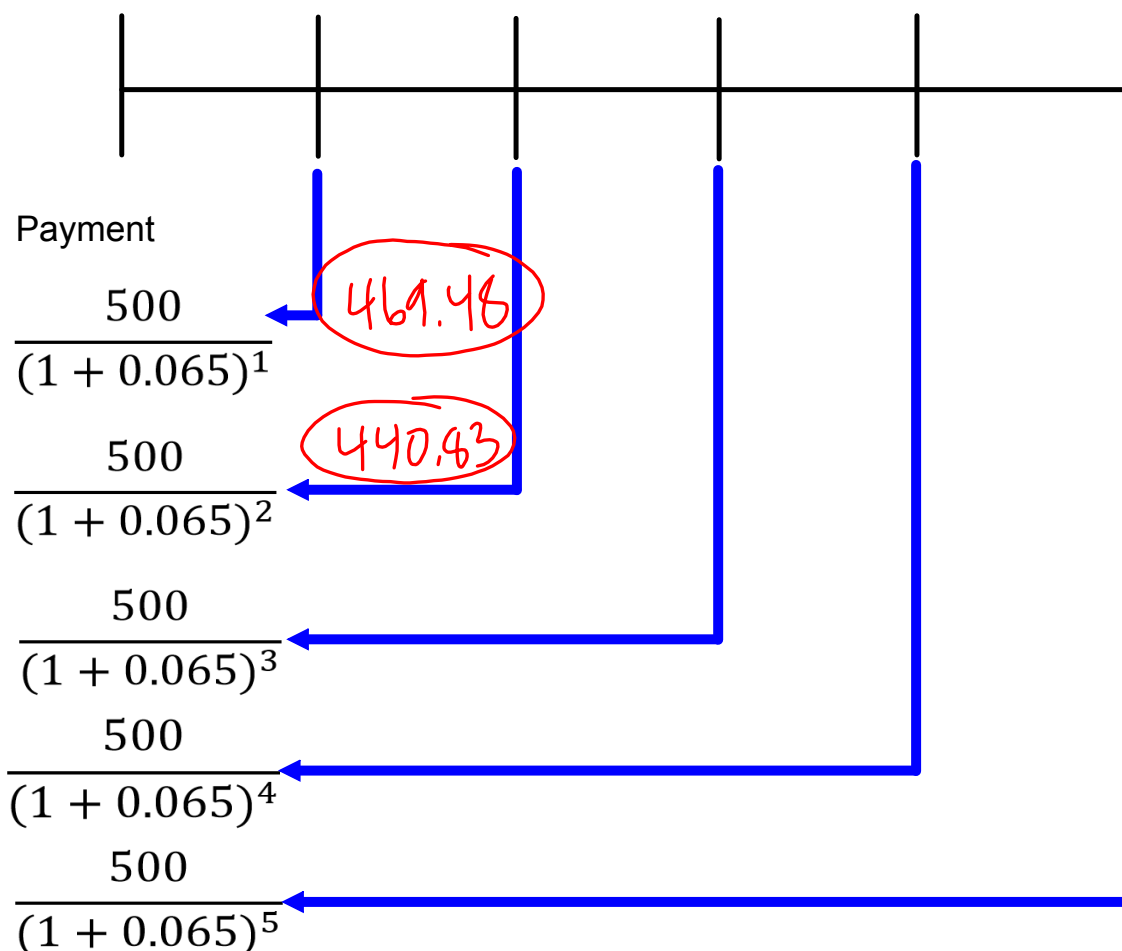
Minds on

What's a Present Value Annuity?

Present Value

How much would you need to invest now, at 6.5% interest compounded annually to provide $500 per year for the next 5 years?

*Remember, payments are made **at the end** of each year.

Compounding Period

Payment

$$\frac{500}{(1 + 0.065)^1}$$ ← 461.48

$$\frac{500}{(1 + 0.065)^2}$$ 440.83

$$\frac{500}{(1 + 0.065)^3}$$

$$\frac{500}{(1 + 0.065)^4}$$

$$\frac{500}{(1 + 0.065)^5}$$

Minds on

Present Value

$$\frac{500}{(1+0.065)^1} + \frac{500}{(1+0.065)^2} + \frac{500}{(1+0.065)^3}$$

$$+ \frac{500}{(1+0.065)^4} + \frac{500}{(1+0.065)^5}$$

Action!

Present Value Formula

$$\frac{500}{(1 + 0.065)^1} + \frac{500}{(1 + 0.065)^2} + \frac{500}{(1 + 0.065)^3}$$

$$+ \frac{500}{(1 + 0.065)^4} + \frac{500}{(1 + 0.065)^5}$$

$$500 \times (1 + 0.065)^{-1}$$
$$+ 500 \times (1 + 0.065)^{-2}$$
$$+ 500 \times (1 + 0.065)^{-3}$$
$$+ 500 \times (1 + 0.065)^{-4}$$
$$+ 500 \times (1 + 0.065)^{-5}$$

Present Value Formula

$$S_n = \frac{a(r^n - 1)}{r - 1}$$

$500 \times (1 + 0.065)^{-1}$

$+\, 500 \times (1 + 0.065)^{-2}$

$+\, 500 \times (1 + 0.065)^{-3}$

$+\, 500 \times (1 + 0.065)^{-4}$

$+\, 500 \times (1 + 0.065)^{-5}$

$$a = R \times (1 + i)^{-1}$$
$$r = (1 + i)^{-1}$$

$$PV = 500 \times (1 + 0.065)^{-1} \left(\frac{[(1 + 0.065)^{-1}]^5 - 1}{(1 + 0.065)^{-1} - 1} \right)$$

Action!

Present Value Formula

$$PV = R \times (1+i)^{-1} \left(\frac{[(1+i)^{-1}]^n - 1}{(1+i)^{-1} - 1} \right)$$

$$= a \left(\frac{r^n - 1}{r - 1} \right)$$

Action!

Present Value Formula

$$PV = R \times (1+i)^{-1} \left(\frac{[(1+i)^{-1}]^n - 1}{(1+i)^{-1} - 1} \right)$$

$$PV = R \times \frac{(1+i)^{-1}[(1+i)^{-n} - 1]}{(1+i)^{-1} - 1} \quad \frac{(1+i)}{(1+i)}$$

$$PV = \frac{R\left((1+i)^{-n} - 1\right)}{-i}$$

$$PV = R \times \left(\frac{(1+i)^{-n} - 1}{-i} \right)$$

$$PV = R \times \left(\frac{1 - (1+i)^{-n}}{i} \right)$$

$$FV = R \times \left(\frac{(1+i)^{n} - 1}{i} \right)$$

Action!

Present Value Formula

$$PV = R \times \left(\frac{1 - (1 + i)^{-n}}{i} \right)$$

Consolidation

Examples

SEE HANDOUT