

Objective of lecture.

To understand the following points

1- Arithmetic gradient.

Solved Examples

Cash in review



Deposit in time 0
to get F value
after n of time
with interest i%.

→ P is unknown
Given F, i%, n

$$P = F \left(\frac{P}{F}, i\%, n \right)$$

$$F = P \left(\frac{F}{P}, i\%, n \right)$$

$$F = P(1+i)^n$$

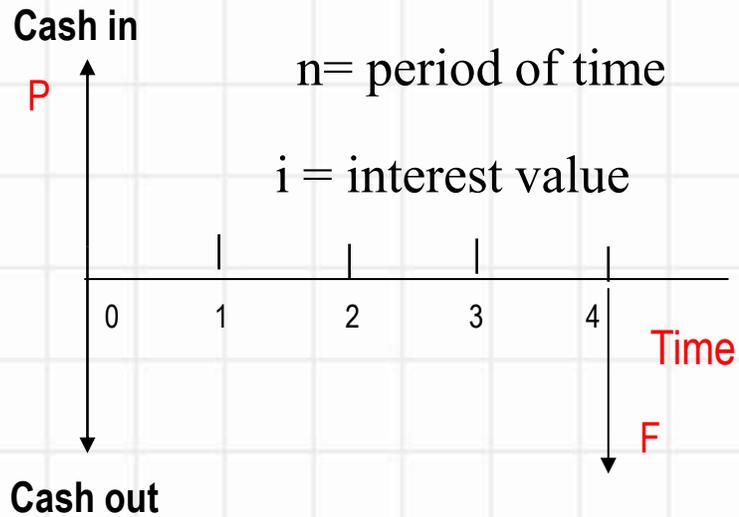
$$P = F(1+i)^{-n}$$

→ Given P
i, n, need

Two different relations between P & F

$$F = P \left(1 + \frac{i\%}{4} \right)^{4n}$$

→ i is compounded quarterly



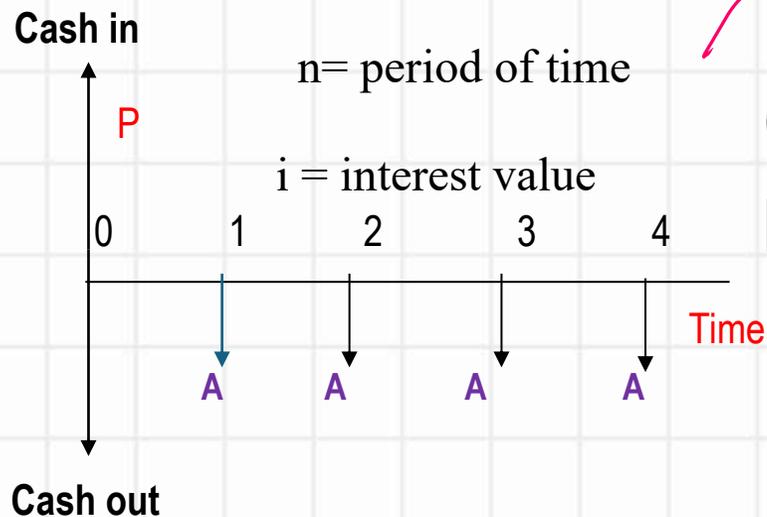
Two cases for depositing in bank.

Getting loan by value of (P) to buy car, urgent needs.

Pay back after n of time, with I interest a value F.

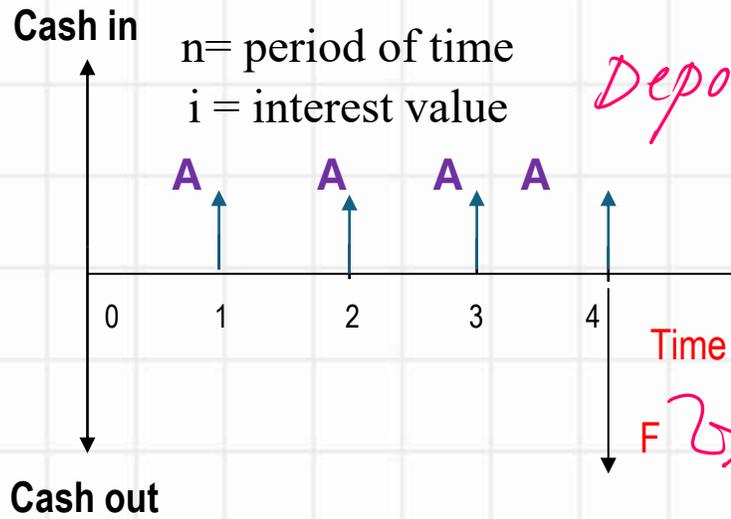
$$F = P(1+i)^n$$

$$A = \frac{P(i)(1+i)^n}{(1+i)^n - 1} \rightarrow \frac{Fi}{(1+i)^n - 1}$$



Getting loan by value of (P) to buy car, urgent needs or pay insurance dues in other insurance company.

Pay back after n of time, with I interest an equal installments of A value at the end of each year



Bank point of view.

Getting insurance money from a client by a value of (+A) and pay money back (-F) after n of time with I interest.

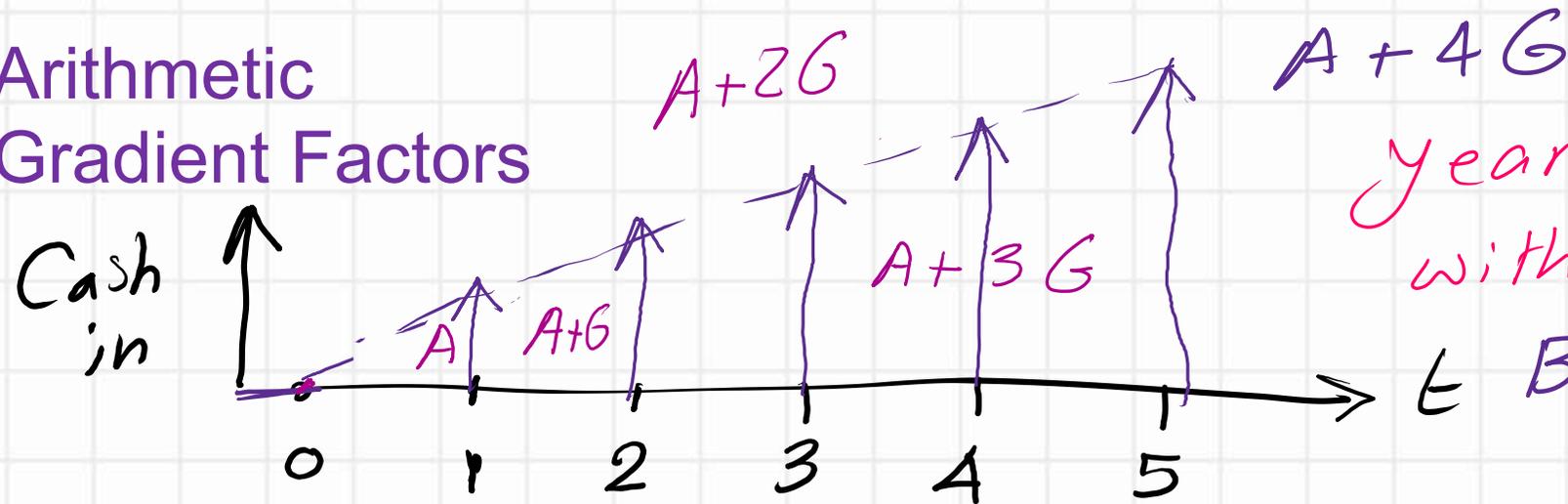
$$\frac{A}{F} = \frac{i}{(1+i)^n - 1}$$

$$\Rightarrow \frac{F}{A} = \frac{(1+i)^n - 1}{i}$$

$$A = F \left(\frac{A}{F}, i\%, n \right)$$

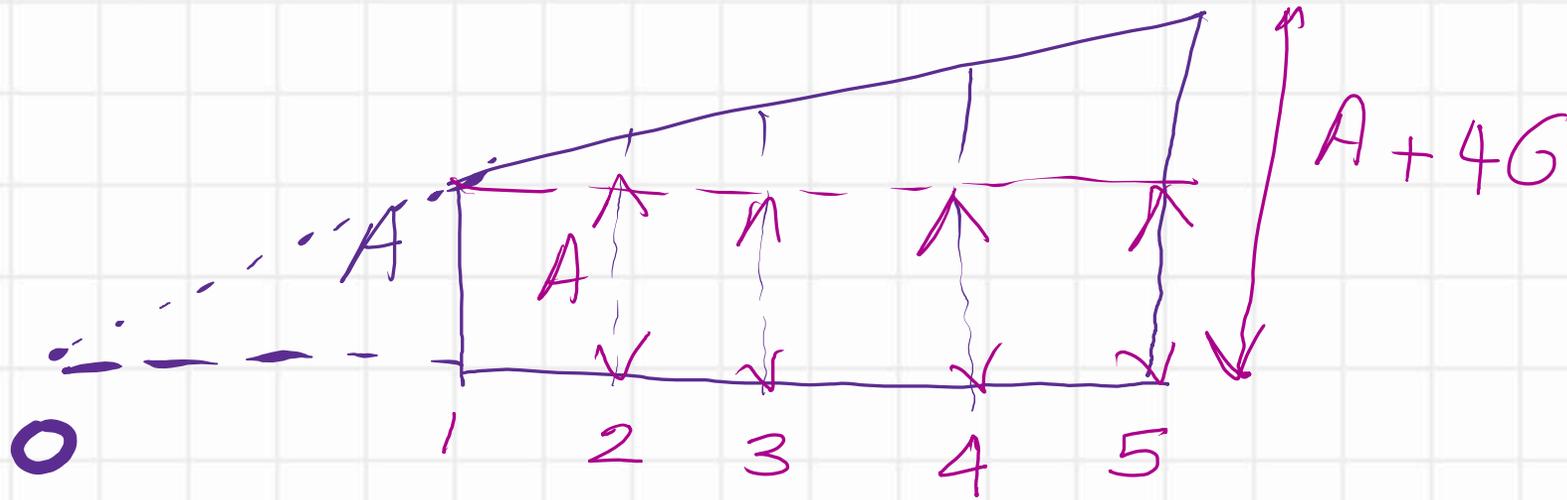
$$F = A \left(\frac{F}{A}, i\%, n \right)$$

Arithmetic Gradient Factors



Yearly cash in with unequal values
 But difference is constant
 $= G$

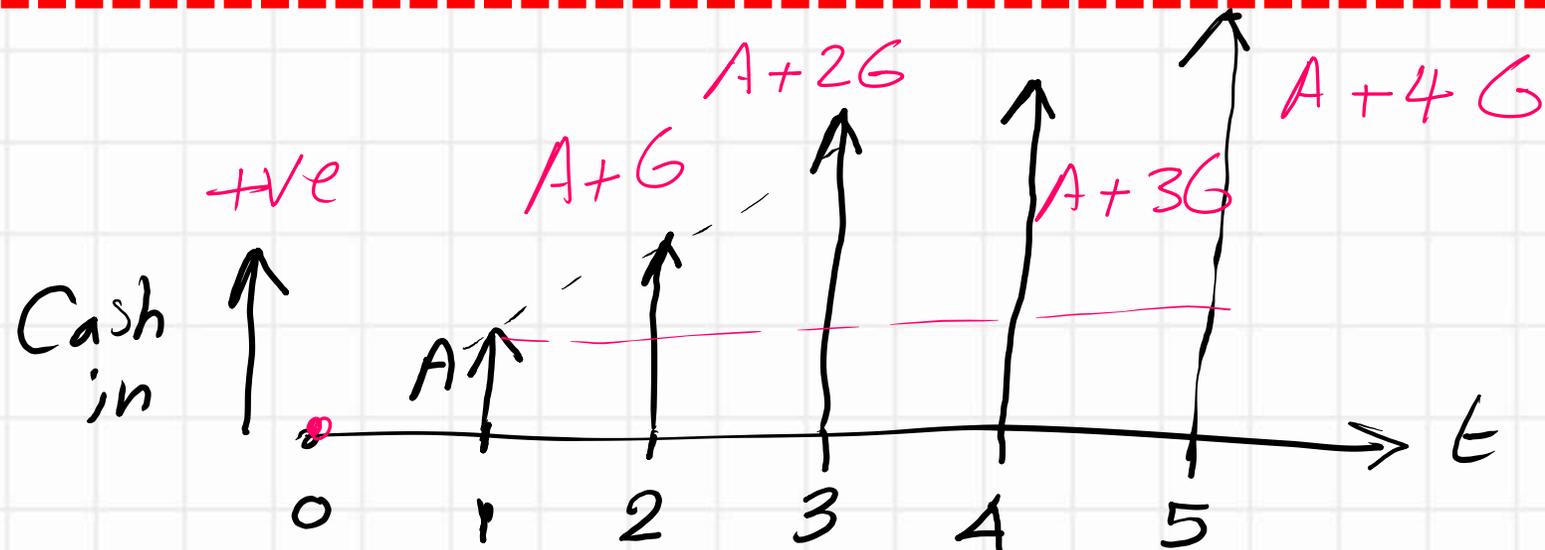
Giving the shape of a Trapezium



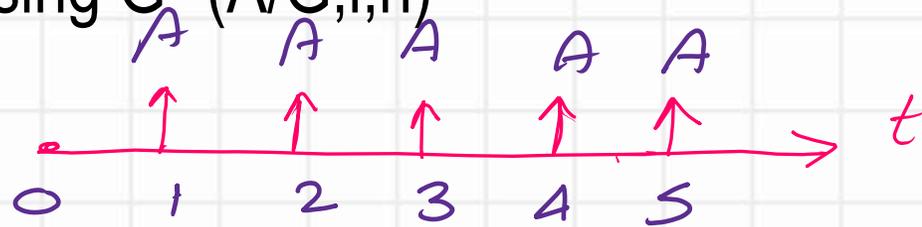
$$\text{slope} = \frac{4G}{(5-1)}$$

$$= \frac{4G}{4}$$

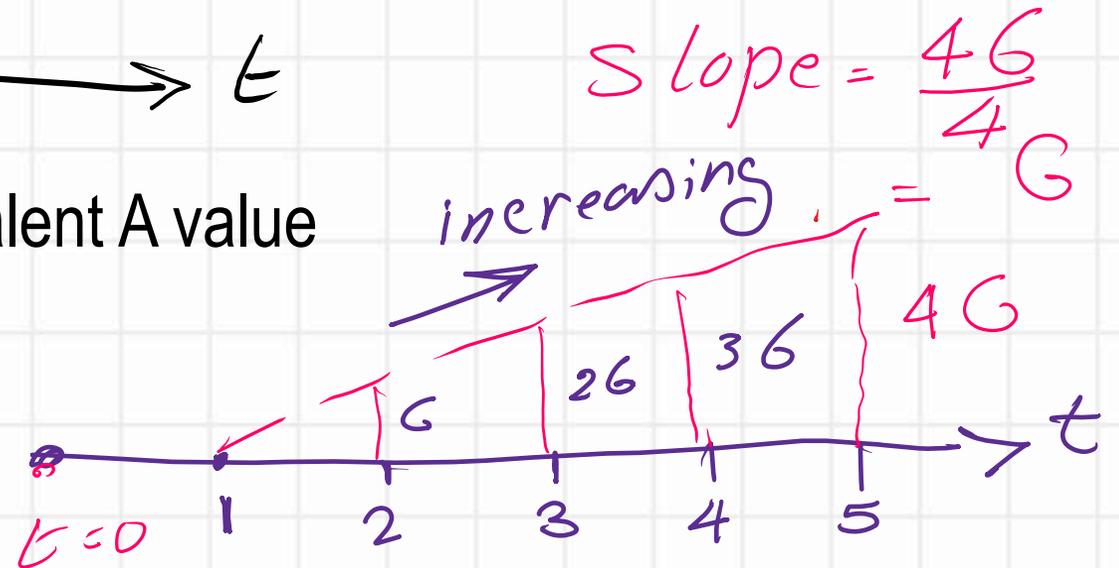
$$\text{slope} = G$$



Arithmetic gradient can be converted into equivalent A value using $G \cdot (A/G, i, n)$



+



$$F = \frac{A}{i} \left[(1+i)^n - 1 \right]$$

$$A = \frac{i P (1+i)^n}{(1+i)^n - 1}$$

$(P/G, i, n)$

$$F = \frac{G}{i} \left[\frac{(1+i)^n - 1}{i} - n \right]$$

$$= \left[\frac{(1+i)^n - in - 1}{i^2(1+i)^n} \right]$$

