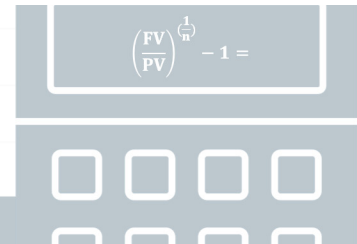




## Yields and Internal Rate of Return



## Yields and Internal Rate of Return (IRR)



## One Simple Equation (Rearranged)

What is a **yield**?

Present value

Future value

Cash flow

PV

FV

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## One Simple Equation (Rearranged)



We know how long  
between **present value**  
and **future value**

n = years

n = years

PV

FV

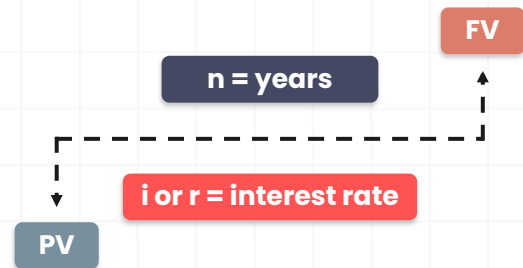
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## One Simple Equation (Rearranged)

Rearrangement of the  
**present value formula:**

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

In excel, use the **rate** function

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## One Simple Equation (Rearranged)

### Computer

FV= future value

PV= present value

r = Interest rate

n= number of years

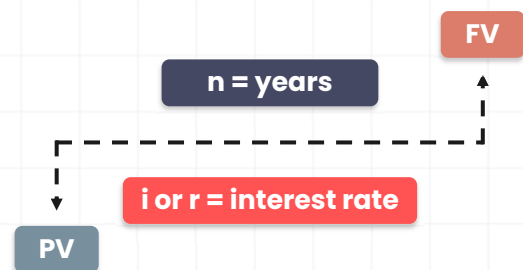
### Calculator

FV= future value

PV= present value

i = Interest rate

n= number of years

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## One Simple Equation (Rearranged)



### Computer

FV= future value

PV= present value

r = Interest rate

n= number of years



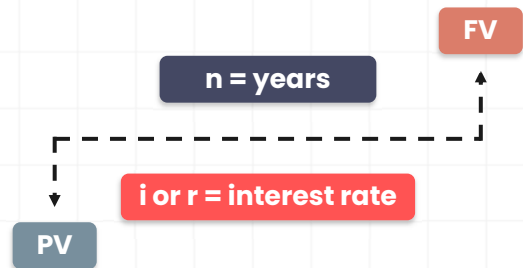
### Calculator

FV= future value

PV= present value

i = Interest rate

n= number of years

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## Application

**100 is invested now and 200 returned in ten years**



Present value

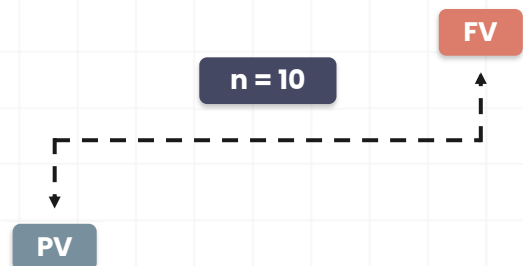
100

Future value

200

How many years?

10

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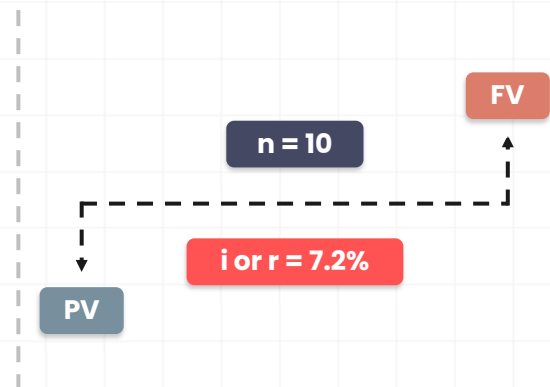
## Application

100 is invested now and 200 returned in ten years

Equation:

$$\left( \frac{200}{100} \right)^{\left( \frac{1}{10} \right)} - 1 = 7.2\%$$

In excel =RATE(10,0,-100,200)



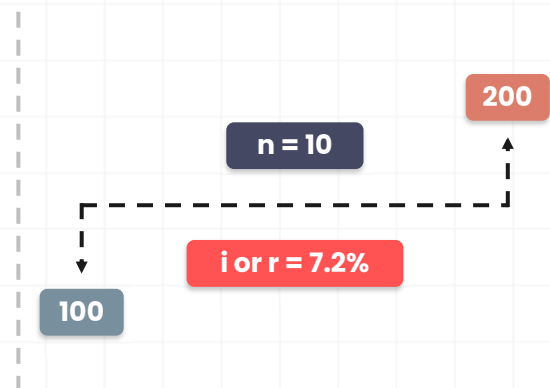
FINANCIALEDGE<sup>7</sup>

## Application

100 is invested now and 200 returned in ten years

Equation:

$$\left( \frac{200}{100} \right)^{\left( \frac{1}{10} \right)} - 1 = 7.2\%$$

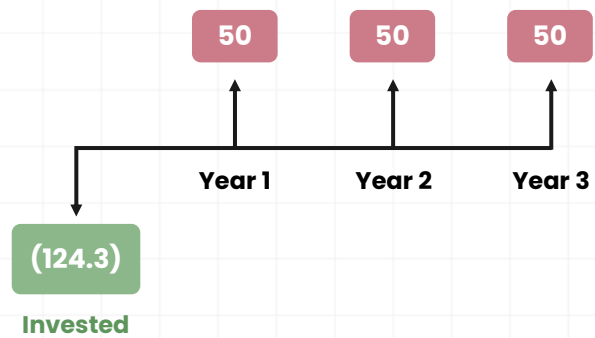


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## Internal Rate of Return (IRR)



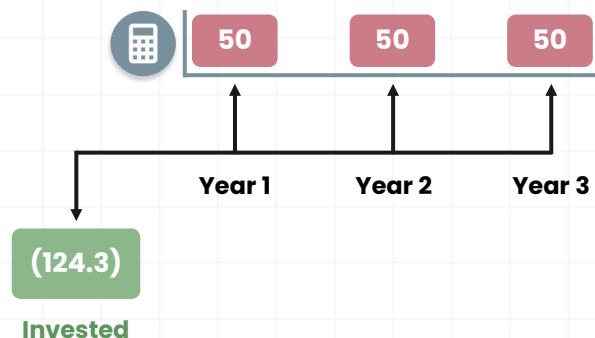
Multiple cash flows cause problems with the **simple yield formula**

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## Internal Rate of Return (IRR)

What is the **rate of return**?

Calculate the present value of those **three 50s iteratively**

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## Internal Rate of Return (IRR)

Discount rate	PV of future cash flows	
8.0%	128.9	✗
9.0%	126.6	✗
10.0%	124.3	✓
11.0%	122.2	✗

IRR=10% ←

The **internal rate** of return is the discount rate which makes the **future cash flows** equal to the **initial investment**

