

## Percentage change

$$\% \text{ change} (\uparrow/\downarrow) = \frac{\text{Difference}}{\text{Initial Value}} \times 100$$

$\Rightarrow$  if initial & final =

$\Rightarrow$  When initial value = final value.

$$\text{if } \frac{n}{n} \uparrow = \frac{n}{n+1} \downarrow$$

$$0.08 \uparrow = 0\%$$

$$\text{if } \frac{1}{n} \uparrow = \frac{1}{n+1} \downarrow$$

$$0.02 \downarrow = -0.02\%$$

Increment  $\times$  Decrement

$$0.04 \downarrow = -0.04\%$$

$$\text{if } \frac{1}{2} \uparrow = \frac{1}{2+1} = \frac{1}{3} \downarrow$$

$$\text{if } \frac{2}{3+2} \uparrow = \frac{2}{3+2} = \frac{2}{5} \downarrow$$

### Word problem

At a supermarket, a certain item has increased from 75 cents per pound to 81 cents per pound. What is the percentage increased in the cost of

Change  $\uparrow = \frac{\text{Diff}}{\text{Initial}}$

$$\times 100$$

$$\frac{81 - 75}{75} \times 100$$

$$\frac{6^2}{75} \times 100$$

$$= 8\% \text{ increase}$$

Q2 A Teacher by mistakenly entered a student marks as 320 instead of 400. Find the percentage of error.

$$\text{Sol} \quad \frac{320 - 400}{400} \times 100 = \frac{-80}{400} \times 100 = -20\%$$

~~So good to bring out first~~  $\Rightarrow \frac{20}{400} \times 100 = 5\%$

$= 20\%$

~~at + 20% of~~ ~~at - 20% of~~  
 $\downarrow$  Percentage of Error is  $20\%$ .

Q3 The Price of Book is 20% more than price of pen.  
By what % is the price of pen less than the book?

$$\text{Sol} \quad \text{Let price of pen} = 100$$

price of Book = Pen + 20%  $\Rightarrow 100 + 20 = 120$ .

~~Now if I know the % of Pen less than a Book - i.e.~~

$$\frac{100 - 120}{120} \times 100 = \frac{-20}{120} \times 100 = \frac{1}{6} \times 100 = 16.66\%$$

Simple fitted

$$100 \xrightarrow{\frac{1.10}{4}} 120$$

## Successive Percentage Change

$$\frac{a+b+\frac{ab}{100}}{100}$$

$$\text{Total} = 100$$

$$\text{Day 1 Increment} = 10\%$$

$$\text{Day 2 Increment} = 20\%$$

What will be the count by the end of Day 2?

$\text{if } a ; \uparrow = +a$ $\downarrow = -a$	$b ; \uparrow = +b$ $\downarrow = -b$
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i.e.,  $10 + 20 + \frac{(10)(20)}{100} = 30 + (2) = 32$

∴ Total Increment is  $10\% + 32\% = 42\%$

Word problems

- Q. The population of a village increases 20% per annum if its population 2 years ago was 10000, find present population.

Sol

$$a = -20$$

$$b = -20$$

$$a+b+\frac{ab}{100}$$

$$\Rightarrow (-20) + (-20) + \frac{(-20)(-20)}{100}$$

$$= -40 + 4$$

$$= 36\%$$

∴ 36% of 10000 is 3600 so the current population is

Q The population of village 10,000

Year 1 Increased by 20%

Year 2 Decreased by 40%

Year 3 Increased by 30%

Find the population after 3rd year.

$$\boxed{\frac{a+b+ab}{100}}$$

i.e.,  $(+20) + (-40\%) + \frac{(20)(-40)}{100} \Rightarrow -20 - 8 = -28 \rightarrow \text{eq (1)}$

year 3 i.e.,

$$(-28\%) + (30\%) + \frac{(-28) + (30\%)}{100} = -\underline{\underline{8}}$$

$$\Rightarrow (+2) + \frac{(-84)}{10} = +2 - 8.4 = -6.4$$

6.4% 10000 is 640 The after 3 years 9360 is population