RATIO AND PROPORTION

Ratio and Proportion are explained majorly based on fractions and it is the foundation to understand the various concepts in mathematics as well as in science.

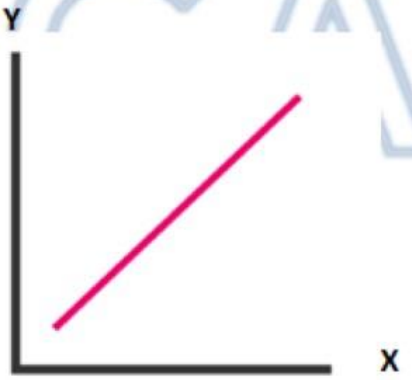
RATIO

When a fraction is represented in the form of a:b, then it is a ratio.

PROPORTION

When two ratios are equal, the four quantities composing them are said to be in proportion.

- If , then a, b, c, d are in proportion.
- This is expressed by saying that 'a' is to 'b' as 'c' is to 'd' and the proportion is written as **a:b::c:d or a:b=c:d**
- The terms a and d are called the extremes while the terms b and c are called means.



DIRECT PROPORTION

y = kx, where k is a constant

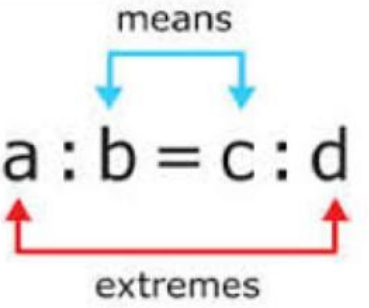
INVERSE PROPORTION

y = k/x, where k is a constant

RATIO

$$a : b = \frac{a}{b}$$ a — antecedent, b — consequent

PROPORTION



DIRECT PROPORTION

If on the increase of one quantity, the other quantity increases to the same extent or on the decrease of one, the other decrease to the same extent, then we say that the given two quantities are directly proportional.

Some Examples:

- Work done /Number of men
- Cost / Number of men
- Work / Wages
- Working hour of a machine / Fuel consumed
- Speed / Distance to be covered

INVERSE PROPORTION

If on the increase of one quantity, the other quantity decreases to the same extent or vice versa, then we say that the given two quantities are indirectly proportional.

Some Examples:

- More men / Less time
- Less men / More hours
- More speed / Less time

PERCENTAGE

A percentage is a fraction with denominator hundred, It is denoted by the symbol %.
Numerator of the fraction is called the rate per cent.

POPULATION FORMULA

If the original population of a town is P, and the annual increase is r %, then the
population after n years is **P (1 + r/100) ^{n}** and
population before n years **= P/[1 + (r/100)] ^{n}**
If the annual decrease be r%, then the population after n years is **P (1 - r/100) ^{n}** and
population before n years **= P/[1 + (r/100)] ^{n}**

SUCCESSIVE INCREASE OR DECREASE

In the value is increased successively by x% and y% then the final increase is given by

$[x + y + (xy/100)]$ %

In the value is decreased successively by x% and y% then the final decrease is given by

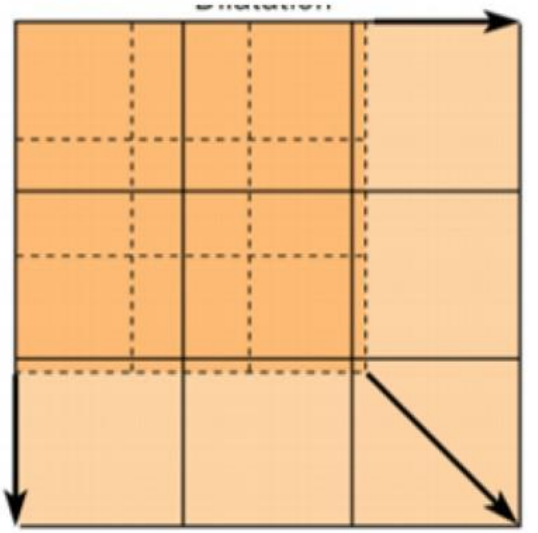
$[-x - y - (xy/100)]$ %

2-DIMENSIONAL FIGURE AND AREA

If the sides of a triangle, square, rectangle, rhombus or radius of a circle are increased by a%, its area is increased by **$[a(a+200)]/ 100$ %**
If the sides of a triangle, square, rectangle, rhombus or radius of a circle are decreased by a %, its area is decreased by **$[a(200-a)]/ 100$ %**

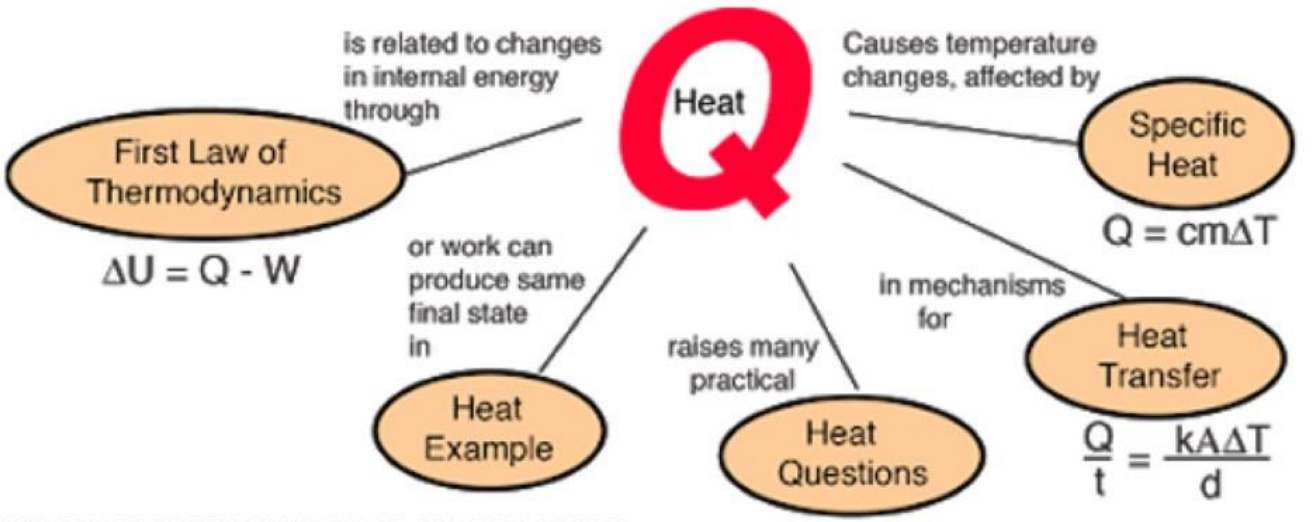
STUDENT AND MARKS

The percentage of passing marks in an examination is x%. If a candidate who scores y marks fails by z marks, then the maximum marks - **M = [100 (y + z)] / x**
A candidate scoring x% in an examination fails by 'a' marks, while another candidate who scores y% marks gets 'b' marks more than the minimum required passing marks, then the maximum marks - **M = [100 (a+b)] / ($y-x$)**
In an examination x% and y% students respectively fail in two different subjects while z% students fail in both subjects, then the % age of student who pass in both the subjects will be **{100-(x + y - z)}%**



15 NUMERICAL REASONING

PHYSICS



CONVERSION OF FARENHEIT TO CELCIUS SCALE

On any temperature scale, $\frac{T-\text{ice point}}{\text{steam point}-\text{ice point}}$ remains constant. So,

$$\left(\frac{T-\text{ice point}}{\text{steam point}-\text{ice point}}\right)_{\text{Faurenheit scale}}=\left(\frac{T-\text{ice point}}{\text{steam point}-\text{ice point}}\right)_{\text{Celsius scale}} \Rightarrow T_C=\frac{5}{9}(T_F-32)$$

SPEED, DISTANCE AND TIME TAKEN

Speed is the rate at which any moving body covers a particular distance.

SPEED = DISTANCE / TIME

RELATIVE SPEED

When two bodies are moving in same direction with speeds s1 and s2respectively, their relative speed is the difference of their speeds.

RELATIVE SPEED=S1-S2

When two bodies are moving in opposite direction with speeds s1and s2 respectively, their relative speed is the sum of their speed.

RELATIVE SPEED=S1+S2

TRAINS

When two trains with lengths L1 and L2 and with speeds S1 and S2 respectively, then

(a) When they are moving in the same direction, time taken by the faster train to cross the slower train = **(L1+ L2) /difference of their speeds.**

(b) When they are moving in the opposite direction, time taken by the trains to cross each other = **(L1+ L2) /sum of their speeds.**

BOAT AND STREAM

Let the speed of a boat (or man) in still water be X m/sec and the speed of the stream (or current) be Y m/sec. Then,

Speed of boat with the stream (or downstream) =(X+Y) m/sec

Speed of boat against the stream (or upstream) =(X - Y) m/sec

Speed of boat in still water is

X = (Downstream+Upstream)/2

DIRECTIONS

In our day to day life, we get our direction after seeing the position of sun.

Left turn is a clockwise turn

Right turn is an Anti-clockwise turn