RATIO PROPORTION AND VARIATION

RATIO:–
The ratio a : b represents a fraction a/b. a is called antecedent and b is called consequent. Ratio is the relation between two numbers which is expressed by a fraction.
The equality of two different ratios is called proportion.
If a : b = c : d then a, b, c, d are in proportion. This is represented by a : b :: c : d.
In a : b = c : d, then we have a * d = b * c.
If a/b = c/d then (a + b) / (a - b) = (d + c) / (d - c). The ratio of two quantities a and b in the same units, is the fraction a/b and we write it as a : b. Ratio of two quantities is always an abstract number (without any units).
In the ratio a : b, we call a as the first term or antecedent and b, the second term or consequent.
Rule: The multiplication or division of each term of a ratio by the same non-zero number does not affect the ratio. Eg. 4 : 5 = 8 : 10 = 12 : 15. Also, 4 : 6 = 2 : 3.

PROPORTION: The equality of two ratios is called proportion. If a : b = c : d, we write a : b :: c : d and we say that a, b, c, d are in proportion. Here a and d are called extremes, while b and c are called mean terms. Product of means = Product of extremes. Thus, a : b :: c : d = (b * c) = (a * d).

VARIATION: We say that x is directly proportional to y, if x = ky for some constant k and we write, x \( \propto \) y. We say that x is inversely proportional to y, if xy = k for some constant k and we write, x \( \propto \) \( \frac{1}{y} \).

Ratio: If A is thrice as good a workman as B, then: Ratio of work done by A and B = 3 : 1. Ratio of times taken by A and B to finish a work = 1 : 3 general formula can be extended if more than 2 people (or machines are working together) 1/TA+1/TB+1/TC+.....=1/Ttogether Where TA, TB and TC are the times taken by A, B and C respectively to complete the task alone and Ttogether is the time taken by them to complete the task when they are all working together. Example If Alex can build a house in 2 days and his apprentice Bob can build a house in 3 days, then how long will it take Alex and Bob to build a house when they are working together? Putting the information from the question into the formula gives us Invert both sides of the equation Time working together=6/5=1 (1/5)days So Alex and Bob will take 1 (1/5) days to build a house when they are working together.

Tips:
1) Direct proportion: If x is directly proportional to y: \( \frac{x_1}{y_1} = \frac{x_2}{y_2} \)
2) Indirect proportion: If x is inversely proportional to y: \( x_1 y_1 = x_2 y_2 \)