1. **Ratio:**

The ratio of two quantities *a* and *b* in the same units, is the fraction  and we write it as *a* : *b*.

In the ratio *a* : *b*, we call *a* as the first term or **antecedent** and b, the second term or **consequent**.

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| Eg. The ratio 5 : 9 represents | 5 | with antecedent = 5, consequent = 9. |
| 9 |

**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.

1. **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* x *c*) = (*a* x *d*).

1. **Fourth Proportional:**

If *a* : *b* = *c* : *d*, then *d* is called the fourth proportional to *a, b, c*.

**Third Proportional:**

*a* : *b* = *c* : *d*, then *c* is called the third proportion to *a* and *b*.

**Mean Proportional:**

Mean proportional between *a* and *b* is *ab*.

1. **Comparison of Ratios:**

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| We say that (*a* : *b*) > (*c* : *d*) | *a* | > | *c* | . |
| *b* | *d* |

1. **Compounded Ratio:**
2. The compounded ratio of the ratios: (*a* : *b*), (*c* : *d*), (*e* : *f*) is (*ace* : *bdf*).
3. **Duplicate Ratios:**

Duplicate ratio of (*a* : *b*) is (*a*2 : *b*2).

Sub-duplicate ratio of (*a* : *b*) is (*a* : *b*).

Triplicate ratio of (*a* : *b*) is (*a*3 : *b*3).

Sub-triplicate ratio of (*a* : *b*) is (*a*1/3 : *b*1/3).

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| If | *a* | = | *c* | , then | *a* + *b* | = | *c* + *d* | .     [componendo and dividendo] |
| *b* | *d* | *a* - *b* | *c* - *d* |

1. **Variations:**

We say that *x* is directly proportional to *y*, if *x* = *ky* for some constant *k* and we write, *x*  *y*.

We say that *x* is inversely proportional to *y*, if *xy* = k for some constant *k and*

|  |  |  |
| --- | --- | --- |
| we write, *x* | 1 | . |
| *y* |