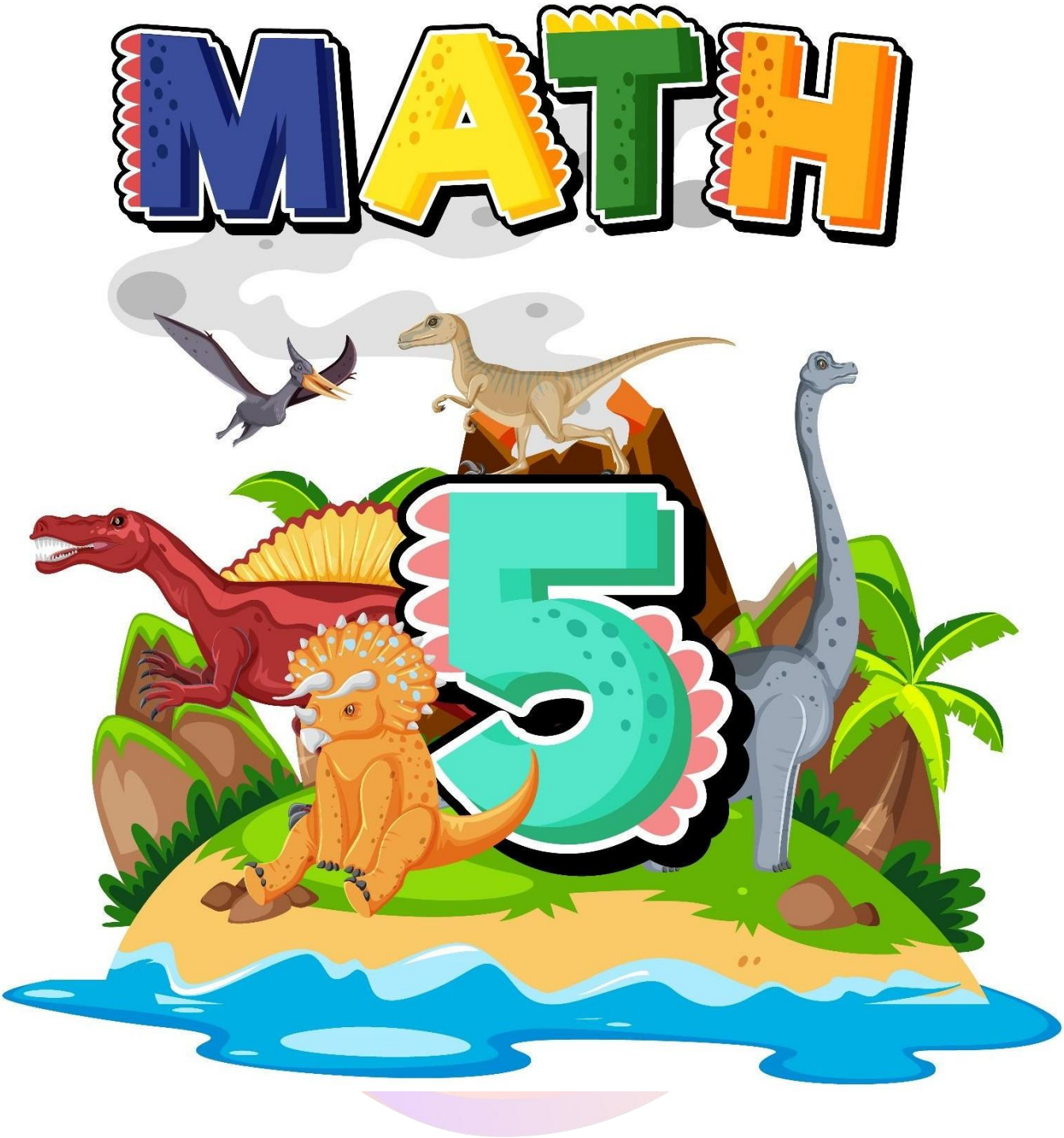

CHAPTER 19: ARITHMETIC

ARITHMETIC

➢ FUNDAMENTALS

In this chapter, we shall study comparing quantities like ratio and proportion, profit and loss, discount simple interest, distance speed and time.

➢ RATIO AND PROPORTION

Ratio is a method of comparing two quantities of the same kind by division.

When two ratios are equal, they are said to be in proportion.

If two ratios are to be equal or are in proportion, their product of means should be equal to the product of extremes.

Example: If a: b: c: d then the statement ad = be, holds good.

If a: b and b: c are in proportion such that b2 = Ac than b is called the mean proportional of a: b and b: c Multiplying or dividing terms of the ratio by the same number gives equivalent ratios.

Elementary Questions

1. If 5 : 6 = a : 18, then a = ?

Solution:

$$\frac{5}{6} - \frac{a}{18} = 5 \times 18 = a \times 6$$

$$\Rightarrow a = \frac{5 \times 15}{6} = 15$$

2. 3725 can also be written as,

(a) $\frac{147}{99}$

(b) $\frac{149}{101}$

(c) $\frac{148}{100}$

(d) $\frac{152}{97}$

Solution:

$$\frac{37}{25} = \frac{37\times4}{25\times4} = \frac{148}{100}$$

➢ PERCENTAGE

- Another way of comparing quantities is percentage. The word percent means per hundred. Thus 12% means 12 parts out of 100 parts
- Fractions can be converted into percentages and vice= versa.

  Example:

  25 = 25 × 100

  25

  Decimals can be converted into percentages and vice-versa.

  Example:

  (i) 0.36 = 0.36 × 100

  (ii) 43

➢ SIMPLE INTERNET

When we deposit money in banks, bank give interest on money. Interest may be simple interest (called S.I.)

A = Amount

B = Principle

R = Rate

T = Time

$$S.I. = \frac{P \times R \times T}{100}$$

(Simple Interest) S.I. = A – P

➢ PERCENT

'Percent' means 'for every hundred'.

Symbol for percentage is %.

Conversions

❖ **Percentage to decimals:**

To convert a percentage to a decimal, divide the number by 100.

e.g., 68% = $\frac{68}{100}$

= 0.68

❖ **Decimal to percentage:**

To convert a decimal to a percentage, multiply the number by 100%.

e.g.,

0.59 = 0.59 × 100

❖ **Percentage to fraction:**

To convert a percentage to a fraction, write the number with denominator 100 and reduce the fraction to its lowest terms.

e.g., 45% = $\frac{45}{100}$ = 920

❖ **Fraction to percentage:**

To convert a fraction to a percentage, multiply one fraction with 100%

e.g.,

920 = 920 × 100

❖ **Finding the percent of a quantity:**

To find the percent of a quantity, multiply them and simplify.

e.g., 30% Rs 100

$$\frac{30}{100} \times \text{Rs } 100 = \text{Rs } 30$$

❖ **Average:**

Average = The sum of quantitiesThe number of quantities.

❖ **Ratio:**

(a) The comparison of two quantities of the same kind by division gives their ratio.

(b) The two quantities compared are written with a : (colon) between them.

e.g., a; b read as 'a is to b'.

(c) Ratio of two numbers can be thought of as a fraction and all the rules for operations with fractions can be used.

(d) Double, triple, four times, etc., can be expressed in ratio as 2:1, 3:1, 4:1, etc.

(e) A ratio can be expressed as a fraction.

e.g., 2: 5 is the same as 25.

(f) In a ratio a: b, the first term 'a' is called the antecedent and the second term 'b' is called the consequent. The order of terms of a ratio is important i.e., 1:4 is not the same ratio as 4:1.

(g) To find the ratio of two like quantities, they should be changed into the same unit of measurement.

(h) While writing a ratio, co-prime numbers are generally used, that is, the ratio is often expressed in the lowest terms by cancelling the common factors from both the numbers.

(i) A ratio does not have any unit of measurement.

❖ **Speed, Distance and Time:**

Speed = DistanceTime

Average = Total distance covered Total time taken

Distance = Speed × Time

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

❖ **Simple Interest:**

$$I = \frac{PTR}{100}$$

where |= Interest, P = Principal, T = Time, R = Rate per annum

Amount (A) = P + |

⇒ I = A -P and also P = A -|

❖ **Profit and Loss:**

(i) The price of an article is called its cost price denoted as C.R

(ii) The price at which an article is sold is called its selling price denoted as S.R

(iii) If the selling price is greater than the cost price, there is a gain/profit, which is equal to the difference of selling price and cost price.

∴ If S.P. > C.R, gain = S.R − C.R

a) S.R = Gain + C.R

b) C.R = S.R − Gain

(iv) If S.R < C.R there is a loss, which is equal to the difference of cost price and sell in price.

∴ If S.R < C.R, loss = C.R − S.R

C.R = Loss + S.P

a) S.R = C.R − Loss

❖ **Percentage profit and percentage loss:**

Profit or loss is incurred on the cost price.

So, percentage profit = $\frac{\text{Profit}}{\text{C.P.}} \times 100$ and percentage loss = $\frac{\text{loss}}{\text{C.P.}} \times 100$

Questions:

1. The equality of two ratio is called_____.

(a) Ratio

(b) percentage

(c) Proportion

(d) Triangle

2. Express the ratio 45 : 108 in its simplest form.

(a) 5 : 12

(b) 3 : 12

(c) 4 : 5

D) 6 : 7

3. If 6 pens cost Rs. 96. What will be the cost of 15 such pens?

(a) Rs. 200

(b) Rs. 210

(c) Rs. 240

(d) Rs. 250

4. Find a number whose 4% is 72

(a) 1200

(b) 1500

(c) 1600

(d) 1800

5. Find the loss or Gain percent if C.P. = Rs. 500 and S.P. = Rs. 565

(a) 13%

(b) 15%

(c) 17%

(d) 18%

6. Divide 108 in two parts in the ratio 4 : 5

(a) 48 and 60

(b) 12 and 50

(c) 20 and 50

(d) 60 and 70

7. A sum of Rs. 4000 is lent for 5 years at the rate of 15 % simple interest per annum. Find the interest

(a) Rs. 3000

(b) Rs. 4000

(c) Rs. 5000

(d) Rs. 6000

8. Fill in the following blanks $\frac{12}{20} = \frac{(\,)}{5} = \frac{9}{(\,)}$

(a) 12, 13

(b) 3, 15

(c) 15, 4

(d) 16, 17

9. Ratio of the number of male and female workers in a factory is 5 : 3. If there are 115 male workers, determine the number of female workers in the factory.

(a) 69

(b) 63

(c) 61

(d) 64

10. On selling a fan for Rs. 810, Sunil gains 8%. For how much did he purchase it?

(a) Rs. 720

(b) Rs. 730

(c) Rs. 750

(d) Rs. 800