<u>Topic 9:</u> Ratio, Rate, Speed

Notes:

Ratio:

1. A ratio is used to compare two or more quantities that are measured in the same units.

2. A ratio has no units.

3. The ratio of a to b, where a and b represent two quantities of the same kind and units, and $b \neq 0$, is written as $a : b$ or $\frac{a}{b}$. The order in which the ratio is expressed is important because $a : b \neq b : a$. $(\frac{a}{b} \neq \frac{b}{a})$

4. Two ratios are known as **equivalent ratios** if they can be reduced to the same simplest ratio form. An example of equivalent ratios is 2 : 3 and 10: 15
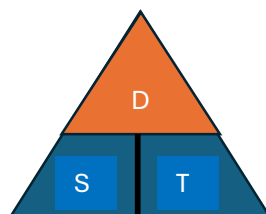
Rate:

5. Rate is used to measure how one quantity changes with respect to another, such as speed, unit cost and service consumption. Rates over a period can be constant or varying.

Speed:

6. Speed is a special form of rate. It is used to measure the rate of change of distance travelled with time;
(Speed $= \frac{Distance}{Time\ taken}$).

7. An object is said to be moving at a **uniform speed** when its speed remains unchanged throughout the journey.

8. As a moving object typically has varying speeds at different times, it is more useful to calculate its **average speed**, for example: speed of the object over a certain amount of distance travelled over a period.

   (Average speed, $\mathcal{AS} = \frac{Total\ Distance\ travelled}{Total\ Time\ taken}$)

9. Conversion of speed between various units:
   - 1km/h $= \frac{1000m}{60min} = \frac{1000}{60}$ m/min
   - 1km/h $= \frac{1000m}{60\ x\ 60s} = \frac{1000}{3600}$ m/s

Simple Interest:

10.   For a sum of money or principal, $\$\mathcal{P}$, deposited in a bank at a simple interest rate of $\mathcal{R}$% per annum (p.a.) for $\mathcal{T}$ years, its simple interest can be calculated using the formula:

    (Simple Interest, $\mathcal{I} = \frac{PRT}{100}$)

Money Exchange:

11.   The exchange rates of different currencies fluctuate or change due to the daily **demand** and **supply** of the currencies. To earn money, the banks or licensed money changers either impose a direct commission for the exchange or earn indirectly through buying and selling at different rates of exchange.

Hire Purchase:

12. **Hire purchase** is a transaction where the hirer pays a certain amount of instalment to the seller to have immediate access to the goods. The ownership of the goods is transferred to the hirer only when the last instalment is paid.

Taxation:

13. Income tax is imposed on all working citizens and permanent residents and the money collected contributes to the funding of government expenditure and operations.