8 Ratio, Rate and Speed

Key Notes

8.1 Ratio

1. A ratio is the comparison of two quantities measured in the **same unit**. A ratio has **no units**.

2. It is written in the form $a : b$ or $\frac{a}{b}$, where $b \neq 0$.

3. Similar to fractions, ratio is always expressed in its **simplest form**.
   $x : y = mx : my$
   $= \frac{x}{m} : \frac{y}{m}$, where $m \neq 0$

4. Ratio can also be used to compare 3 or more quantities i.e. $x : y : z$.

8.2 Rate

1. Rate is used to compare two or more quantities of **different units**. It expresses the change in a quantity per unit of another quantity.

2. A **constant rate** is uniform and does not change. The **average rate** is calculated when there is no constant rate.

3. Some examples in our real-world contexts are interest rates, exchange rates and hire purchases.

   - Simple interest rates are calculated using the formula $I = \frac{PRT}{100}$, where P = principal amount deposited or borrowed, R = interest rate per annum and T = amount of time.
   - Hire purchases involve the purchasing of items through downpayment of a certain amount or percentage, followed by monthly instalments over a period of time for the rest of the purchase price subjected to interest rates.

8.3 Speed

1. $\text{Speed} = \frac{\text{Distance travelled}}{\text{Time taken}}$

2. An object maintains a constant (uniform) speed when it does not change its speed throughout the journey.

3. If the object does not travel at a constant speed, we can find its average speed.
   $\text{Average speed} = \frac{\text{Total distance travelled}}{\text{Total time taken}}$