

## Answer on Question 55860, Physics, Other

### Question:

- 1) Briefly describe the history of the metric system as it applies to the meter and how the definition of a meter has changed over time.
- 2) Construct the metric units of distance, time, and speed. Describe the relationship between them.

### Answer:

1) In 1670 Gabriel Mouton, Vicar of St. Paul's Church and an astronomer proposed the swing length of a pendulum with a frequency of one beat per second as the unit of length. In 1791 the Commission of the French Academy of Sciences proposed the name meter to the unit of length (from the Greek word metron, that means "a measure"). It would equal one tens-millionth of the distance from the North Pole to the equator along the meridian through Paris. It is realistically represented by the distance between two marks on an iron bar kept in Paris. In 1889 the 1st General Conference on Weights and Measures define the meter as the distance between two lines on a standard bar that made of an alloy of 90% platinum with 10% iridium. In 1960 the meter was redefined as 1650763.73 wavelengths of orange-red light, in a vacuum, produced by burning the element krypton (Kr-86). In 1984 the Geneva Conference on Weights and Measures has defined the meter as the distance light travels, in a vacuum, in  $1/299792458$  seconds with time measured by a cesium-133 atomic clock which emits pulses of radiation at very rapid, regular intervals.

2) The metric unit of distance is the meter ( $m$ ). Also we use for most purposes the other common metric units of distance - millimeters ( $mm$ ), centimeters ( $cm$ ) and kilometers ( $km$ ):

$$1km = 1000m,$$

$$1m = 100cm,$$

$$1m = 1000mm.$$

The metric unit of time is the second ( $s$ ). Also we use for most purposes the other common metric units of time – minutes and hours:

$$1hour = 3600s,$$

$$1\text{min} = 60\text{s}.$$

The metric unit of speed is meters per second ( $m/s$ ). Another common metric unit of speed is kilometers per hour ( $km/h$ ).

Let's describe the relationship between the metric units of distance, time, and speed.

The metric units of speed are defined in terms of metric units of distance and time, speed is equal to distance divided by time:

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

The metric units of time are defined in terms of metric units of distance and speed, time is equal to distance divided by the speed:

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

The metric units of distance are defined in terms of metric units of speed and time, distance is equal to time multiplied by the speed:

$$\text{Distance} = \text{Time} \cdot \text{Speed}.$$