Pakistan School
Kingdom of Bahrain

Basic Rules of the Class:

- 1) Always be on time for all your classes
- 2)Always Respect your all Class fellows.
- 3)Do not create any disturbance.
- 4)Raise hand if you have any question or you wish to answer any question.
- 5)Pay attention to your teacher.
- 6)Please, Enter into the class with your actual Name and CPR number.
- 7)Always follow your Time Table.

WARM UP!

$$[\ M^{1}\ L^{1}\ T^{-2}\ ]$$

Engaging Starter

2π radian = 360^0

Exercise: MCQ's

Select the correct answers of the following questions.

i) Which of the following quantities have not been expressed in proper units?

(a) $\frac{\text{Stress}}{\text{Strain}}$ = Newton metre^{-1} (b) Surface tension = Newton metre^{-1}

(c) Energy = kg m s^{-1} (d) Pressure = newton metre^{-2}

ii) Which of the following correctly represent the S.I. unit of pressure?

(a) Newton metre^{-2} (b) Newton^{2} m^{-1}

(c) Pascal (d) newton metre^{-2}

iii) Which of the following may be used as a valid formula to calculate speed of ocean waves? v = speed, g = acceleration due to gravity, λ = wave length, ρ = density, h = depth.

(a) $v = \sqrt{\lambda g}$ (b) $v = \rho g h$ (c) $v = \frac{gh}{\lambda}$ (d) none

Exercise: Conceptual Questions

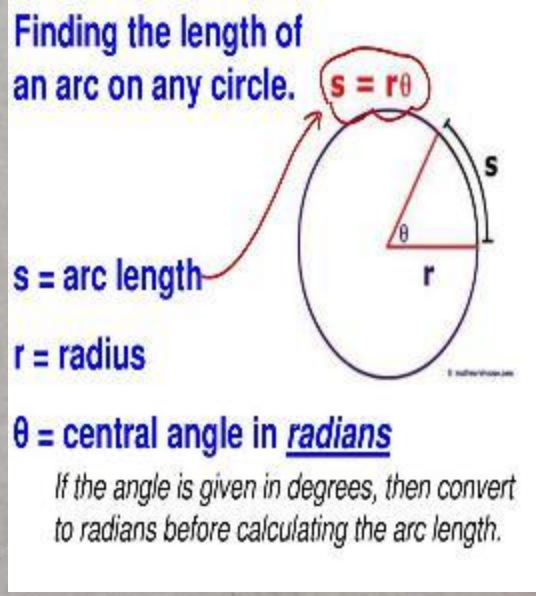
Q.No.1: Define the number π and show that $2\pi = 360^0$

Ans. The number π is defined as;

"The ratio between the circumferences "C" of a circle to the diameter "d" of the same circle".

According to definition

$$\text{Ratio of Circumference to diameter} = \frac{C}{d} = \pi$$



2π radian = 360°

Since the angle subtended by the circumference at the centre of a circle in one complete revolution is 360° or one revolution, therefore we write as;

For 1 rev, $\theta = 360^\circ$ (1)

Also $\theta = \frac{S}{r}$ (2)

For one revolution $S = 2\pi r$

Eq. 2 becomes; $\theta = \frac{2\pi r}{r} = 2\pi$ rad (3)

By comparing Eq.1 and Eq.3, we get;

$$2\pi \text{ rad} = 360^\circ$$

Exercise : Conceptual Questions

Q.No 2: Define the terms.

i. Error:

Difference b/w actual and measured value.

ii. Uncertainty:

It estimates the possible range of error.

iii. Precision:

The magnitude of error in any measurement.

iv. Accuracy:

It stands for the magnitude of relative error.

Q. 3:Explain several repetitive phenomena occurring naturally which could served reasonable time standard.

Ans: Any natural phenomena that repeat itself after equal time interval can be used as a measure of time.

(i) The rotation of the earth around the sun provides us the natural phenomena which determine the length of the day and has been used as time standard from the earliest time.

(ii) During the day time the change of shadow of an object can serve as measure of time.

(iii) The oscillation of bob of simple pendulum can be used as time standard.

(iv) The rotation of planets in the solar system can serve as a measure of time.

(iv) Characteristic vibrations of crystals such Quartz crystal is used as time standard.

Exercise: Numerical Problems.

1. Express the following quantities by using prefixes.

(a) 4.0×10^{-4} m (b) 15.0×10^{-8}s (c) 7.5×10^{-7}g

Solution:

(a) 4.0×10^{-4}m multiplying and dividing by 10

$$4.0\times10^{-4}\text{m} = \frac{4.0\times10^{-4}\times10}{10}\text{m}$$

$$4.0\times10^{-4}\text{m} = \frac{4.0\times10^{-3}}{10}\text{m}$$

$$4.0\times10^{-4}\text{m} = 0.4\times10^{-3}\text{m}$$

$$4.0\times10^{-4}\text{m} = 0.4\text{mm}$$

(b) 15.0×10^{-8}s multiplying and dividing by 10

$$15.0\times10^{-8}\text{s} = \frac{15.0\times10^{-8}\times10}{10}\text{s}$$

$$15.0\times10^{-8}\text{s} = 15.0\times10^{-8}\times10\times10^{-1}\text{s}$$

$$15.0\times10^{-8}\text{s} = 15.0\times10^{-9}\times10\,\text{s}$$

$$15.0\times10^{-8}\text{s} = 150\text{ns}$$

(c) 7.5×10^{-7}g multiplying and dividing by 10

$$7.5\times10^{-7}\text{g} = \frac{7.5\times10^{-7}\times10}{10}\text{g}$$

$$7.5\times10^{-7}\text{g} = \frac{7.5}{10}\times10^{-6}\text{g}$$

$$7.5\times10^{-7}\text{g} = 0.75\times10^{-6}\text{g}$$

$$7.5\times10^{-7}\text{g} = 0.75\ \mu\text{g}$$

2. The length and width of a rectangular plate are 15.6 ±0.1 cm and 10.80±0.01cm respectively. Calculate area of the plate and un-certainty in it.

Solution:

Length of rectangular plate $L = 15.6 \pm 0.1\text{cm}$

Width of rectangular plate $b = 10.80 \pm 0.01\text{cm}$

Uncertainty in area of the plate = ?

Area of rectangular plate $A = L \times b$

$A = 15.6 \times 10.80 = 168.48 cm^2$

$$\% \text{ uncertainty in length} = \frac{0.1}{15.6} \times 100 = 0.6\%$$

$$\% \text{ uncertainty in width} = \frac{0.01}{10.80} \times 100 = 0.09\%$$

In multiplication % uncertainties are added

$\%$ uncertainty in area $= 0.6\% + 0.09\% = 0.69\%$

$$\text{Uncertainty in area of plate} = \frac{0.69 \times 168.48}{100} = 1.16 = 1.0$$

Area of plate $= 168.48 \pm 1 cm^2$

Closure

a) Define Error.

b) Define uncertainty.

c) Define precision.

d) Define Accuracy.

e) Name any three repetitive phenomenon occurring naturally which could served reasonable time standard.

Home Work

- Students should Revise and Practice today's Topic and Exercise questions….. at home and should enhance their knowledge by Searching and Exploring more and more…….. by using internet resources.

Thank you.....