Pakistan School
Kingdom of Bahrain

MCQs(), Conceptional Questions (10-13)and Numericals()

Class 11

Objective

- Students will be able to create solutions for the given problems.

Numerical(1.7-1.10)

- **1.7)** If there are $N_o = 6.02 \times 10^{23}$ atoms in 4.0 g of helium, what is the mass of helium atom?
- Data:
- Mass of Helium = m = 4g
- Total number of atoms = No = 6.02×10^{23} atoms
- To Prove:
- Mass of 1 atom of helium = m = ?
- Solution:
  - Mass of 6.02×10^{23} atoms = 4g
  - Mass of 1 atom=4g/(6.02 4xg 10^{23})
    - = 0.66×10^{-23} g
    - = 6.6×10^{-24} g
  - (OR) Alternate Method
- Mass of 1 atom =Molar mass /Avogadro Number (N_A)
  - 4g/(6.02×10^{23})
  - = 0.66×10^{-23} g
  - = 6.6×10^{-24} g

Numerical(1.7-1.10)

- **1.8** Compute the following to correct significant digits
- (a) 3.85m x 3.9m (b) (1023 kg + 8.5489kg) (c) (22/7)m (d) m_p/m_e =(1.67 x 10-22 kg)/(9.1096 x 10^{-31} kg)
- Sol:
- a.)3.85 m x 3.9m
- = 15.015 m^2
- = 15 m^2
- (In multiplication or division, significant figures in the answers should be equal to least number of significant figures in the data.)
- b.) 1023 kg + 8.5489 kg
- = 1031.5489 kg
- = 1032 kg
- (In addition or subtraction, answer should be upto least decimal places according to given data.)
- c)If 22/7= π= 3.1428571...
- (All digits are significant because it represents a constant value of ratio
- (circumference /diameter), which must be constant number
- d)m_p/m_e =1.67 x 10^{-27} kg /9.10196.x 10^{-31} kg
- = 0.18332 x 10^4
- = 1.8332 x 10^3
- = 1.83 x 10^3
- [significant should contain least number of significant figures according to given data]

-Numerical(1.7-1.10)

- 1.9.A rectangular metallic piece is (3.70 ± 0.01) cm wide, and (7.20±0.01) cm long.
- (a) Find the area of the rectangular metallic piece and uncertainty in area.
- (b) Verify that the sum of the percentage uncertainty in the length and in the width Is equal
- to percentage uncertainty in A.
- Sol.
- Data:
- Width = W = (3.70 ± 0.01) cm
- Length =L= (7.20±0.01) cm
- To Find:
- Area=?
- (a) Unctaunity in Area=ΔA=?
- (b) To Prove % ΔA = % ΔW + % ΔL
- a)
- A=L x W
- A=7.20 x 3.70
- A=(26.64cm²)
- %age uncertainty in width = % ΔW= $\% \Delta W = \frac{\Delta W}{W} \times 100 = \frac{0.01}{3.70} \times 100 = 0.14\%$
- %age uncertainty in length = % ΔL = $\% \Delta L = \frac{\Delta L}{L} \times 100 = \frac{0.01}{7.20} \times 100 = 0.27\%$
- %age uncertainty in area = % ΔA = % ΔW + % ΔL
- % ΔA = 0.14% + 0.27% = 0.41%
- Absolute uncertainty area=ΔA= (A x(% ΔA /100))= ((26.64cm²) x(0.41/100))= ±0.1cm²
- b) Maximum area of plate is: A_{max} = [(7.20 + 0.01) x (3.70 + 0.01)] cm² = 7.21 x 3.71 cm² =26.75cm²
- And Minimum area of plate is A_{min}= [(7.20 — 0.01) x (3.70 — 0.01)] cm² = (7.19 x 3.69) cm² = 26.53 cm²
- So The area of the Plate is: $A = [\frac{A_{max} + A_{min}}{2}] \pm [\frac{A_{max} - A_{min}}{2}]$

$$A = [\frac{26.75 + 26.53}{2}] \pm [\frac{26.75 - 26.53}{2}]$$

- A=26.64±0.11cm²
- %age uncertainty in Area =(0.11/26.62)x100=0.41%....(x)
- %age uncertainty in W + %age uncertainty in L
- 0.14% + 0.27% = 0.41% ... (y)
- Comparing x and y
- It is Proved that % ΔA = % ΔW + % ΔL

Numerical(1.7-1.10)

- **10**.Calculate the answer up to appropriate numbers of significant figures.
- (a) 168.99 x 9 (b) 23.5 + 234.09 (c)984.25 / 80.0
  - (a)168.99 x 9 [As data has least number of significant figure is only one so result will contain one significant figure]
- = 1.52091×10^3
- = 1.5×10^3
- = 2×10^3
- Or = 2000
- (b) 23.5 + 234.09 [Answer should be upto 1 decimal place.]
- = 257.59
- = 257.6
- (c) 984.25 /80.0[Answer is upto least significant figures in the data i.e 3 s-F]
- = 12.303125
- = 12.3

Conception Questions

- What does the word "micro" signify in the words "micro wave oven"?
- Ans: In microwave oven, we use electromagnetic waves, called microwaves, to heat food. Micro means small, because these waves are smaller in wavelength than other radio waves. It does not show that its wavelength is in micrometer.

  Wavelength of microwaves used in microwave over is12 cm and their frequency is 2450 MHz.
- Density of air is 1.2kg m^{-3}. Change it into gm cm^{-3}.
- Ans: Density of air = 1.2 kg m^{3}

  =1.2 x (10^{3}g) x (10^{2} cm) ^{3} =1.2 x (10^{3}g) x (10^{-6} cm^{-3})

  =1.2 x 10^{3-6} gcm^{-3} = 1.2 x 10^{-3} gcm^{-3} = 0.0012gcm^{-3}
- An old saying is that "A chain is only as strong as its weakest link. What analogue statement can you make regarding measurement?
- Ans:An old saying is that "A chain is only as strong as its weakest link".

  Its analogous statement is

  "A result of experimental data is only as much accurate as least accurate reading in experimental data."
- Differentiate between the light year and year.
- Ans: Light year: It is the distance travelled by light in vacuume in one year.

  1 light year = 9.46 x 10^{12} km It is unit of length.

  Its dimensions are [L]

  Year: It is the time in which earth completes its one revolution around sun.

  1 year = 365.25 days

  = 365.25 x 24 x 60 x 60seconds

  = 31557600 secondss

  Its unit is second.

  Its dimensions are [L]

Multiple Choice Questions

11) Which one is a pair of SI base units?

(a) ampere joule (b) coulomb second

(c) kilogram kelvin (d) meter newton

Answer.(C) kilogram kelvin

12) What is the ratio $\frac{1\mu m}{1Gm}$

$\frac{1\mu m}{1Gm} = \frac{10^{-6}}{10^{9}} = 10^{-6-9} = 10^{-15}$

(a) 10^{-3} (b) 10^{-9} (c) 10^{-12} (d) 10^{-15}

Answer. (d) 10^{-15}

13) A student measured the diameter of a wire using a screw gauge with least count 0.0011cm. the correct measurement is

(a) 5.3 cm (b) 5.32 cm (c) 5.320 cm (d) 5.3200 cm

Answer.(d)5.3200m ,because least count has 4 decimal places

14) The dimensions of frequency f are

(a) $[T^{-2}]$ (b) $[LT^{-1}]$ (c) $[T^{-1}]$ (d) $[MT^{-1}]$

Answer(c)$[T^{-1}]$, because$[f]=1/[T]= [T^{-1}]$

15) Which one is the least sub multiple?

(a) pico (b) femto (c) atto (d) nano

Answer.(d)atto, because atto= 10^{-18}

16) One femto is equal to

(a) 10^{-15} (b) 10^{-1}s (c) 10^{-16} (d) 10^{-9}

Answer. (a) 10^{-15} ,because femto= 10^{-15}

17) The scientific notation of a number 0.0023 is expressed as

(a)2.3x 10^{-3} (b)0.023x 10^{-2}

(c)2.3 x10 $^{-4}$ (d)0.23x 10 ^{3}

Answer.(a) because 0.0023=2.3x 10-3

Home Work

- Write the solution of the numerical, MCQs and Short questions of chapter 1
- Or
- Create dimensions of different physical quantites.