STEPPING STONE SCHOOL (HIGH)

CLASS – IX

Subject: PHYSICS

Topic: Answers to worksheets

Date: 3.6.2020

Answers to worksheet no: 1

Answer 1:

The three requirements are:

(a) The unit should be of convenient size.

(b) The unit should be reproducible.

(c) The unit can be defined without ambiguity.

Answer 2:

The three fundamental quantities are Length, Mass and Time.

Answer 3:

The three systems of unit are:

(a) C.G.S system- In this system, the unit of length is centimetre (cm), of mass is gram (g) and of time is second (s).

(b) F.P.S system – In this system, the unit of length is foot (ft), of mass is pound (lb) and time is second (s).

(c) M.K.S system – In this system, the unit of length is metre (m), of mass is kilogramme (kg) and of time is second (s).

Answer 4:

Derived units are those which depend on the fundamental units.

Example- Volume is expressed in a unit which is length × length × length.

Answer 5:

The three convenient units are: mm, m and km.

Answer 6:

The S.I unit of mass is kilogram. One kilogram is defined as the mass of a cylindrical piece of platinum- iridium alloy kept at International Bureau of Weights and Measures at Sevres near Paris.

Answer 7:

Two smaller units are:

gram and milligram

1 kg = 1000g

1 kg = 10^6 mg.

Answer 8:

SI unit of time is second (s). A second is defined as 1/86400 th part of a mean solar day.

Answer 9:

Two units bigger than a second are: minute and hour

1 minute = 60 seconds

1 hour = 3600 seconds

Answer 10:

A leap year is the year in which the month of February is of 29 days.

Answers to worksheet no: 2

Answer 1:

1 A.U $=10^{-1}$nm

5800 A U = 580 nm

1 A U = 10^{-10} m

5800 A U = $5800 \times 10^{-10\,m}$

$= 5.8 \times 10^{-7}$ m

Answer 2:

No. of bacteria = 10^{6}

Answer 3:

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

$= \frac{5.6 \times 10^{25}}{3 \times 10^{8}} = 1.87 \times 10^{17}$ s

Answer 4:

$1\ u = 1.66 \times 10^{-27}$ kg

$16\ u = 16 \times 1.66 \times 10^{-27}$ kg

$= 2.656 \times 10^{-26}$ kg

Answer 5:

Time = 8 min = 480 s

Distance = Speed × Time

$= 3 \times 10^{8} \times 480$ m

$= 1.44 \times 10^{8}$ km.

<u>Vernier Calliper</u>

(1) A stopwatch has 10 divisions graduated between the 0 and 5 s marks. What is the least count?

(2) A Vernier has 10 divisions and they are equal to 9 divisions of main scale in length. If the main scale is calibrated in mm, what is its least count?

(1) L.C = $\frac{5}{10}$ = 0.5 s

(2) 10 divisions on Vernier = 9 divisions on main scale

1 division on Vernier = $\frac{9}{10}$ division on main scale

L.C = Value of 1 M S D – Value of 1 V S D

$= 1 - \frac{9}{10} = \frac{1}{10} = 0.1$ mm

$= 0.01$ cm

Answers to worksheet no: 3

Answer 1:

The correct thickness of pencil

= 1.4 mm – (+ 0.02) cm

= 1.4 m – 0.2 mm

= 1.2 mm

Answer 2:

10 divisions on Vernier = 9 mm

1 division on Vernier = $\frac{9}{10}$ mm

(i) L C = $1 - \frac{9}{10} = \frac{1}{10}$ = 0.1 mm= 0.01 cm

(ii) Zero error = 0.01 × 3

= + 0.03 cm

Answer 3:

When the zero mark of main scale coincides with zero mark of Vernier scale.

Answer 4:

Parts	**Functions**
(i) Main scale	to measure length correct up to 1mm
(ii) Vernier scale	helps to measure length correct up to 0.1 mm
(iii) Strip	to measure depth of a beaker
(iv) Outside jaws	to measure the length of a rod, diameter of a sphere
(v) Inside jaws	to measure the internal diameter of a hollow cylinder

Answer 5:

Vernier Constant is defined as the ratio of value of one main scale division to the total number of divisions on Vernier.

Principle – n divisions on Vernier

Scale = (n-1) divisions on main scale.

Answer 6:

20 divisions of Vernier = 19 divisions on main scale

1 division of Vernier = $\frac{19}{20}$ division on main scale

(i) L.C = $1 - \frac{19}{20}$

= $\frac{1}{20}$ = 0.05 mm = 0.005 cm

(ii) Diameter = 3.5 cm + 4 × 0.005 cm

= 3.5 cm + 0.02 cm

= 3.52 cm

.

. . Radius = $\frac{D}{2} = \frac{3.52}{2}$ = 1.76 cm

Answers to worksheet no: 4

Answer 1:

Pitch- The of a screw gauge is the linear distance moved by its screw on the main scale when the circular scale is given one complete rotation.

Least count- It is the ratio of pitch of the screw gauge to the total number of divisions on its circular scale.

Answer 2:

The least count of a screw gauge can be decreased by (i) decreasing the pitch and (ii) increasing the total number of divisions on the circular scale.

Answer 3:

To advance the screw by turning it till the object is gently held between the stud and spindle of the screw.

Answer 4:

Due to wear and tear of threads of screw, it is observed that on reversing the direction of rotation of the thimble, the tip of the screw does not start moving in the opposite direction at once. This causes error in the observation which is called the backlash error.

To avoid the backlash error, while taking the measurement, the screw should be rotated in one direction only.

Answer 5:

(i) Least count is calculated

(ii) Main scale reading is noted

(iii) Circular scale reading is noted where number of division of circular scale coincides with main scale.

Diameter of wire= MSR + CSR × LC

Answer 6:

(a) vernier callipers

(b) metre rule

(c) screw gauge

Answer 7:

It is used to measure the diameter of wire

Answer 8:

On bringing the flat end of the screw in contact with the stud, if the zero mark of circular scale coincides with the base line of main scale, the screw gauge is said to be free from zero error.

Answers to worksheet no: 5

Answer 1:

$$LC = \frac{0.5}{100} = 0.005 \text{ mm}$$

Answer 2:

No. of revolutions = 2

(i) Pitch = $\frac{1}{2}$ = 0.5 mm

(ii) LC = $\frac{1}{2 \times 100}$ = $\frac{1}{100}$ = 0.01mm

Answer 3:

(i) LC = = $\frac{1}{100}$ = 0.01mm = 0.001cm

(ii) MSR = 2 mm

CSR= 45 × 0.01 = 0.45 mm

Diameter of the wire = 2 + 0.45 mm

= 2.45 mm

= 0.245 cm

Answer 4:

(i) MSR = 1mm

CSR = 27 × 0.01 = 0.27 mm

Diameter of the wire = 1 + 0.27 mm

= 0.127 – 0.005

= 0.122cm

(ii) Correct diameter = 0.127 – (+ 0.005)

= 0.127 – 0.005

= 0.122 cm

Answer 5:

No. of divisions = $\frac{0.5}{0.001}$

$= \frac{5}{0.01} = \frac{5}{1/100} = 500$

Answer 6:

(i) Pitch = $\frac{1}{2}$ = 0.5 mm

(ii) LC = $\frac{1}{2 \times 50} = \frac{1}{100}$ = 0.01 mm

(iii) Zero error = 4 × LC

= 4 × 0.01

= + 0.04 mm

Answers to worksheet no: 6

Answer 1:

(i) Effective length

(ii) acceleration due to gravity

Answer 2:

(a) Time period gets doubled

(b) Time period gets doubled

Answer 3:

The bob is made to oscillate and the time taken to complete 20 oscillations is noted. We calculate the time period using the formula $T = 2\pi\sqrt{l}/g$

Answer 4:

1:1 as time period does not depend upon the weight of the bob

Answer 5:

The pendulum A

The reason as time period is directly proportional to the effective length

Answer 6:

The time period of oscillation is two seconds

Answer 7:

0.5 s^{-1}

<u>Numericals</u>

Answer 1

40 oscillations in 60 seconds

1 oscillations in $\frac{60}{40}$ seconds

i.e 1.5 seconds

(a) Frequency = $\frac{1}{T}$

$= \frac{1}{1.5} = 0.67\ s^{-1}$

(b) Time period = 1.5 s

Answer 2

$$\frac{T_1}{T_1} = \sqrt{\frac{l_1}{l_2}}$$

$$= \sqrt{\frac{1}{9}} = \frac{1}{3} = 1:3$$

Answer 3

$$\sqrt{\frac{l_1}{l_2}} = \frac{T_1}{T_2}$$

Squaring both sides we get

$$\frac{l_1}{l_2} = \frac{T_1^2}{T_2^2} = \left(\frac{T_1}{T_2}\right)^2 = \left(\frac{2}{1}\right)^2 = \frac{4}{1}$$

$$= 4:1$$