WORKSHEET 2

CHAPTER 1 – MEASUREMENTS AND EXPERIMENTATION

A. Tick (✓) the correct option.

1. What is the derived unit of electric resistance?
   a. hertz b. coulomb c. ohm d. watt
2. One nanometre is equal to
   a. 10^{-10} m. b. 10^{-6} m. c. 10^{-12} m. d. 10^{-9} m.
3. If the length of a pendulum is increased, its time period also
   a. increases. b. decreases. c. remains same. d. none of these.
4. The mean distance between the centre of the earth and the sun is known as
   a. one parsec. b. one light year. c. one astronomical unit. d. all of these.
5. What is the least count of a metre scale?
   a. 1 mm b. 2 mm c. 3 mm d. 0.5 mm

B. Fill in the blanks.

1. The SI unit of solid angle is _____
2. One light year is the _____ travelled by light in vacuum in one year.
4. The time taken by the earth to complete one rotation about its axis with respect to the sun is known as the _____
5. Vernier callipers was designed by a French mathematician _____
5. A _____ is used to measure the thickness of thin metallic sheets and diameter of thin wire or thickness of paper.

C. State whether the following statements are true or false.

1. In the laboratory, simple pendulum is the most commonly used device for measuring time.
2. Time period and frequency of a simple pendulum are directly proportional to each other.
3. Vernier scale reading = Vernier division coinciding with the main scale × Least count
4. A compound unit formed by multiplication of two or more units is written after leaving a gap between the symbols.
5. The atomic and nuclear masses are measured in atomic mass unit.

D. Match the following.

1. Electric charge	volt (V)
2. Frequency	pascal (Pa)
3. Pressure	joule (J)
4. Electromotive force	coulomb (C)
5. Work, Energy	hertz (Hz)

Name: ..... Teacher's signature: .....

Class: IX Date: .....

E. Answer the following questions.

Very short answer questions

1. What is pitch of a screw gauge?
2. Why does a pendulum clock run slower and lose time in summer?

Short answer questions

1. What are the characteristics of a standard unit?
2. Define one kilogram and write any two subunits of it.

Long answer questions

1. How do you measure the time period of a simple pendulum?
2. Describe in details about negative zero error and its correction.

ANSWERS

WORKSHEET 2

A. Tick (✓) the correct option.

1. c 2. d 3. a 4. c 5. a

B. Fill in the blanks.

1. steradian
2. distance
3. solar day
4. Pierre Vernier
5. screw gauge

C. State whether the following statements are true or false.

1. T 2. F 3. T 4. F 5. T

D. Match the following.

1. Electric charge	coulomb (C)
2. Frequency	hertz (Hz)
3. Pressure	pascal (Pa)
4. Electromotive force	volt (V)
5. Work, Energy	joule (J)

E. Answer the following questions.

Very short answer questions

1. The linear distance moved by the screw head during one complete rotation of the screw is called the pitch.
2. The reason is that in summer, due to hot weather, the pendulum expands (thermal expansion) and its length increases. Due to the increase in length, its time period increases.

Short answer questions

1. Characteristics of a standard unit:
   i. It should be of convenient size.
   ii. It should be well defined.
   iii. It should be easily reproducible, i.e. replicas of the unit should be available easily.
   iv. It should not change with time and place.
   v. It should not change with the change in physical conditions, e.g. temperature, pressure, etc.
   vi. It should be easily available and accessible.
2. One kilogram is defined as the mass equal to the mass of a standard platinum-iridium alloy cylinder (90% platinum and 10% iridium) kept at 0 °C at the International Bureau of Weights and Measures at Sevres, near Paris in France. Gram and milligram are two subunits of kilogram.

Long answer questions

1. a. Tie a bob (a metallic sphere) to one end of a nylon thread about 120 cm long. The other end of the thread is passed through two half pieces of a cork. This cork is held firmly in a clamp stand.

   b. Put ink marks with a pen on the thread at distances of 100, 81, 64, 49, 36, 25 cm from the top surface of the bob.

   c. Now, put the 100 cm mark just at the lower surface of the cork by gradually pulling the thread through the cork pieces and adjust the clamp so that the bob is about 1 cm above the ground.

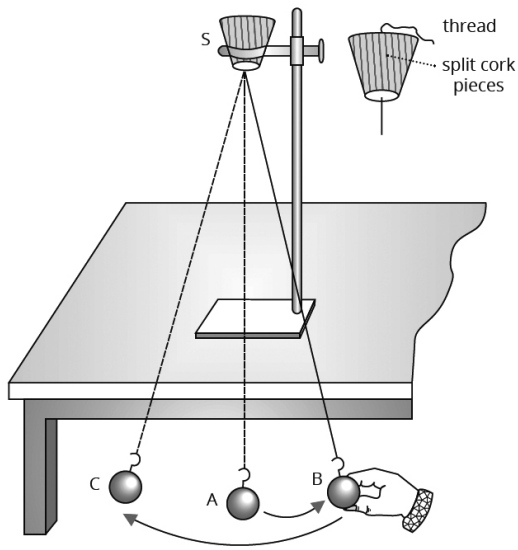
   d. Take the bob to a distance of 10 cm away from its mean position and then release it gently so that it starts vibrating about its mean position in a vertical plane.

   e. With the help of a stopwatch, measure and record the time taken by the pendulum to complete 25 vibrations.

   f. Now decrease the length and put to 81 cm by pulling the thread after loosening the clamp slightly and then tighten it again. Repeat step 4 again for finding the time for 25 vibrations for this new length.

   g. Take observations for different lengths marked on the thread. Record the observation as follows.

S. No.	Length (l) (in cm)	Time for 25 vibrations (in s)	Time period T (in s)
1.	25	25	1.0
2.	36	30	1.2
3.	49	35	1.4
4.	64	40	1.6
5.	81	45	1.8
6.	100	50	2.0



Measurement of the time period of a simple pendulum

2. If the zero mark of the Vernier lies towards the left side of the zero of the main scale when the jaws C and D are made to touch each other, the zero error is said to be negative. In such a situation, the measured length is less than the actual length. It is because of this fact that such zero error is called negative zero error.

   To find this error, we note that division of the Vernier scale that coincides with any division of the main scale when the jaws C and D are made to touch each other. The number of this Vernier division is subtracted from the total number of divisions on the Vernier and the difference so obtained multiplied by the least count of the Vernier gives the negative zero error.

   For example, for the scale shown in the figure below, the least count is 0.01 cm and the 6th division of Vernier scale coincides with the main scale.

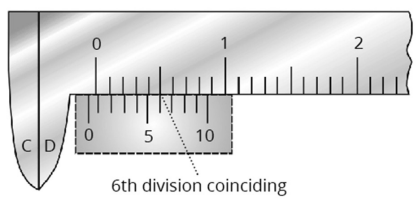
   Zero error = – (10 – 6) × L.C.

   = – (4) × 0.01 cm = – 0.04 cm

   Correct reading = Observed reading – Vernier scale reading

   Correct reading = Observed reading – (0.04 cm)

   = Observed reading + 0.04 cm



Negative zero error (– 0.04 cm) and its correction

   So, to obtain the actual length of the object, we must add 0.04 cm to the observed reading value.