Q1. What is measurement? How is a measurement expressed?
Ans. Measurement is a comparison of an unknown quantity with a known fixed quantity of the same kind.
A measurement is expressed as:
  Measurement = n x u   (whereas n= number and u= unit).

Q2.State two characteristics of a unit.
Ans. The unit must have the following characteristics:
(i)It should be of convenient size, and
(ii)It must be universally accepted, i.e. its value must remain same at all places and at all times. It should not change with the change of place or time.

Q3. Name four basic measurements in our daily life.
Ans. Four basic measurements in our daily life are: measurement of length, measurement of mass, measurement of time, and measurement of temperature.

Q4. What are the S.I units of (i) mass (ii) length (iii) time and (iv) temperature? Write their names and symbols.
Ans. S.I units with their names and symbols are:

Quantity	S.I unit	Symbols for S.I unit
(i) mass	kilogram	kg
(ii) length	metre	m
(iii) time	second	s
(iv) temperature	kelvin	K

Q5. Define one metre, the S.I unit of length. State its one multiple and one sub multiple.
Ans. One metre is defined as the distance travelled by light in air in $1/3 \times 10^8$ of a second.
One multiple of metre is kilometer (km) and one sub-multiple of metre is centimetre (cm).

Q6. Convert the following quantities as indicated:

(a) 12 inch = --------- ft

Ans. 12 inch = 1 ft

(b) 1 ft = --------- cm

Ans. 1 ft = 12 inch

     1 ft = 12 x 2.54 cm   (1 inch = 2.54 cm)

     1 ft = 30.48 cm

(c) 20cm = ---------- m

Ans. 1cm = 1/100 m

    20cm = 20/100 m

        = 0.2 m

(d) 4.2 m = ------------ cm

Ans. 1 m =100 cm

    4.2 m = 4.2 x 100 m

       = 420 m

(e) 0.2 km = ----------- m

Ans. 1 km = 1000 m

    0.2 km = 0.2 x 1000 m

       = 200 m

(f) 0.2 cm = ------- mm

Ans. 1 cm = 10 mm

    0.2 cm = 0.2 x 10 mm

        = 2 mm

(g) 1 yard = ----------- m

Ans. 1 yard = 91.44 cm

     1 cm = 1/100 m

  91.44 cm = 91.44 / 100 m

        = 0.9144 m

Q7. (a) Describe in steps how would you measure the length of a pencil using a metre ruler. Draw a diagram if necessary.

Ans. To measure the length of a pencil using a metre ruler, place metre ruler with its marking close to the object. Let PQ be a pencil.

The end P of the pencil coincides with the zero mark on the ruler, the end Q of the pencil is read by keeping the eye at the position vertically above the end Q. The coinciding mark of end Q is the length of the pencil. (Draw Fig. 2.2 given on page 19)

(b) Explain with an example how you will use the metre ruler in part (a) if the ends of ruler are broken.

Ans. To measure the length of an object with such a ruler, the object is placed close to a specific marking on the ruler and positions of both ends of the object are read on the ruler. The difference of the two readings gives the length of the object. For example the reading on ruler at the end P of pencil PQ is 1 cm and at the end Q it is 4.3 cm. So the length of the pencil PQ is 4.3 – 1 = 3.3 cm.

Q8. Name the device which you will use to measure the perimeter of your playground. Describe in steps how you will use it.

Ans. We will use a measuring tape to measure the perimeter of our playground. To measure the length of playground the tape is spread along the length of the curved area.

Q9. The diagram below show a stick placed along a metre ruler. The length of the stick is measured keeping the eye at positions A, B and C.
   (a) Write the length of stick PQ as observed, for each position of the eye. Are they all same?
   (b) Which is the correct position of the eye? Write the correct length of the stick.

Ans. (a) Length of stick from position A = 3.4 cm
         Length of stick from position B = 3.2 cm
         Length of stick from position C = 3 cm
 No, they all are not same.
       (b) 'B' is the correct position of the eye.
       Correct length of the stick = 3.2 cm.

Q10. Define mass. State its (i) S.I (ii) C.G.S and (iii) F.P.S units. How are they related?

Ans. The quantity of matter contained in a body is called its mass.

System	Unit
S.I	Kilogram (kg)
C.G.S	Gram (g)
F.P.S	Pound (lb)

Relationship between gram, kilogram and pound:-
       1g = 1/ 1000 kg
       1 lb = 453.59 g

Q11. Convert the following quantities as indicated:
   (a) 2500 kg = ---------- metric tonne
       Ans. 1000 kg = 1 metric tonne
              2500 kg = 2500 / 1000 metric tonne
                       = 2.5 metric tonne.
   (b) 150 kg = ---------- quintal
       Ans. 100 kg = 1 quintal
              150 kg = 150 / 100 quintal
                      = 1.5 quintal.
   (c) 10 lb = ----------- kg
       Ans. 1 lb = 453.59 g
              10 lb = 453.59 x 10 g
                     = 4535.9 g
              1 g = 1 / 1000 kg
              4535.9 g = 4535.9 / 1000 kg
                        = 4.5359 kg.
   (d) 2500 g = ----------- kg
       Ans. 1 g = 1 / 1000 kg
              2500 g = 2500 / 1000 kg
                      = 2.5 kg
   (e) 0.01 kg = -------- g
       Ans. 1 kg = 1000 g
              0.01 kg = 0.01 x 1000 g
                       = 10 g
   (e) 5 mg = ---------- kg
       Ans. 1 mg = 1/ 1000000 kg
                  = 1 x 10^{-6} kg
              5 mg = 5 x 10^{-6} kg

Q12. Name the instrument which is commonly used to measure the   mass of a body. State how it is used.
Ans. The instrument which is commonly used to measure the mass of a body is beam balance.
The beam balance is first held up. On holding up the balance, it is ensured that when there is nothing on either pan, the beam is horizontal. The body whose mass is to be measured is placed on the left pan. The standard weights are

placed on the right pan. They are so adjusted that the beam is again horizontal on holding the balance up. The total of the standard weights gives the mass of the given body.

Q13. Define one kilogram, the S.I unit of mass. How is it related to (i) quintal (ii) metric tonne and (iii) gram?

Ans. The mass of 1 litre of water at 4°C is taken as 1 kilogram.

   Relation:-

   (i)   1 quintal = 100 kg
   (ii)   1 metric tonne = 1000 kg
   (iii)   1 gram = 1 / 1000 kg