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Answers Key:

Problems

1. Inian's statement is correct
   Because light travels 3 x 10^8 m in one second total number of second in one year is equal to 365 x 24 x 60 x 60 = 3.153 x 10^7 second.
   So one light year is = (3.153 x 10^7) x (3 x 10^8)
   = 9.46 x 10^{15} m
2. Main scale reading = 7 x 10 = 70 mm.(∴ 1 cm = 10 mm)
   Vernier coincidence = 6
   Least count = 0.1 mm.
   Zero error = Nil
   The diameter of the ball = MSR + (V.C x L.C) ± ZE
   = 70 mm + (6 x 0.1)
   = 70 mm + 0.6 = 70.6 mm
   radius of the ball = 70.6/2 (∴ r = d/2)
   35.3 mm
3. Pitch scale reading is = 1 mm
   Head scale coincidence = 68
   Thickness of 5 rupee coin = PSR + (HSC x L.C)
   = 1 +(68 x 0.01)
   = 1 + 0.68
   = 1.68 mm
   Thickness of five rupee coin is = 1.68 mm
4. 9.8 = 1 kg mass
   98 N = ?
   Mass of the object $= \frac{98 \times 1}{9.8} = 10\ kg$
5. Weight (w) = mg
   Mass of a man = 50 kg
   His weight = 50 × 9.8
   w = 490 newton

7 Marks

6. **Finding the outer diameter of the tea cup:**
   1. Place the tea cup between the outside jaws.
   2. Note the reading of main scale and vernier coincidence. Tabulate the readings.
   3. The outer diameter of the tea cup is calculated by MSR + (VC x LC).
   4. Repeat the experiment and find the average diameter.

   Finding the inner diameter of the tea cup:
   1. Place the tea cup between the inside jaws.
   2. Note the reading of main scale and vernier coincidence.
   3. Tabulate the readings.
   4. The inner diameter of the tea cup is calculated by MSR + (VC x LC).
   5. Repeat the experiment and find the average diameter.

S.No		MSR	VSC	MSR + (VC x LC) ± ZC
1. 2. 3.	Outer diameter			
1. 2. 3.	Inner diameter			

   The thickness of tea cup = outer reading - inner reading = _____ mm
7. **The thickness of coin (one rupee) is finding with the help of screw gauge:**
   1. Determine the pitch, least count and the zero error of the screw gauge.
   2. Place the coin between two studs.
   3. Rotate the head until the coin is held firmly but no tightly with the help of the ratchat.
   4. Note the reading of a pitch scale crossed by the head scale and the head scale (PSR) division that coincides with the pitch scale axis (HSC).
   5. The thickness of the coin is given by PSR + (HSR + ZC) x LC. Repeat the experiment for the different position of the coin.
   6. Tabulate the reading.
   7. The average of the reading given the thickness of the coin.

S.No	PSR Cmm	HSC	HSC ± ZC	= PSR + (HSC x LC)
1	1	33	33	1 + (33 x 0.01) = 1.33
2	1	32	32	1 + (32 x 0.01) =1.32
3	1	34	34	1 + (34 x 0.01) = 1.34
				Average = 1.33

The thickness of one rupee coin is = 1.33 mm.

Assertion and reason

8. Both A and R are true and R is the correct reason
9. Both A and R are true and R is the correct reason
10. Both A and R are true and R is the correct reason

Match the following

11. (⊠) metre
12. (⊠) kilogram
13. (⊠) second
14. (⊠) kelvin
15. (⊠) Coins
16. (⊠) Cricket ball
17. (⊠) Vegetables
18. (⊠) Gold ornaments

4 Marks

19. 1. The units named after scientists are not written with a capital intial letter.
    Ex: newton, henry, ampere and watt
    2. The symbols of units named after scientists should be written by the initial capital letter.
    Ex: N for newton, H for henry, A for ampere and W for watt.
    3. Small letters are used as symbols for units not derived from a proper noun.
    Ex: m for metre, kg for kilogram
    4. No full stop or other punctuation marks should be used within or at the end of the symbols.
    Ex: 50 m and not as 50 m.
    5. The symbols of the units are not expressed in plural form.
    Ex: 10 kg not as 10 kgs.
    6. Accepted symbols should only be used.
    Ex: ampere should not be written as amp and second should not be written as sec.

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20. i) Standard units give the correct and accurate measurement like length, mass, time etc...
    ii) It is not varied from person to person, place to place and object to object. So we need standard unit.
21.

Mass	**Weight**
1. Fundamental quantity	Derived quantity
2. It is a scalar quantity	It is a vector quantity
3. The amount of matter contained in a body	Normal source exerted by the surface on the object against gravitational pull
4. It remains the same	Varies from place to place.
5. Its unit is kilogram	Its unit is newton.

22. The value is one smallest main scale division is divided by total number of vernier scale division is called the least count of vernier caliper.
    $\text{Least count} = \frac{\text{The value of one smallest main scale division}}{\text{Totalnumber of vernier scale division}}$
    $\text{L.C} = \frac{1\text{ mm}}{10} = 0.1\text{ mm} = 0.01\text{ cm}$

2 Marks

23. Measurement is defined as the determination of the size or magnitude of something.
24. A standard unit is defined as a specific magnitude of a physical quantity that has been adopted by law or convention.
25. Full form of SI system is "International system of units"
26. Least count is least distance measured by a device. In Vernier Caliper the value of one smallest main scale division is divided with total number of vernier scale division.
27. The pitch of the screw is the distance moved by the tip of the screw for one complete rotation of the head. It is equal to 1 mm in typical screw gauges.
    $\text{Pitch of the screw} = \frac{\text{Distance moved by the Pitch}}{\text{No. of rotations by Head scale}}$
28. No. I cannot find the diameter of a thin wire by using the ruler.

True or False

29. (a) True

Fill in the blanks

30. (⊠) length
31. (⊠) common (beam) balance

32. (☒) Vernier Caliper
33. (☒) Screw gauge
34. (☒) milligram

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