Units and Measurements

1. Assertion (A): A displacement can be added with a distance.

Reason (R): Adding a scalar to a vector of the same dimensions is a meaningful algebraic operation.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- **2. Assertion (A):** Mass, length and time may be taken as fundamental quantities.

Reason (R): Mass, length and time are independent of one another.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- **3.** Assertion (A): If \vec{r} is the position vector then dimensions of $\frac{d^2\vec{r}}{dt^2}$ is [M⁰L¹T⁻²].

Reason (R): Dimensions of $\int \left(\frac{d^2\vec{r}}{dt^2}\right) dt$ is

[$M^0L^1T^{-1}$] where $\vec{r} \rightarrow position$ vector, $t \rightarrow time$.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- **4. Assertion (A):** The error in measurement of radius of the sphere is 0.3%. The permissible error in its surface area is 1.2%.

Reason (R): Area of sphere, $\Delta A \Delta r$

$$A=4\pi r^2\Rightarrow \frac{\Delta A}{A}=4\frac{\Delta r}{r}.$$

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
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- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false

5. Assertion (A): Mean absolute error of a measurement is always positive.

Reason (R): Mean absolute error is defined as the magnitude of difference between true value and measured value.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- **6. Assertion (A):** In mechanics the method of dimensions can't be applied to derive formula of a physical quantity which depends on more than three physical quantities.

Reason (R): We can derive relation of a physical quantity with other physical quantities out of which two have same dimensions.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- **7. Assertion (A):** Only like quantities can be added or subtracted from each other.

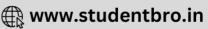
Reason (R): Velocity can be subtracted from the velocity gradient.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- **8. Assertion (A):** If a physical quantity has a unit it must have dimension.

Reason (R): There may exist a physical quantity which has dimension but no unit.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false





9. Assertion (A): Pressure at height (z) and

temp (q) is given by $P=\frac{\alpha}{\beta}e^{\frac{\alpha z}{k\theta}},$ K is

Boltzmann constant then b may represent volume.

Reason (R): Acceleration, force and work (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- **10. Assertion (A):** When we change the unit of measurement of a quantity, its numerical value changes.

Reason (R): Smaller the unit of measurement smaller is its numerical value.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A) $\,$
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- **11. Assertion (A):** If the measuring instruments used are perfect, then measurements made will be perfect.

Reason (R): Measurements depend upon only on the instruments.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- **12. Assertion (A):** When an algebraic equation has been derived, it is advisable to check it for dimensional consistency.

Reason (R): This guarantees that the equation is correct.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- **13. Assertion (A):** eV and joule are the S.I. units of energy used in modern physics and mechanics respectively.

Reason (R): Different types of energies require different units in S.I. units.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false

14. Assertion (A): Pressure and energy density have same units in SI.

Reason (R): Dimensions of energy density and pressure are same.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- **15. Assertion (A):** The dimensions of base (fundamental) quantity in other base quantities is always zero.

Reason (R): All derived quantities may be represented dimensionally in terms of fundamental quantities.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- **16. Assertion (A):** A unitless quantity never has a non-zero dimension.

Reason (R): A dimensionless quantity never has a unit.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- **17. Assertion (A):** Light year and wavelength have same dimensions.

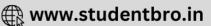
Reason (R): Light year represent time while wavelength represent distance.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- **18. Assertion (A):** Angle and strain are dimensionless.

Reason (R): Angle and strain have no unit. (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false





	ANSWER KEY																	
Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Ans.	4	1	2	4	3	3	3	4	4	3	4	3	4	1	2	3	3	3

