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**SUBJECT: PHYSICS**

**CLASS: 11TH STD**

**CHAPTER: MOTION IN A PLANE**

**EXERCISES**

1. State, for each of the following physical quantities, if it is a scalar or a vector:

volume, mass, speed, acceleration, density, number of moles, velocity, angular frequency, displacement, angular velocity.

1. Pick out the two scalar quantities in the following list:

force, angular momentum, work, current, linear momentum, electric field, average velocity, magnetic moment, relative velocity.

1. Pick out the only vector quantity in the following list:

Temperature, pressure, impulse, time, power, total path length, energy, gravitational potential, coefficient of friction, charge.

1. State with reasons, whether the following algebraic operations with scalar and vector physical quantities are meaningful:
	1. adding any two scalars,
	2. adding a scalar to a vector of the same dimensions
	3. multiplying any vector by any scalar,
	4. multiplying any two scalars,
	5. adding any two vectors,
	6. adding a component of a vector to the same vector.
2. Read each statement below carefully and state with reasons, if it is true or false:
	1. The magnitude of a vector is always a scalar,
	2. each component of a vector is always a scalar,
	3. the total path length is always equal to the magnitude of the displacement vector of a particle.
	4. the average speed of a particle (defined as total path length divided by the time taken to cover the path) is either greater or equal to the magnitude of average velocity of the particle over the same interval of time,
	5. Three vectors not lying in a plane can never add up to give a null vector.
3. Establish the following vector inequalities geometrically or otherwise:
4. |**a**+**b**| $\leq $ |**a**| + |**b**|
5. |**a+b**| $\geq $ ||**a**| − |**b**||
6. |**a−b**| $\leq $ |**a**| + |**b|**
7. |**a−b**| $\overbar{>}$ ||**a**| − |**b**||
8. Given **a + b + c + d = 0**, which of the following statements are correct:
9. **a, b, c,** and d must each be a null vector,
10. The magnitude of (**a + c**) equals the magnitude of ( **b + d**),
11. The magnitude of **a** can never be greater than the sum of the magnitudes of **b, c,** and **d,**
12. **b + c** must lie in the plane of **a** and **d** if **a** and **d** are not collinear, and in the line of **a** and **d**, if they are collinear ?
13. Three girls skating on a circular ice ground of radius 200 m start from a point P on the edge of the ground and reach a point Q diametrically opposite to P following different paths as shown in Fig. below.



What is the magnitude of the displacement vector for each? For which girl is this equal to the actual length of path skate ?

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