

CONCEPT OF SCALAR AND VECTOR FIELD

A scalar field assigns a single value to every point in space, while a vector field assigns a vector (both magnitude and direction) to every point.

A scalar field example is Temperature, which varies by location but has no inherent direction, whereas a vector field example is Earth's gravitational field, where gravity has a specific strength and direction.

Scalar field $\rightarrow$

A quantity that has only magnitude at each point in space.

Example $\rightarrow$

Temperature - Every point in a room has a specific temperature value.

Pressure $\rightarrow$ The pressure of a fluid at different locations.

Density $\rightarrow$ The density of an object or fluid.

Vector field $\rightarrow$

A quantity that has both magnitude and direction at each point in space.

Example $\rightarrow$

Gravitational field $\rightarrow$ At each point, there is a force with



Oxford

a certain strength pulling towards the center of the Earth.

Electric field $\rightarrow$ The electric force around a charged particle has a strength and a direction

Fluid velocity $\rightarrow$ The speed and direction of water flow in a river or wind in the atmosphere

— + —