Rest and Motion: Motion is Relative

Physics · CBSE Class 9 · Motion · PrayogX short notes

▸ **Video explanation:** Watch the PrayogX reel on Instagram

In one line: whether something is at rest or in motion depends on the **reference point** you measure it from. Always ask: relative to whom?

Key definitions

Term	Meaning
Reference point	A fixed point (or observer) from which position is measured; also called the origin.
Rest	An object is at rest if its position does **not** change with time relative to the reference point.
Motion	An object is in motion if its position **changes** with time relative to the reference point.

Key ideas

- The same object can be at rest for one observer and in motion for another.
- Rest and motion are **relative** terms: they mean nothing until a reference point is chosen.
- Nothing is in absolute rest: the Earth spins on its axis (once a day) and goes round the Sun (once a year), so even a "still" platform is moving relative to the Sun.

The train example

Observer (reference point)	You, sitting in a moving train, are…	Why
Your friend in the next seat	**At rest**	The distance between you does not change.
A person standing on the platform	**In motion**	Your position changes with time.

Rule to remember

Position changes with time (from the reference point) → motion. Position does not change → rest.

More examples

- Passengers in a bus are at rest relative to each other but moving relative to the road.
- A tree is at rest relative to the ground but moving relative to the Sun.
- A geostationary satellite stays over one spot of Earth, yet it is moving fast relative to the Sun.

Common mistakes

- "Something is either at rest or moving, full stop." Always name the reference point.
- "The ground is perfectly at rest." Only relative to things on Earth.
- Confusing "fast" with "moving": slow motion is still motion if position changes with time.

Quick check

1. A girl sits in a moving car. Is she at rest or in motion? *At rest relative to the car, in motion relative to the road.*
2. What must you choose before calling an object "at rest"? *A reference point.*
3. Is a building at rest? *Relative to the Earth, yes; relative to the Sun, no.*

Takeaway

Rest and motion are both relative. Always ask: relative to whom?

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