

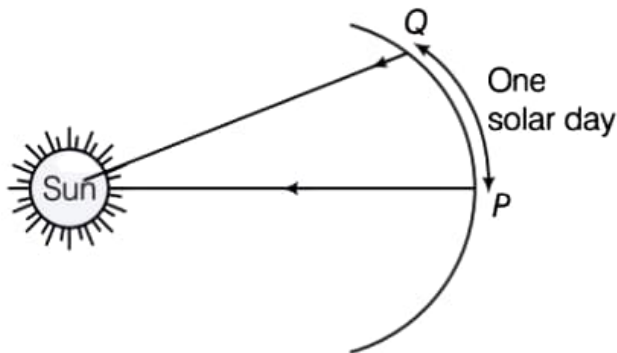
Q. Mean solar day is the time interval between two successive noon when sun passes through zenith point (meridian).

Sidereal day is the time interval between two successive transit of a distant star through the zenith point (meridian).

By drawing appropriate diagram showing the earth's spin and orbital motion, show that mean solar day is 4 min longer than the sidereal day.

In other words, distant stars would rise 4 min early every successive day.

Ans. Consider the diagram below, the earth moves from the point P to Q in one solar day.



Every day the earth advances in the orbit by approximately 1° . Then, it will have to rotate by 361° (which we define as 1 day) to have the sun at zenith point again.

$\therefore 361^\circ$ corresponds to 24 h.

$\therefore 1^\circ$ corresponds to $\frac{24}{361} \times 1 = 0.066 \text{ h} = 3.99 \text{ min} \approx 4 \text{ min}$

Hence, distant stars would rise 4 min early every successive day.