Question: 6.2 PQ The surface of the earth is not a true inertial refer- enc...

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Expert Answer

Anonymous answered this
260 answers

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Solution

Time of rotation - 24 hours.

d = 8000 miles = 12874.752m.

radius = d/2 = 6437.3752m

Angular velocity of rotation (ω) = $\frac{2\pi}{24\times60\times60}$

$\omega = 7.277\times10^{-5}$ sec^{-1}

→ Centripetal acceleration (a_c) = $\omega^2 R$.

$= (7.277\times10^{-5})^2 \times (6437\times10^3)$

$a_c = 0.03408\ ms^{-2}$

→ Mass of earth = 5.98×10^{24} kg

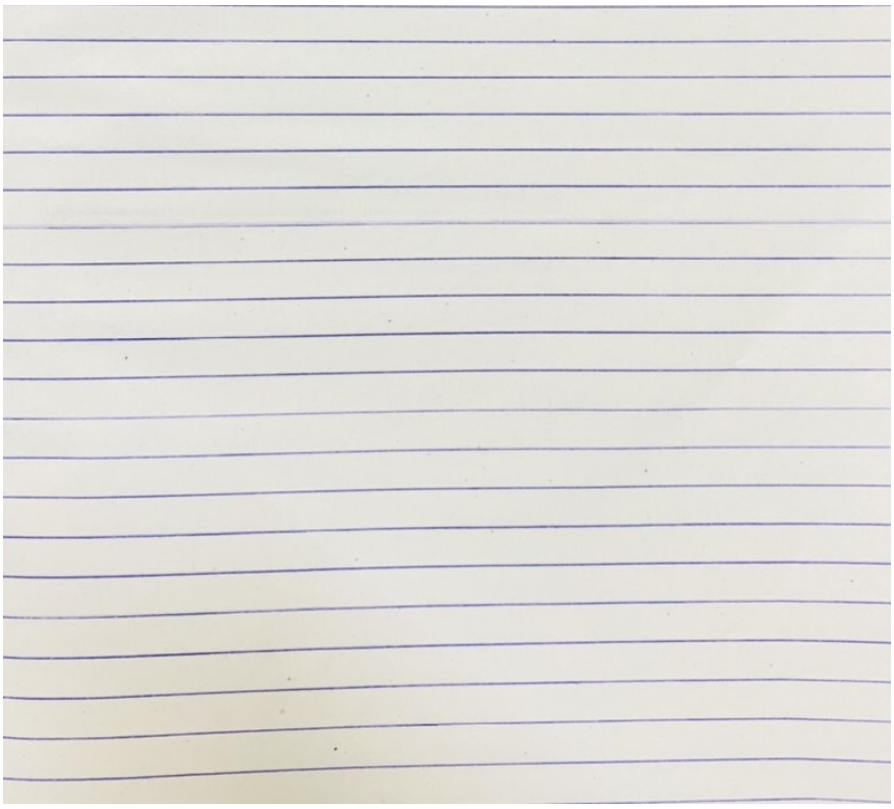
G = Gravitational constant = $6.673\times10^{-11}\ \frac{N m^2}{Kg^2}$

acceleration due to gravity (g)

$= \frac{GM}{R^2} = \frac{5.98\times10^{24}\times6.673\times10^{-11}}{(6437.3)^2}$.

$g = 9.8066\ ms^{-2}$.

Centripetal acceleration	Gravitational acceleration
→ It is dependent on radius and angular velocity.	→ It is dependent on mass and radius.
→ It can change based upon the object.	→ It is constant for a particular planet.
→ It is due to circular motion of object around planet.	→ It's due to rotation of earth on its own axis.



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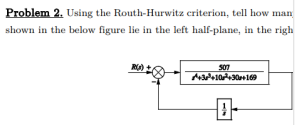

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