Q- Calculate the acceleration due to gravity at a height of 8.848 km from surface of the earth.

The magnitude of force of gravity on a body of mass m at distance r from the center of earth is given by Newton's law of universal gravitation as

$$F = \frac{GMm}{r^2}$$

Hence the force on the body at height h from the surface of the earth is given by

$$F = \frac{GMm}{(R+h)^2}$$

And hence the acceleration due to gravity at height h from the surface of earth is given by

$$g_h = \frac{F}{m} = \frac{GM}{(R+h)^2} = \frac{gR^2}{(R+h)^2} = g\left(\frac{R}{R+h}\right)^2$$

Or $\quad g_h = g\left(\frac{R}{R+h}\right)^2 = 9.8\left(\frac{6.4*10^6}{6.4*10^6 + 8848}\right)^2 = 9.773\,\text{m/s}^2$