If we want to launch a mass horizontally just above the earth’s surface, what speed is required to make it travel in a circle around the earth? If $R_E$ is earth’s radius and $h$ is height above earth’s surface of the launch, the speed must be:

a) $gH$

✓b) $(g \cdot R_E)^{1/2}$

c) $gR_E$

d) $(gh)^{1/2}$

e) $(gR_E^2/h)^{1/2}$

f) None of the above.
This is purely a problem of circular motion, for which $F_{\text{Cent}} = m \frac{v^2}{r}$.

- Since the object is to move in a circle around the earth just above the earth's surface, and $R_E$ is large, $h \ll R_E$, and radius of circle is $r = R_E + h = R_E$, approximately.

- Also, $F = F_{\text{Grav}} = mg$ towards center of earth. Therefore from $F_{\text{Cent}}$, above,
  
  $F_{\text{Cent}} = mg = m \frac{v^2}{r} = mv^2/R_E,$
  and $v^2 = g R_E$ or $v = (g R_E)^{1/2}$.

- Therefore, the correct answer is (b).