J. Griffin 10/1/07

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

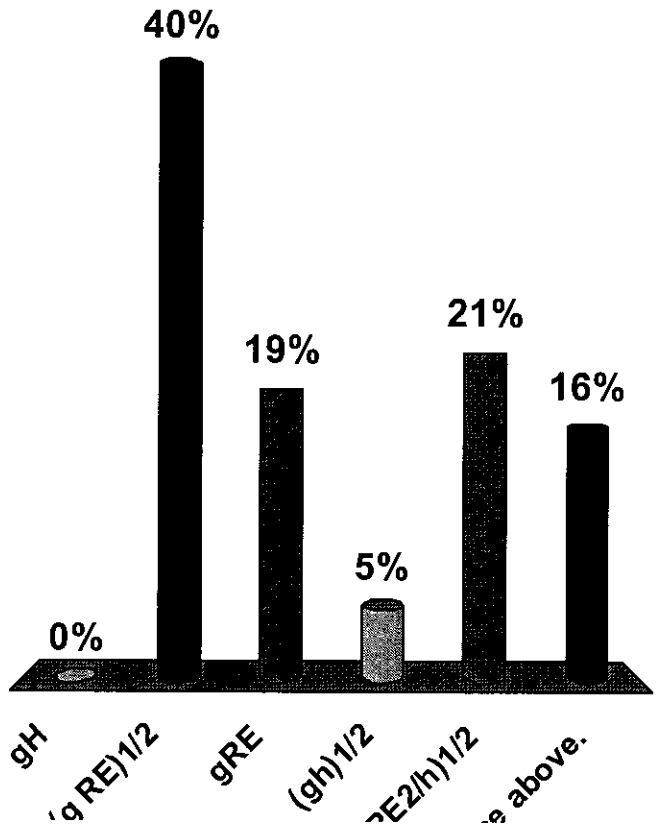
✔b) $(g\ R_E)^{1/2}$

c) gR_E

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

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

f) None of the above.



J. Griffin 10/1/07 (b)

This is purely a problem of circular motion, for which $F_{Cent} = m\ v^2/r$.

- Since the object is to move in a circle around the earth just above the earth's surface, and R_E is large, $h << R_E$, and radius of circle is
  $r = R_E + h = R_E$, approximately.
- Also, $F = F_{Grav} = mg$ towards center of earth. Therefore from $F_{Cent,}$ above,
  $F_{Cent} = mg = m\ v^2/r = mv^2/R_E$,
  and $v^2 = g\ R_E$ or $v = (g\ R_E)^{1/2}$.
- Therefore, the correct answer is (b).