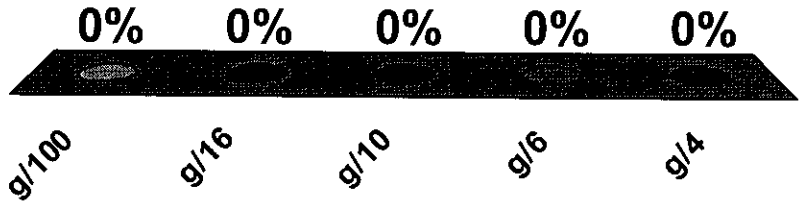
11/1/06

On the earth's surface, the force of gravity is $\mathbf{mg = GM_Em/R_E^2}$. If another planet, **P**, has a mass $\mathbf{M = 0.01M_E}$ and a radius $\mathbf{R = R_E/4}$, the acceleration of gravity there is, most nearly, $\mathbf{g_P}$ = _____:

1. **g/100**
2. **g/16**
3. **g/10**
4. ✔ **g/6**
5. **g/4**



The correct answer is #4 $g'_p = g/6$; as follows.

- Denoting the planets mass and radius by M and R, respectively, we have:

$$g_P/g = \{GMm/R^2\}/\{GM_Em/R_E^2\}$$
$$= \{M/R^2\}/\{M_E/R_E^2\}$$
$$= \{M/M_E\}\{R_E^2/R^2\}$$
$$= (0.01)*(4^2)$$
$$= 0.16 = 1/6, \text{ approximately.}$$

- **i.e. $g_P = g/6$; i.e., answer #4.**

(Note that these values of M and R are quite close to those of the moon.)