

30. The amount of (kinetic) energy needed to escape is the same as the (absolute value of the) gravitational potential energy at its original position. Thus, an object of mass m on a planet of mass M and radius R needs $K = GmM/R$ in order to (barely) escape.

(a) Setting up the ratio, we find

$$\frac{K_m}{K_E} = \frac{M_m}{M_E} \frac{R_E}{R_m} = 0.045$$

using the values found in Appendix C.

(b) Similarly, for the Jupiter escape energy (divided by that for Earth) we obtain

$$\frac{K_J}{K_E} = \frac{M_J}{M_E} \frac{R_E}{R_J} = 28 .$$