Answer on Question #67115-Physics-Solid State Physics

A rocket goes up at a velocity of 20m/s on the moon. If the gravity on the moon is 1.4m/s squared, then what velocity will the rocket hit the ground at?

Solution

According to the conservation of energy law the kinetic energy at the ground is constant. Therefore, the velocity of the rocket when it hits the ground is 20m/s (downwards).

A ball before it is thrown has a gravitational potential energy of 200j. It's kinetic energy when it is thrown into the air is 400j. What is the kinetic energy of the ball when it hits the ground?

Solution

According to the conservation of energy law:

$$K' = K + U = 200 + 400 = 600\,J.$$

Someone uses 8000j of force to lift 400kg 2m off the ground. What is the gravitational potential energy of the object?

Solution

$$U = mgh = (400)(10)(2) = 8000\,J.$$

A ball goes down a hill 5m in 1.5s. The average acceleration at the top of the hill is 3m/s squared. What is the final velocity and acceleration of the ball?

Solution

$$a_{av} = \sqrt{\frac{2h}{t}} = \sqrt{\frac{2(5)}{1.5}} = 2.6\frac{m}{s^2}.$$

$$a_{av} = \frac{a_i + a_f}{2}$$

The final acceleration of the ball is

$$a_f = 2(a_{av}) - a_i = 2(2.6) - 3 = 2.2\frac{m}{s^2}.$$

The final velocity is

$$v_f = a_{av}t = 2.6(1.5) = 3.9\frac{m}{s}$$