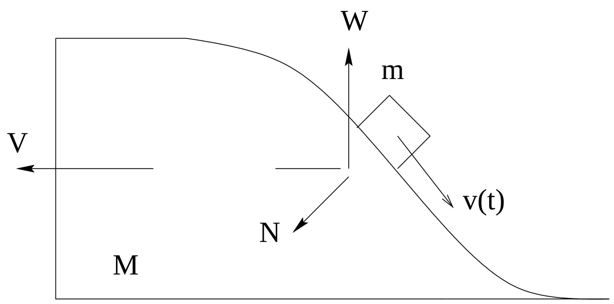
Solution:
Consider the following fig:



We assume a *general* shape of hill, in order to smooth out the singularities at the top and the bottom of the hill.

Let us focus on the mass M (earth). It moves in almost a constant velocity V to the left. There is no much change in its velocity, since we assume that the mass of the small body m is negligible relatively to the earth mass M, $m \ll M$.

The large mass will experience two forces, gravitational force W and a contact force N. According to the third law of Newton the small mass, m, will experience the same forces.

Since W is perpendicular to the velocity V, no work will be made by this force. The contact force N will cause the following change in the energy:

$\Delta E = \int NV \cos\theta(t)dt$,

where $\theta(t)$ is a time dependent angle between V and N (the direction of N changes in time).

Now, $N = mg\sin\theta(t)$. We arrive at

$$\Delta E = Vm \int g\cos\theta(t)\sin\theta(t)dt \tag{1}$$

In order to calculate the last integral (1) we will use the motion of the small body m.

In our notation $v(t)$ is the relative velocity of m (see fig.). Summing the vertical distance leads to (Lemma 1)

$$h = \int dy = \int v_y dt = \int v(t)\cos\theta(t)dt \tag{2}$$

Lemma 2: The change in the vertical velocity (square) is zero

$$0 = \int a_y dy = \int a_y v_y dt = \int g \cos^3 \theta(t) v(t) dt \tag{3}$$

Which leads to

$$0 = \int g \cos \theta(t) v(t) dt - \int g \sin^2 \theta(t) \cos \theta(t) v(t) dt \tag{4}$$

Substitution of (2) in (4) leads to (Lemma 3):

$$\int g \sin^2 \theta(t) \cos \theta(t) v(t) dt = gh \tag{5}$$

Let us consider now the horizontal motion of m. In our notation v_f is the final horizontal velocity. The final velocity v_f is determined by the two following relations

$$v_f = V - \int a_x dt = V - \int g \sin \theta(t) \cos \theta(t) dt, \tag{6}$$

and

$$\frac{1}{2}v_f^2 - \frac{1}{2}V^2 = \int a_x dx = \tag{7}$$
$$\int a_x(-V + v_x) dt = -V \int g \sin \theta(t) \cos \theta(t) dt + \int g \sin^2 \theta(t) \cos \theta(t) v(t) dt,$$

where v_x is the relative horizontal velocity. We can use Lemma 3 (5) to simplify the last relation(7). It reads

$$\frac{1}{2}v_f^2 - \frac{1}{2}V^2 = -V \int g \sin \theta(t) \cos \theta(t) dt + gh \tag{8}$$

The two equations (6) and (8) can be solved. Indeed, substituting v_f (from (6)) in (8), leads to

$$\frac{1}{2}\left(V - \int g \sin \theta(t) \cos \theta(t) dt\right)^2 - \frac{1}{2}V^2 = -V \int g \sin \theta(t) \cos \theta(t) dt + gh \tag{9}$$

Which yields,

$$\int g \sin \theta(t) \cos \theta(t) dt = \sqrt{2gh} \tag{10}$$

Now we can collect all partial results and count the energy: The small body "missing energy" is

$$\Delta E' = \tag{11}$$
$$\frac{1}{2}mV^2 + mgh - \frac{1}{2}mv_f^2 = \tag{12}$$
$$\frac{1}{2}mV^2 + mgh - \frac{1}{2}m(V - \sqrt{2gh})^2 = \tag{13}$$
$$mV\sqrt{2gh} \tag{14}$$

(we used (10) and (6)).

However, according to (1) (again, using (10))

$$\Delta E = mV\sqrt{2gh} \tag{15}$$

Therefore the "missing energy" is transfered to the Earth.

Note that the solution is quite general. We didn't use the relation $V = \sqrt{2gh}$. The solution is valid in any reference frame. In the particular case of $V = \sqrt{2gh}$, $v_f = 0$ and other expressions are simplified also.