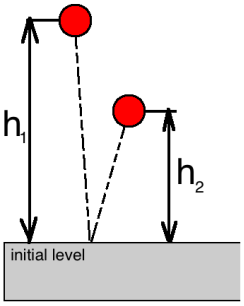
if you drop the ball on a flat surface, and it bounces back up but not as high because energy was lost due to the sound, heat, and the energy absorbed by the surface. How would you measure how much energy the surface absorbed.

Solution:

$h_1 -$ initial height, $h_2 -$ final height.



$E_1 = mgh_1 -$ initial mechanical energy (potential energy at a height h_1);
$E_2 = mgh_2 -$ final mechanical energy at a height h_2 $(h_2 < h_1)$;
$\Delta U -$ energy that surface absorbed.
The conservation of the total mechanical energy:

$$E_1 = \Delta U + E_2$$
$$\Delta U = E_1 - E_2 = mg(h_1 - h_2)$$

Answer: energy that surface absorbed can be represented as $mg(h_1 - h_2)$, m – mass of the ball, $h_1 -$ initial height, $h_2 -$ final height.