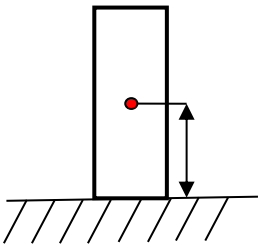
Answer on Question#62032 – Physics – Mechanics – Relativity

10 kg block, with 20 cm × 20 cm × 40 cm sides, is laying down on it's shortest edge. How much work (A) do we need to do, to spin it over the edge?

Solution. Work (if we neglect all friction losses) equals the change in potential energy. Consider the block as a material point located in the center of mass of the block.

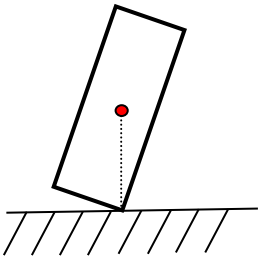
Choosing a floor as a zero level of potential energy.



$m = 10kg; b = 0.4m; a = 0.2m$

The height of the center of mass $h = \frac{b}{2} = 0.2m.$

The center of mass is at a height of 0.4 m and a distance of 0.1 m from the edges. To turn the block over the edge, it is necessary to turn the block as shown in the figure (and then the slightest push, and he falls)



The height of the center of mass will find using the Pythagorean theorem.

$h' = \sqrt{\left(\frac{b}{2}\right)^2 + \left(\frac{a}{2}\right)^2} \to h' = \sqrt{0.2^2 + 0.1^2} = 0.1\sqrt{5}m.$

Using the potential energy formula $W = mgh$ will find work:

$A = \Delta W = mgh' - mgh = mg(h' - h).$

$A = 10 \cdot 9.8(0.1\sqrt{5} - 0.2) \approx 2.3J.$

Answer. 2.3J