20-R-WE-DK-1

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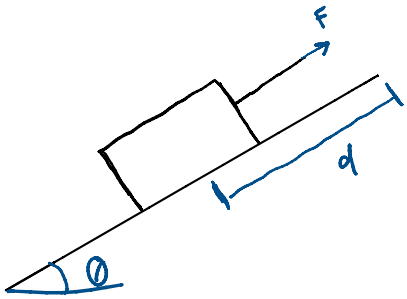
20-R-WE-DK-1 Beginner Work

Inspiration: None

You ask your little cousin to move a ***1 kg*** box up a hill with a coefficient of kinetic friction ***mu_k = 0.2***. Rather than carrying the box, he overthinks things and drags the box up the hill with a rope. Determine the work done by your little cousin and the work done by friction if he applies a constant force **F = 10N** and he drags the box up the hill ***d = 3 m*** with an incline of ***theta = 30 degrees***. How long will it take him to do so?



$\sum F_x = F - F_F - F_G \sin\theta = ma_{Gx}$

$\sum F_y = N - F_G \cos\theta = 0$

$N = (1)(9.81)\cos 30 = 8.4957$

$10 - (0.2)(8.4957) - (1)(9.81)\sin 30 = a_{Gx}$

$a_{Gx} = 3.395858$

$t = 1.329235$

$U_F = F \cdot d = 10(3) = 30\ J$

$U_{FF} = (0.2)(8.4957)(3) = 5.097426\ J$

$\Delta s = v_0 t + \frac{1}{2}at^2 \qquad 3 = 0 + \frac{1}{2}(3.3958)t^2$