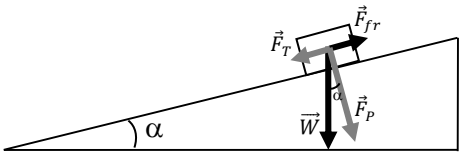
Answer on Question #64164, Physics / Mechanics | Relativity

Question:

Given an inclined plane with a slope of 1 in 4 measured along the plane. A metal block of mass 2 kg slides uniformly. What is the coefficient of friction?

Solution:



There are two forces acting on this block: its weight and the force of friction. Because the block slides uniformly we may conclude that its acceleration is zero and the magnitude of vector $\vec{F}_{fr}$ is equal to the magnitude of vector $\vec{F}_T$ (tangential component of weight).

Let — m be the mass of the block, k— coefficient of friction, g — acceleration of gravity.

$$\left|\vec{F}_{fr}\right| = k\left|\vec{F}_P\right| = kmg\cos\alpha$$

$$\left|\vec{F}_T\right| = mg\sin\alpha$$

$$\left|\vec{F}_{fr}\right| = \left|\vec{F}_T\right| \quad \Longrightarrow \quad kmg\cos\alpha = mg\sin\alpha \quad \Longrightarrow \quad k = \tan\alpha$$

The value of $\tan\alpha$ is equal to the slope of our plane, that is $\frac{1}{4}$. So, $= \frac{1}{4} = 0.25$.

Answer:

0.25