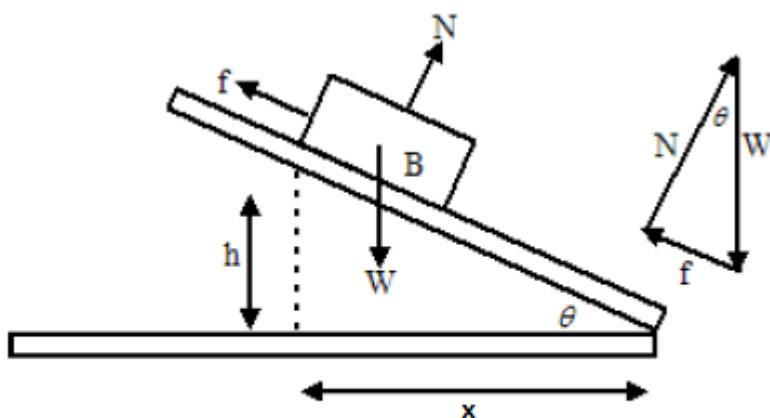


Answer on Question #55630, Physics / Mechanics | Relativity

A student wants to use the inclined plane to measure the coefficient of friction but he was not supplied with a protractor. He measures the height h and the horizontal distance of the free end of the plane from the floor x when the wooden block on the plane just begins to move. Which of the following correctly gives the coefficient of friction?

- A. h/x
- B. $\sin(h/x)$
- C. $\tan(h/x)$
- D. $\cos(h/x)$

Solution:



It is found experimentally that the force of friction f is proportional to the normal component N of the plane's reaction. Stated algebraically

$$f = \mu N$$

where the constant of proportionality μ is called the coefficient of kinetic friction.

If a body slides down an inclined plane without acceleration, it is in equilibrium and the vector diagram of forces is a closed polygon. For example, if the body B (Fig.) is sliding down the incline with constant velocity, the vector diagram formed by the weight W of the block, the force of friction f and the normal component N of the plane's reaction is a closed triangle. Since the coefficient of friction is the ratio f/N , it follows from the similarity of triangles that

$$\mu = \frac{h}{x} = \tan \theta$$

Answer: A. h/x