



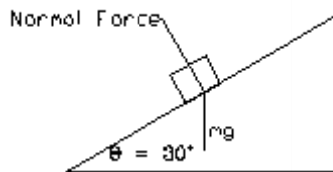
JETS Challenge 118

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Simple Friction

A block of wood is sitting on a inclined plane. The block of wood has a mass of 10 kg and its height is 2 m. The plane is inclined at 30 degrees and is frictionless.



The Challenge: How long will it take for the block to reach the bottom? What is the normal force of the block?

Editor's note: observe the turned axis. This makes the equations much easier to deal with

$$F_x = m a_x = - mg \sin \theta = -98 \sin 30 = 49 \text{ N (Newtons)}$$

$$F_y = m a_y = 0 = N (\text{normal}) - mg \cos \theta = N - 98 \cos 30 = N - 8.49$$

First problem, how long will it take to reach the bottom?

$$m a_x = 49 \text{ N}$$

$$a_x = 49 \text{ N} / m = 4.9 \text{ m/s}^2$$

$$x = a_x t^2$$

$$2 \sin 30 = 4.9 \text{ m/s}^2 t^2$$

$$t^2 = .2040$$

$$t = .45 \text{ seconds}$$

Second problem, what is the normal?

$$m a_y = 0 = N - mg \cos \theta = N - 8.49 \text{ N}$$

$$N = 8.49$$

ANSWER:

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