

Answer on Question 49897, Physics, Other A box of books weighing 225 N is shoved across the floor of an apartment by a force of 397 N exerted downward at an angle of 33.1 below the horizontal. If the coefficient of kinetic friction between box and floor is 0.551, how long does it take to move the box 3.52 m, starting from rest?

Solution

Let us find acceleration first. It is equal to resulting force divide by mass

$$a = \frac{F_r}{m} = \frac{F \cos \alpha - \mu N}{m} = \frac{397 - 0.551 \cdot 225}{225/9.8} \approx 9 \text{ m/s}^2$$

Hence we can now find time from equation of motion

$$s = at^2/2$$

$$t = \sqrt{\frac{2s}{a}} = \sqrt{\frac{2 \cdot 3.52}{9}} \approx 0.88 \text{ s}$$

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