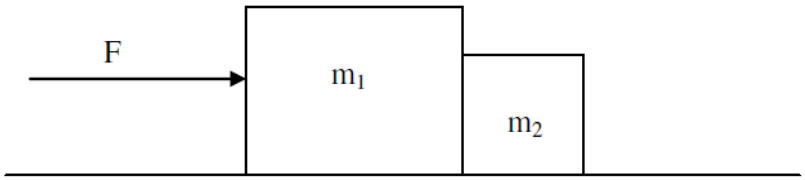
Extra Physics Practice



1. Two blocks are in contact on a frictionless table. A horizontal force is applied to one block, as shown below. (a) If m_1 = 2.3 kg, m_2 = 1.2 kg, and F = 3.2 N, find the acceleration of the two blocks.

   F = ma

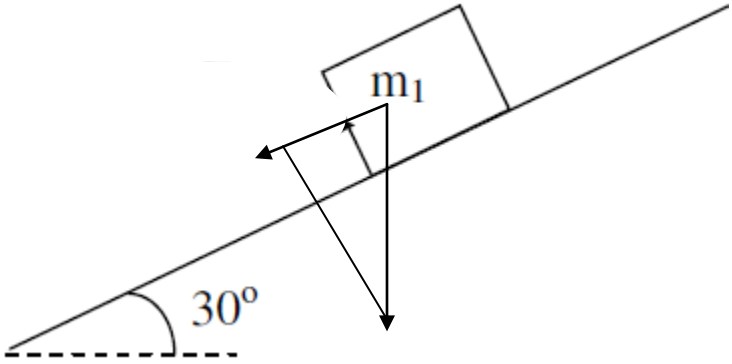
   3.2 N= (2.3 + 1.2)kg a

   a = 3.2/3.5 = 0.91 m/s^2

   (b) What force of contact is there between m_1 and m_2?

   Skip

2. A 100 kg crate is sliding down the frictionless 30° ramp shown below.



   a) With what force is it sliding down?

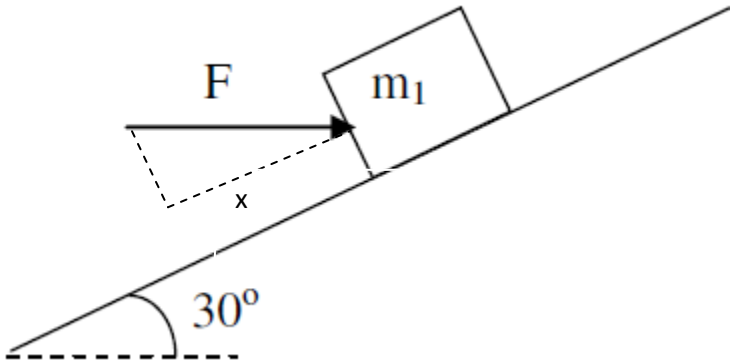
F = mgsinθ = 100 kg (9.8 m/s^2)sin30 = 490 N

b) Calculate its acceleration without using 100 kg.

$mg\sin\theta = ma$

$g\sin\theta = a = 9.8(\sin 30) = 4.9\ m/s^2$

c) Suppose you wanted to apply a horizontal force to this block to stop it from sliding down. How big would the force have to be? (Hint: use trig to find an expression for x and equate it to its opposite force)



$x/F = \cos 30$

$x = F\cos 30$

but this force has to oppose $mg\sin\theta$, so

$F\cos 30 = mg\sin\theta = 490$ from previous calculation

$F = 490/\cos 30 = 566\ N$