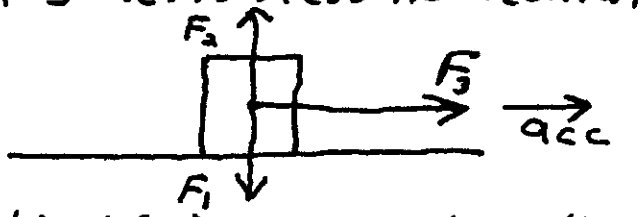
20080215_2115

How much force is needed to accelerate a 1.000 kg object at a rate of 2.000 m/s² on a perfecty smooth frictionless horizontal surface on Earth?



Solution!

The weight of the object (F_1) is exactly the same as the force that the surface exerts on the object (F_2). The vector sum of F_1 and F_2 is zero and can therefore be ignored.

The only force we must determine is the force needed to accelerate the object. Use Newton's second law.

$$F_{acc} = (m)(a_{cc}) = (1.000\ kg)(2.000\ m/s^2)$$

$$F_{acc} = 2.000\ newtons$$

Note: If there were friction, say 1.000 newton of friction, Then the total force needed to cause the acceleration would be The Sum of the above calculated force that was needed to cause the acceleration plus the force needed to overcome friction

$$F_{Total} = F_{acc} + F_{friction}$$

$$= (2.000n) + (1.000n)$$

$$F_{Total} = 3.000n$$