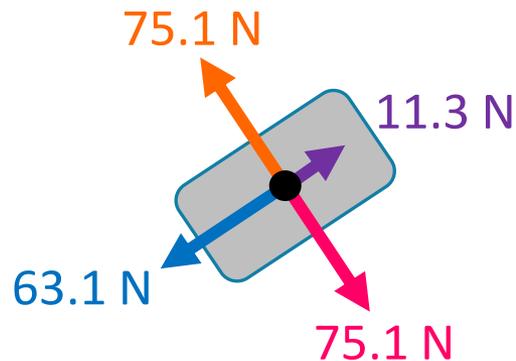


Forces on a Ramp

IB PHYSICS | FORCES

Warm up

What is the acceleration of this 10 kg block?



$$F_{net} = ma$$

Big Ideas so Far....

Acceleration is zero when net force is zero

This doesn't mean just mean "stopped" (constant velocity)

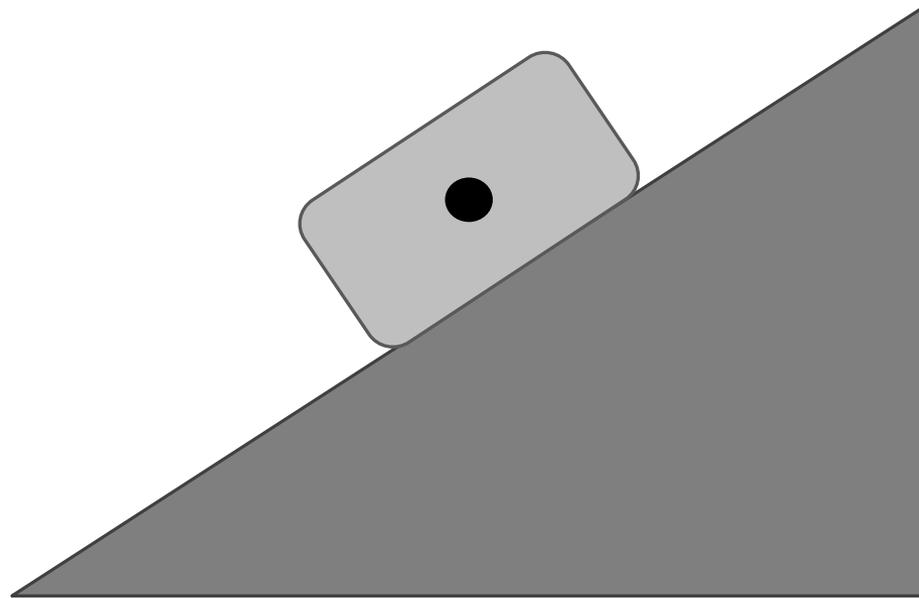
If you have acceleration of an object, you can find the net force causing that acceleration

(Think $F = ma$)

Force of friction is related to the normal force by the coefficient of friction (μ)

$$F_f = \mu R$$

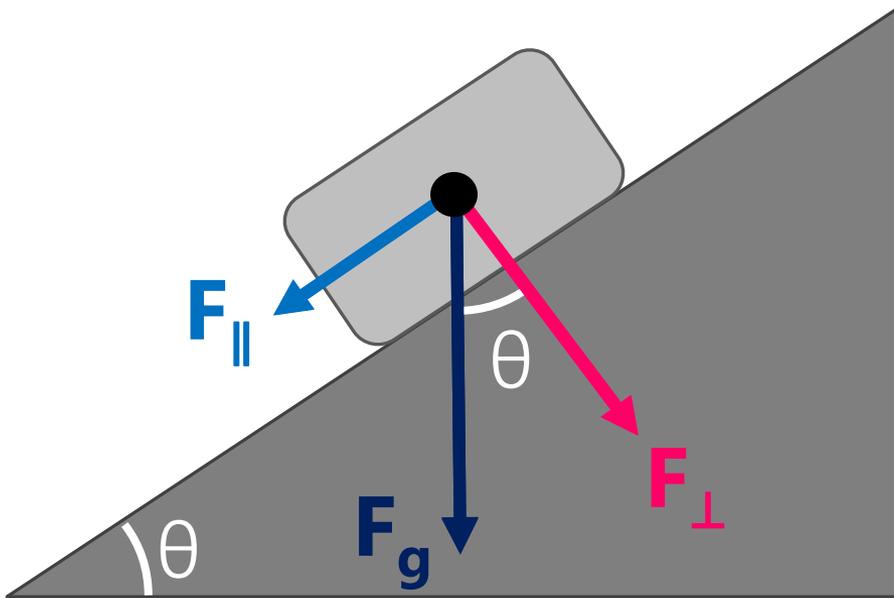
What Forces are acting?



Components of F_g

We try to choose our axes so that we are only looking at forces that are parallel and perpendicular to the motion.

This means that we need to break F_g down into components! 😊

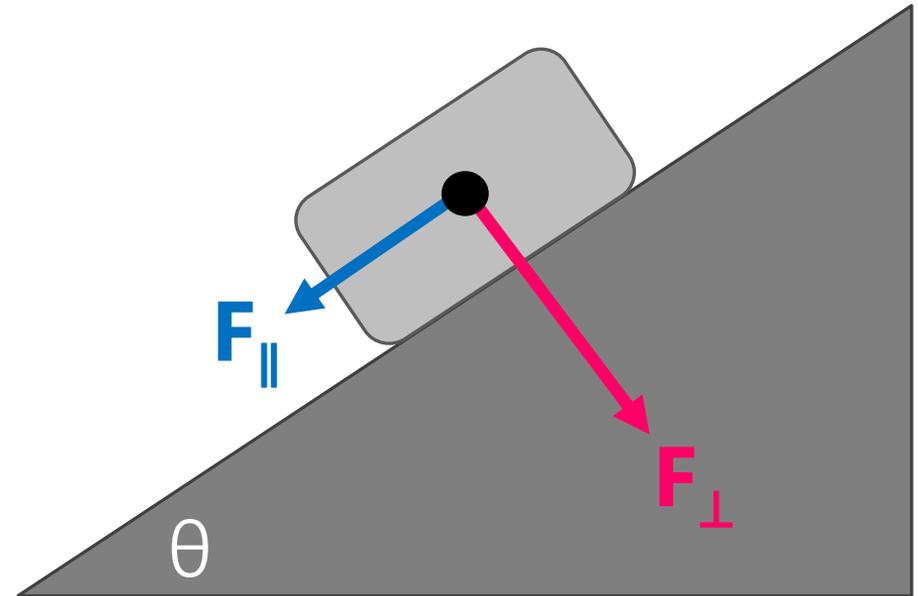


Normal and Friction Forces on Ramp

Normal Reaction Force (R)

Force perpendicular to the surface

Friction Force (F_f)

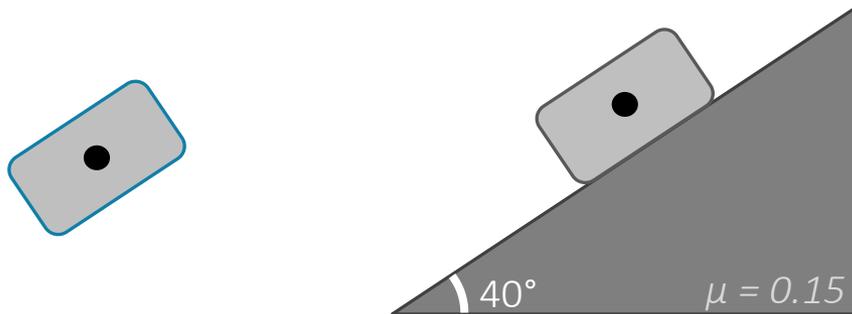


Example IB Question

A wooden block is sliding down an inclined plane at constant speed. The magnitude of the frictional force between the block and the plane is equal to

- A. zero.
- B. the magnitude of the weight of the block.
- C. the magnitude of the component of weight of the block parallel to the plane.
- D. the magnitude of the component of the normal reaction parallel to the plane.

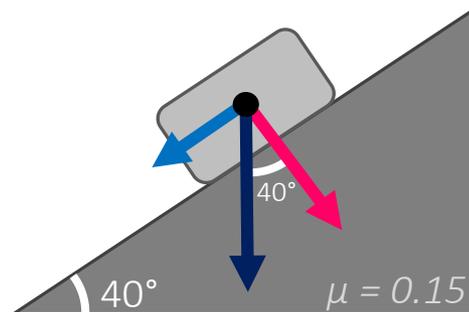
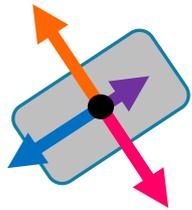
Ramp Example



m	10 kg
F_g	
F_\perp	
F_\parallel	
R	
F_f	
F_{net}	
a	

What if we didn't know mass?

For this Example...



Lesson Takeaways

- I can calculate parallel and perpendicular components of the force due to gravity on a ramp
- I can calculate the force of friction required to keep an object in equilibrium
- I can calculate the acceleration of an object with known mass on a ramp of known angle and friction
- I can symbolically simplify a mathematical model to cancel out unnecessary information