Friction

R6   Understand and use the $F \leq \mu R$ model for friction; coefficient of friction; motion of a body on a rough surface; limiting friction and statics.

For a brief commentary on this content go to the MEI outline SoW.

Pre-requisites

- Newton's laws of motion.
- Resolving forces.

Common student errors

- Using $F = \mu R$ in inappropriate situations (e.g. in static cases where the maximum value of friction has not been reached).
- Confusing the notation of F in Newton's Second Law, $F = ma$, and friction.
- Not appreciating that for objects on slopes friction might act down the slope as well as up.
- Not appreciating that it is possible for the coefficient of friction to take a value greater than 1.

Teaching it!

- A series of videos designed to support students on this topic. (Coming soon)
- A video demonstrating some simple friction experiments that students can try out with minimal equipment.
- A student experiment designed to establish the $F \leq \mu R$ model for friction, with teacher notes.
- A frictional story: Underground Mathematics resource focusing on inclined planes, designed to help students understand frictional forces in terms of inequalities.
- Friction card sort: A matching activity taken from the Teaching Mechanics 1 course.

Getting them thinking

- Hold a metre ruler horizontally across your two index fingers and slide your fingers smoothly together, fairly slowly. What happens and why?
- What are the consequences of incorrectly identifying the direction of a frictional force?
- In what direction is the frictional force between the back wheel of a cycle and the road?
- Does friction always act to prevent motion, or are there situations in which it can *cause* motion?