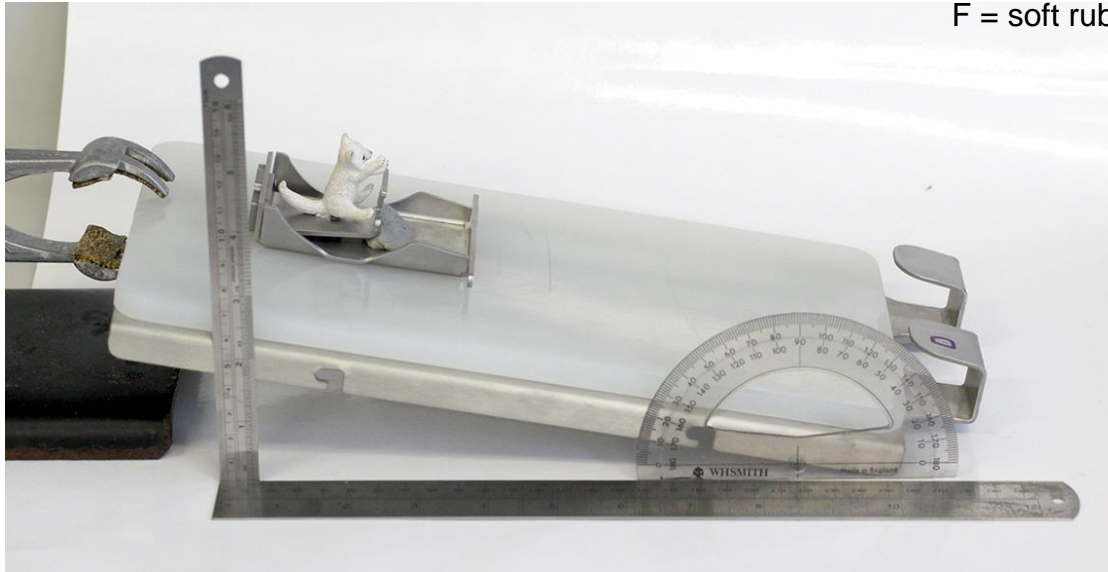


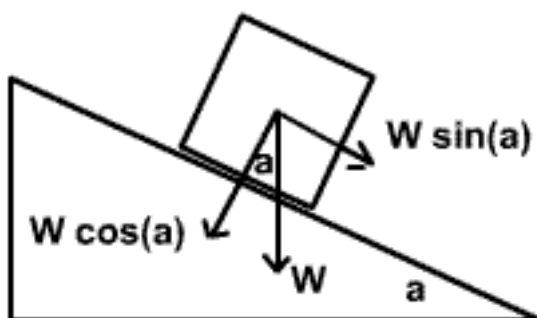
## Slope Demonstrator

- A = hard rubber
- B = acrylic
- C = stainless steel
- D = polypropylene
- E = plywood
- F = soft rubber



The **coefficient of friction** (static or kinetic) is a measure of how difficult it is to slide a material of one kind over another; the coefficient of friction applies to a pair of materials, and not simply to one object by itself.

An easy way to measure the **coefficient of static friction ( $\mu_s$ )** is to place two objects together and then tilt them until the top one slides. The angle at which one object starts to slip on the other is directly related to the coefficient.



From figure above, coefficient of static friction equals

$$\mu_s = \frac{W \sin(a)}{W \cos(a)} = \tan(a) = \frac{\text{Opposite length}}{\text{Adjacent length}}$$

Your task is to work out the coefficient of static friction ( $\mu_s$ ) for the materials provided to you.

**Step 1:** Working in groups (you will need many hands) and using the provided sleds with either a mouse or cat on-board tilt the plate up until the sled just starts to move.

**Step 2:** Using the rulers, measure the lengths of the sides of the triangle you have created. Or measure the angle directly.

**Step 3:** Use your measured lengths (or angle) to calculate the coefficient of static friction for each material pair (with the calculator provided). [Hint  $\tan(10^\circ) = 0.176$ , alternatively a triangle 25cm long by 4.4cm high  $4.4/25 = 0.176$ ]