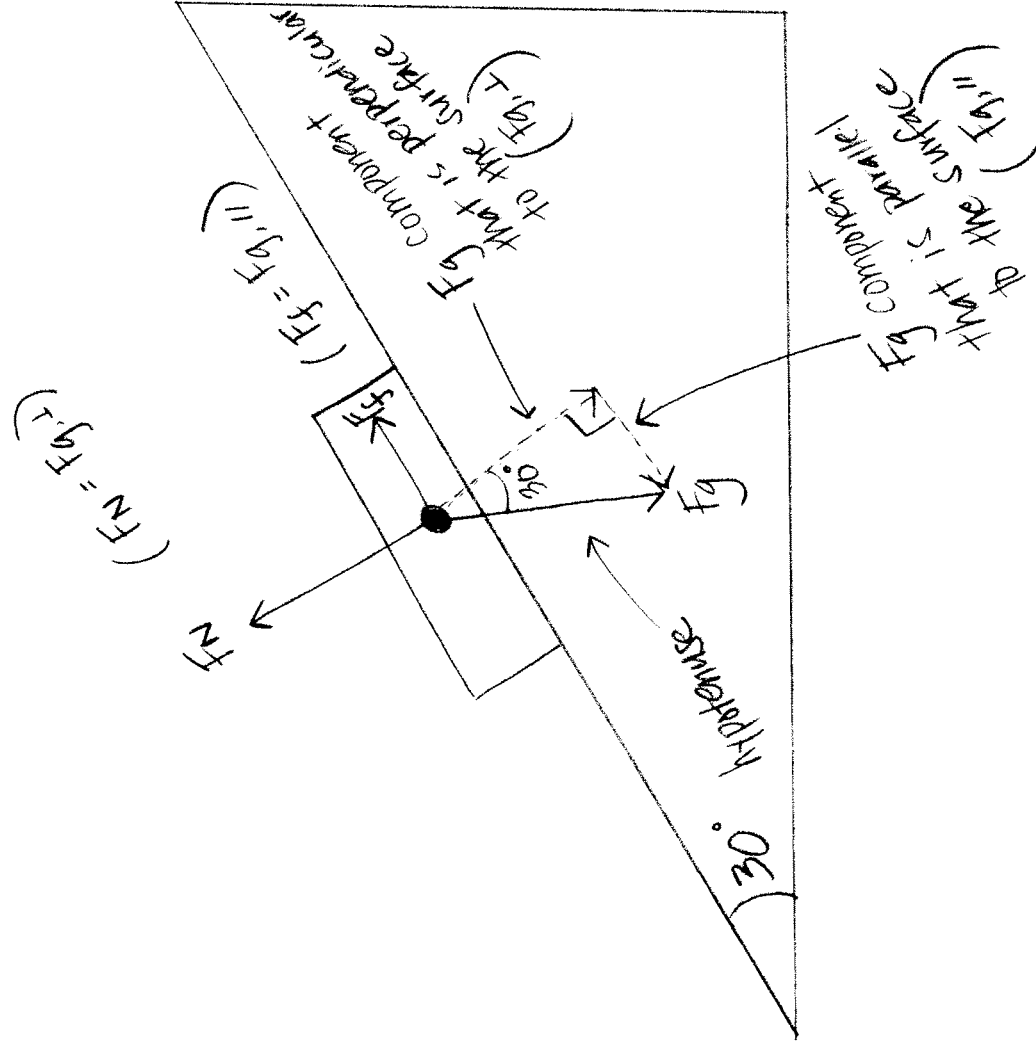


This is how to set up
an inclined plane (ramp)
problem:



Example

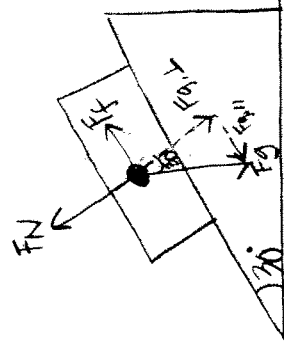
A 20 kg box is at rest
on an inclined plane (ramp)
that is angled at 30° .

Calculate:

- a) F_g b) F_N c) F_f d) μ

Solution

- Sketch the FBD
- Resolve F_g into a triangle (one side perpendicular to the surface and the other is parallel to the surface)



$$\textcircled{3} F_g = mg = 20 \text{ kg} (10 \frac{\text{m}}{\text{s}^2}) = 200 \text{ N}$$

$$\textcircled{4} F_N = F_{g,\perp}$$

$$\cos 30^\circ = \frac{F_{g,\perp}}{200 \text{ N}} \Rightarrow F_{g,\perp} = 0.9(200 \text{ N}) = 180 \text{ N}$$

$$F_N = 180 \text{ N}$$

$$\textcircled{5} F_f = F_{g,\parallel} \Rightarrow F_{g,\parallel} = 0.5(200 \text{ N}) = 100 \text{ N}$$

$$\sin 30^\circ = \frac{F_{g,\parallel}}{200 \text{ N}}$$

$$\frac{F_f}{F_N} = \frac{F_f}{F_N} = 100 \text{ N} / 180 \text{ N} \approx 0.6$$