As the angle of the incline [illegible] **Tension** , normal force decreases.

Assumptions

a. ropes have no mass

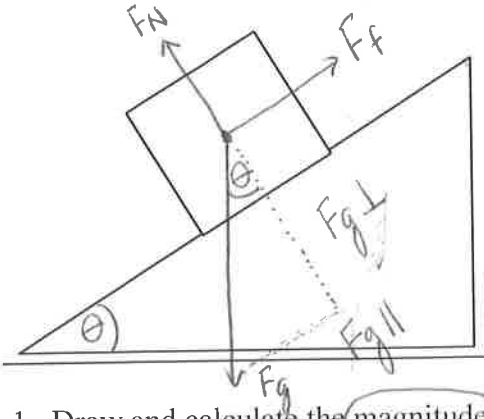
b. ropes do not stretch at all

c. force is transmitted instantly

At 90°, $F_N = 0N$ **The Inclined Plane** At 0°, $F_N = F_g$

$F_g = mg$

Draw a free-body diagram for this box at rest on an inclined plane.



Resolving F_g into components that are parallel and perpendicular to the surface of the inclined plane:

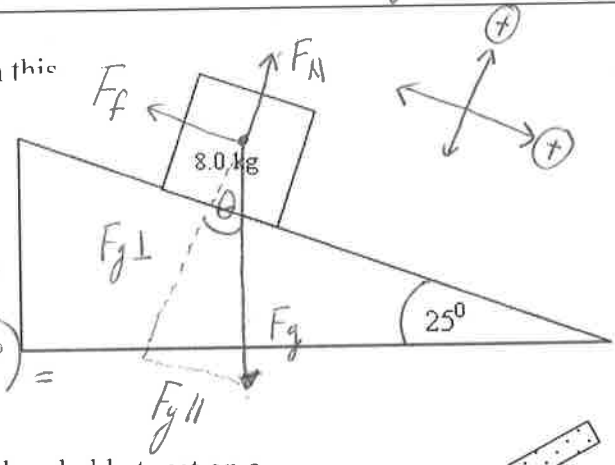
(slide) $F_{g\parallel} = F_g \sin\theta = mg\sin\theta$

(push) $F_{g\perp} = F_g \cos\theta = mg\cos\theta$

If the box is in equilibrium, then . . .

$|F_N| = |F_{g\perp}| = mg\cos\theta$ $|F_f| = |F_{g\parallel}| = mg\sin\theta$

1. Draw and calculate the magnitude of all the forces acting on this box sliding down a hill at a constant speed of 12 m/s.



$\Sigma F = 0N$

$F_N + F_{g\perp} = 0N$ $mg\cos\theta =$

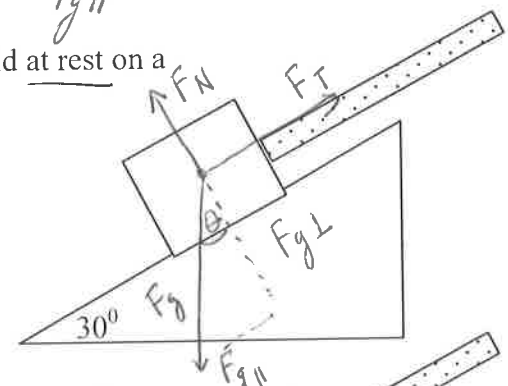
$(8.0kg)(9.8m/s^2)(\cos 25°) =$

71N

$F_f + F_{g\parallel} = 0N$ $mg\sin\theta = (78.4N)(\sin 25°) =$

33N

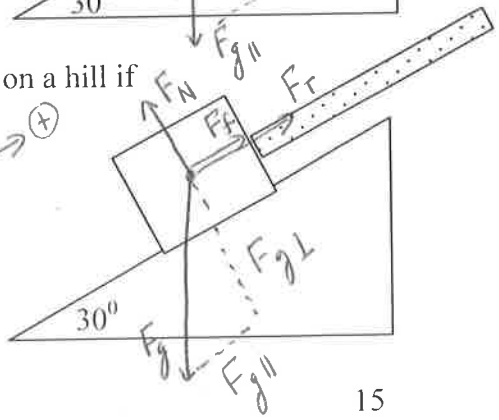
2. Calculate the force of tension in the rope holding this 50. N box held at rest on a frictionless hill.



$|F_T| = |F_{g\parallel}| = mg\sin\theta = 50N\sin 30° = 25N$

$|F_N| = |F_{g\perp}| = mg\cos\theta = 50N\cos 30° = 43N$

3. Calculate the tension in the rope holding this 50. N box held at rest on a hill if there is a 10. N force of friction.



$\Sigma F_{\parallel} = F_f + F_T + F_{g\parallel} = 0N$

$\Sigma F_{\perp} = F_{g\perp} + F_N = 0N$ $F_T = 15N$

$F_f + F_T - 25N = 0N$

(10.N)