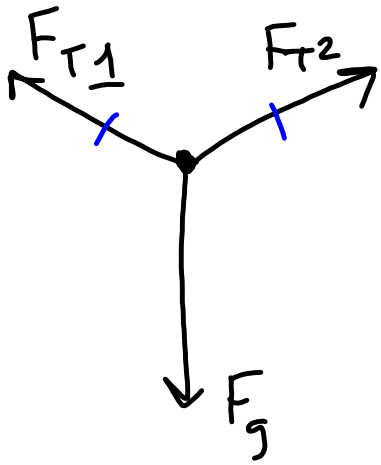
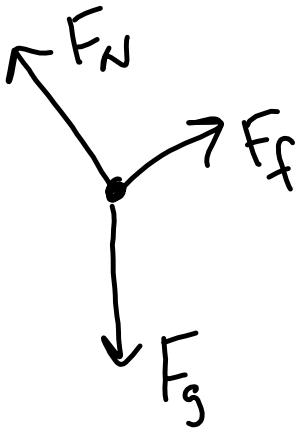
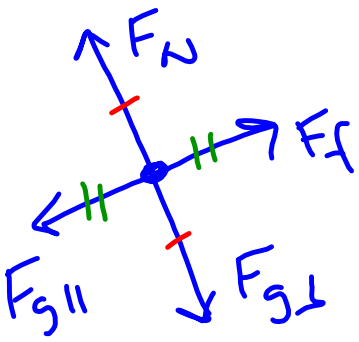
Free-Body Diagrams (Worksheet 1b)

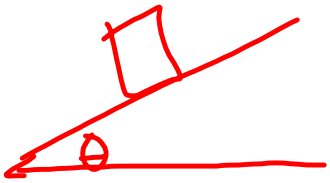
4)

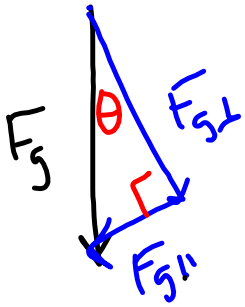


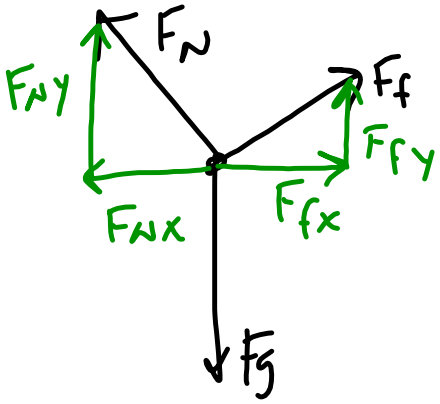
5)











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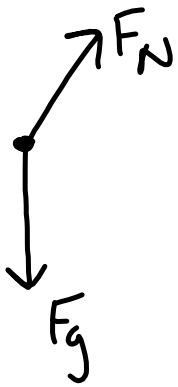

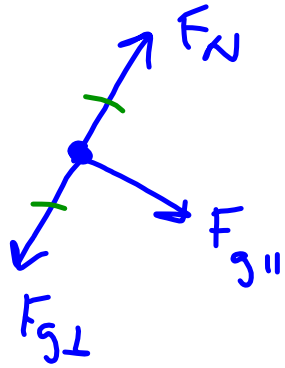

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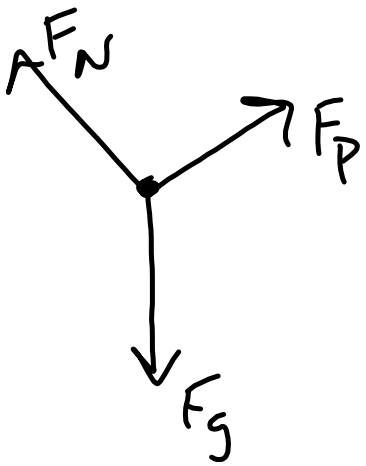
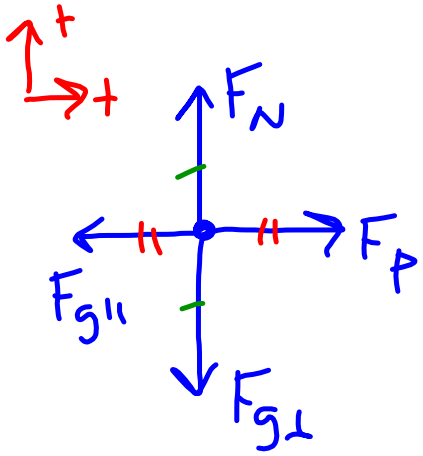
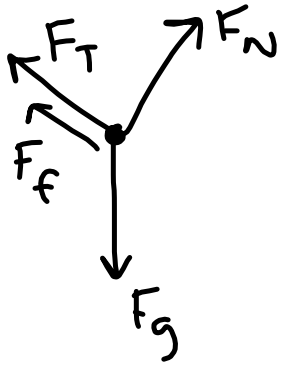


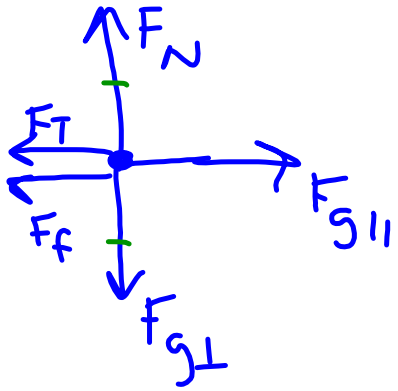


$$\Sigma F_{\parallel} = F_P - F_{g\parallel}$$

$$\Sigma F_{\perp} = F_N - F_{g\perp}$$

8)

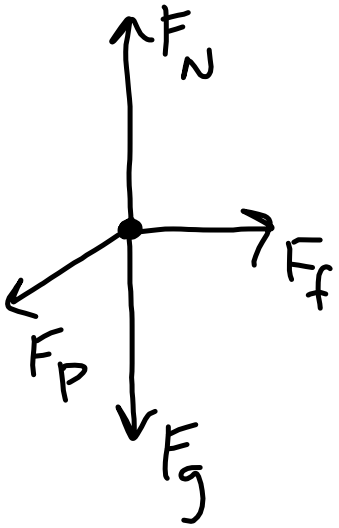


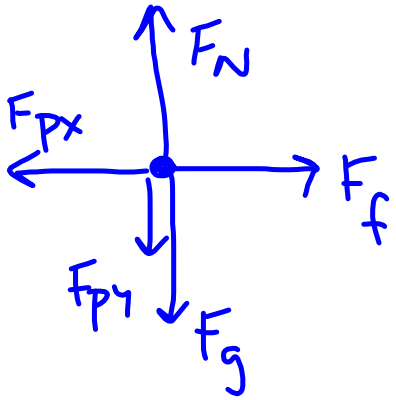


$$F_T + F_f = F_{g\parallel}$$

$$F_N = F_{g\perp}$$

3)





Is there acceleration?

- No → happens when object at rest ($v = 0$ m/s) or during constant velocity

  → Forces in opposite directions add to 0 N.

- Yes → object is accelerating in the direction of the unbalanced force

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Normal force is ALWAYS perpendicular to a surface.

Friction is ALWAYS parallel to a surface.

Other Points:

- Calculating weight (F_g):

$$F_g = mg$$

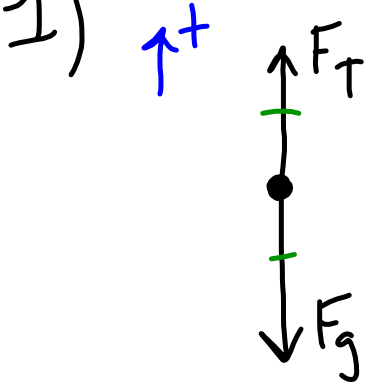
Units: $kg \cdot \frac{m}{s^2} \equiv N$ (newton)

- m → mass
- g → acceleration due to gravity where the object is

- Net Force → $\sum \vec{F}$
  - Use for ONE direction at a time → $\sum \vec{F}_x$, $\sum \vec{F}_y$, $\sum \vec{F}_{\parallel}$, $\sum \vec{F}_{\perp}$
  - Use FBD to expand the net force into an equation

Calculating Forces (Worksheet 3):

1)



→ Greek capital Sigma → summation

$$\sum \vec{F} = \emptyset$$

no acceleration

$$F_T - F_g = \emptyset$$

$$F_T = F_g$$

$$= m a_g$$

$$= (5\,kg)(9.8\,m/s^2)$$

$$= 49N$$