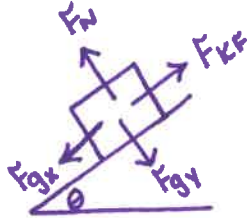
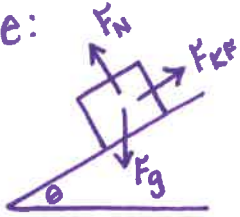


### Problem 3:

Given:  $F_g = 25 \text{ N}$ ,  $\theta = 15^\circ$ , constant speed

Want:  $\mu_k$

Figure:



$$F_{gx} = F_g \sin \theta$$
$$F_{gy} = F_g \cos \theta$$

Calculations:

constant speed  $\Rightarrow$  equilibrium  $\Rightarrow$  up forces = down forces  
left forces = right forces

$$F_N = F_{gy}$$
$$F_N = F_g \cos \theta$$

$$F_{gx} = F_{KF}$$
$$F_g \sin \theta = F_{KF}$$
$$F_g \sin \theta = \mu_k F_N$$
$$F_g \sin \theta = \mu_k F_g \cos \theta$$
$$\mu_k = \frac{\sin \theta}{\cos \theta}$$

$$\mu_k = \frac{\sin 15^\circ}{\cos 15^\circ}$$

$$\mu_k = 0.2679$$

$$\boxed{\mu_k = 0.27}$$

Kinetic Friction:  
 $F_{KF} = \mu_k F_N$

Conclusion: The coefficient of kinetic friction between the crate and the ramp is 0.27.