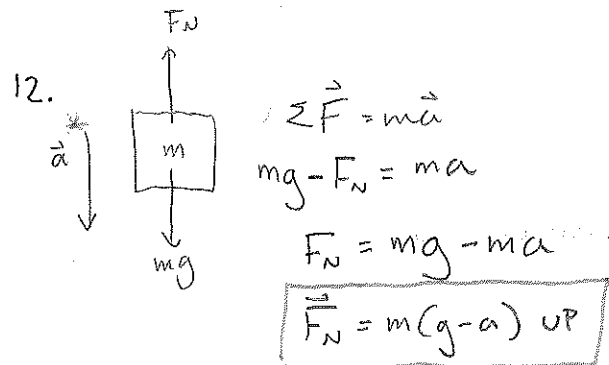
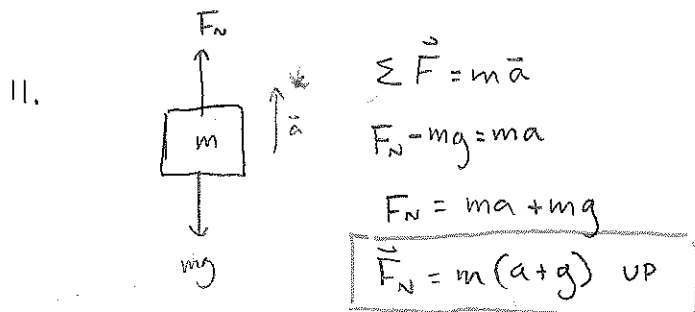
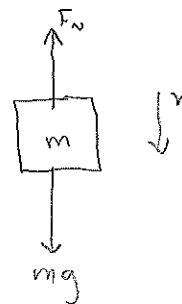
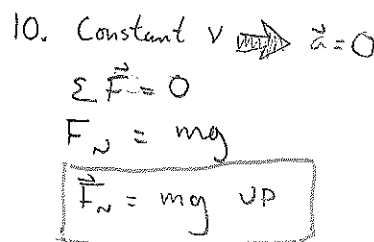
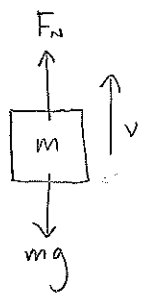
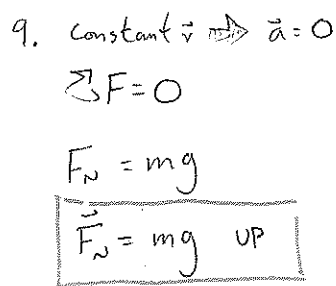
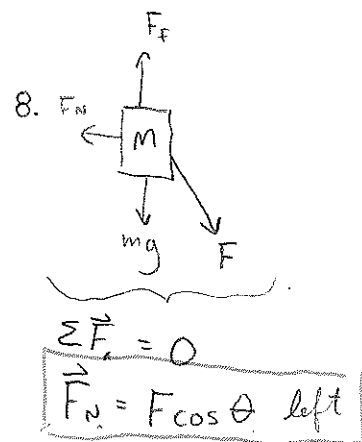
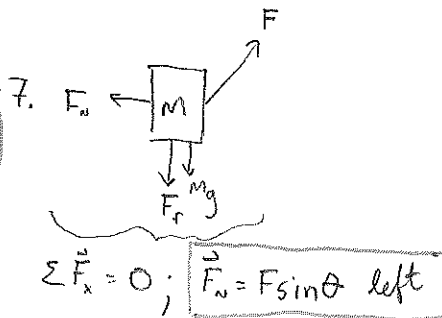
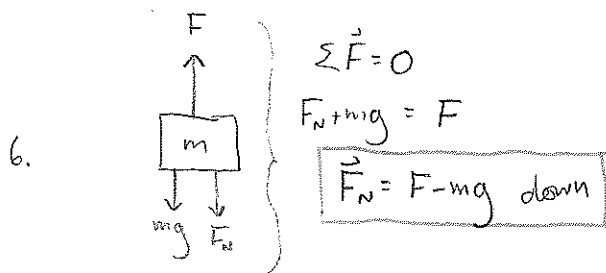
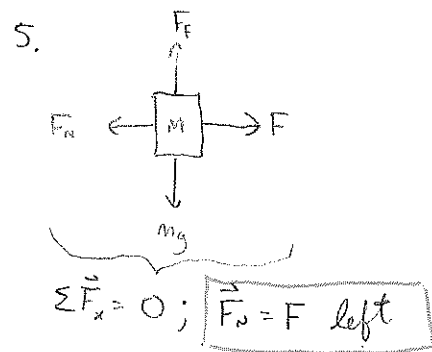
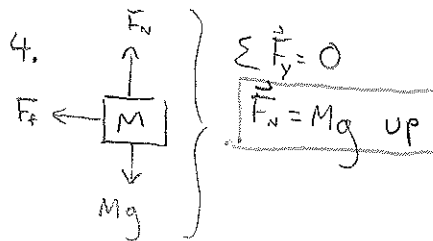
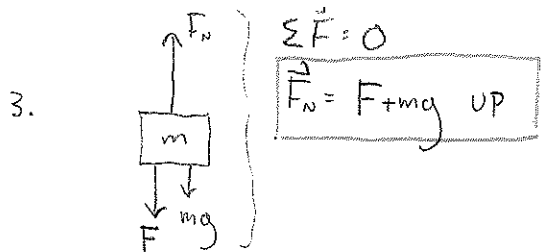
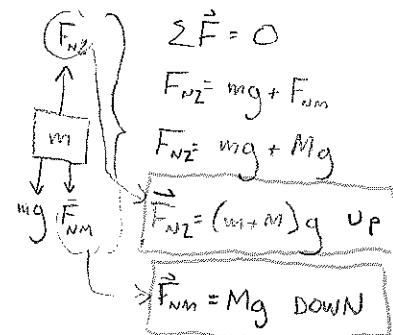
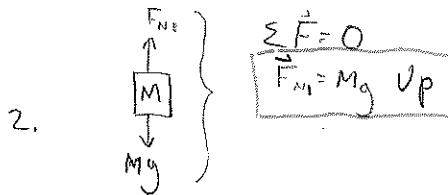
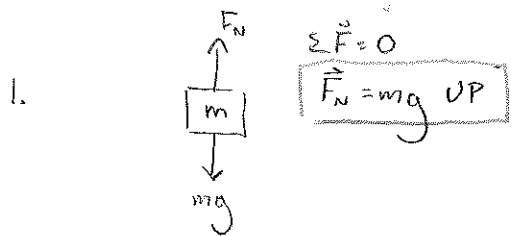


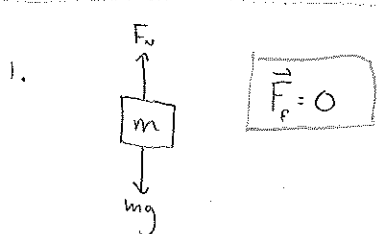
Physics 12: Normal Force

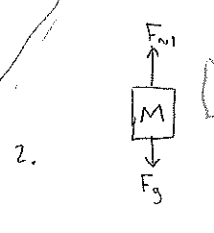
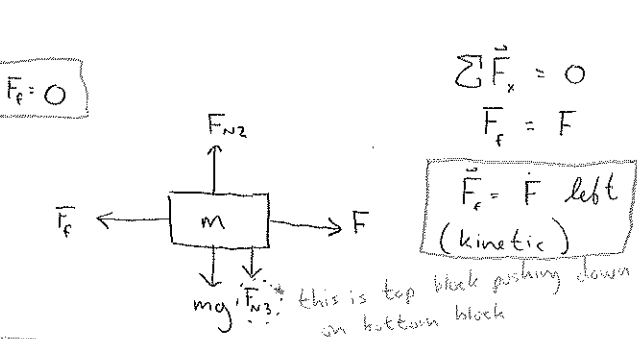
(1)



* choose direction of \vec{a} as positive direction

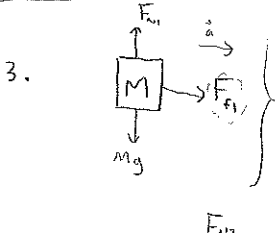
The Frictional Force.

1. 

2.  

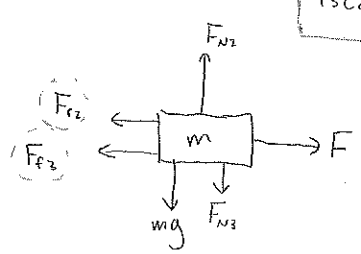
$\sum \vec{F}_x = 0$
 $F_f = F$
 $\vec{F}_f = F$ left (kinetic)

this is top block pushing down on bottom block

3. 

$\sum \vec{F}_x = m\vec{a}$
 $F_{f1} = Ma$
 $\vec{F}_{f1} = Ma$ right (static)

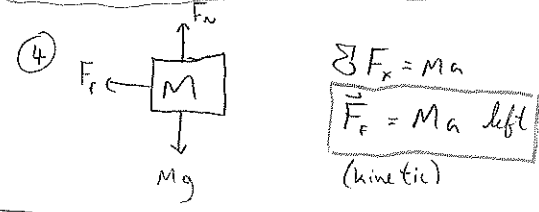
** F_f1 is F_f between the two blocks, from m acting on M.*



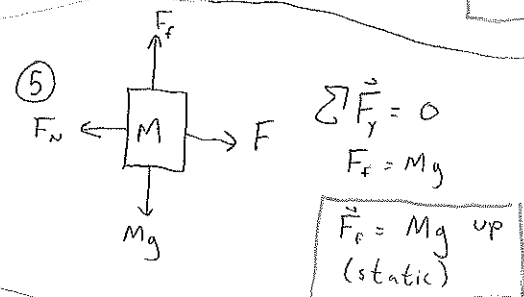
$\sum \vec{F}_x = m\vec{a}$
 $F - F_{f2} - F_{f3} = ma$
 $F - Ma - F_{f3} = ma$
 $\vec{F}_{f3} = F - Ma - ma$ left (kinetic)

** F_f2 is F_f between the two blocks, from M, acting on m*
** F_f3 is F_f from ground on m*

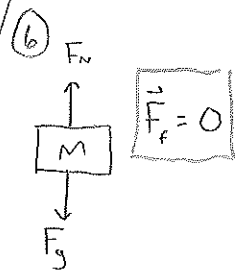
$F_{f2} = F_{f1} = Ma$

4. 

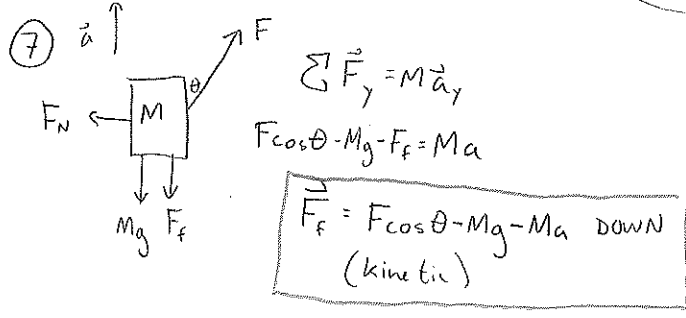
$\sum F_x = Ma$
 $\vec{F}_f = Ma$ left (kinetic)

5. 

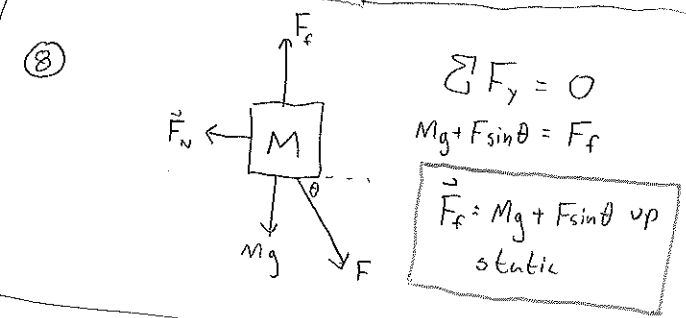
$\sum \vec{F}_y = 0$
 $F_f = Mg$
 $\vec{F}_f = Mg$ up (static)

6. 

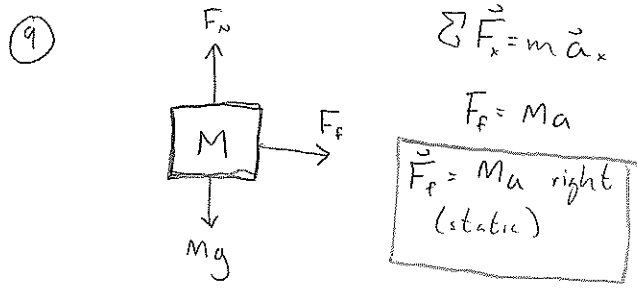
$\vec{F}_f = 0$

7. 

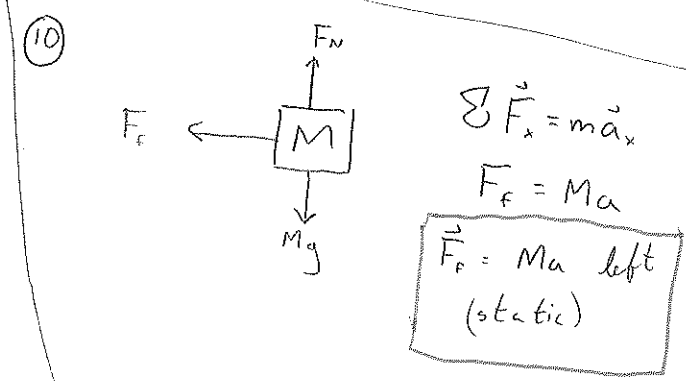
$\sum \vec{F}_y = M\vec{a}_y$
 $F \cos \theta - Mg - F_f = Ma$
 $\vec{F}_f = F \cos \theta - Mg - Ma$ DOWN (kinetic)

8. 

$\sum F_y = 0$
 $Mg + F \sin \theta = F_f$
 $\vec{F}_f = Mg + F \sin \theta$ up (static)

9. 

$\sum \vec{F}_x = m\vec{a}_x$
 $F_f = Ma$
 $\vec{F}_f = Ma$ right (static)

10. 

$\sum \vec{F}_x = m\vec{a}_x$
 $F_f = Ma$
 $\vec{F}_f = Ma$ left (static)