PreAP Forces 3
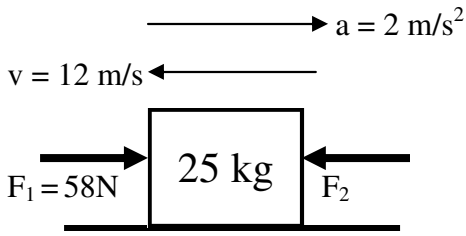
a = 2 m/s²

v = 12 m/s

$F_1 = 58N$ **25 kg** F_2

1. A 25 kg object is moving 12 m/s to the left. It has an acceleration of 2 m/s² to the right.   Notice the directions of v and a.
   A. Is the object speeding up or slowing down?
   B. Is the acceleration positive or negative?
   C. Which force must be bigger?
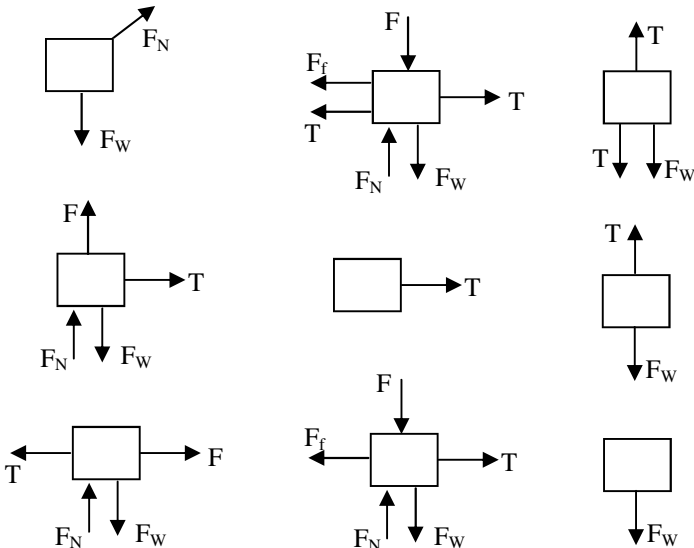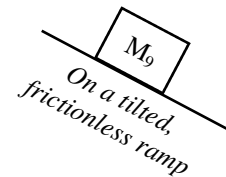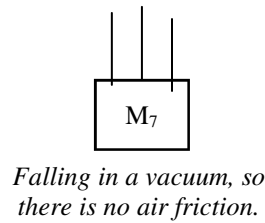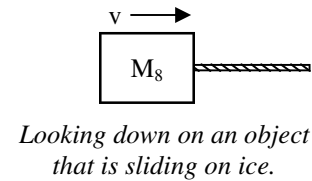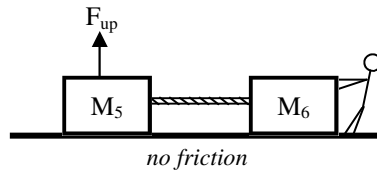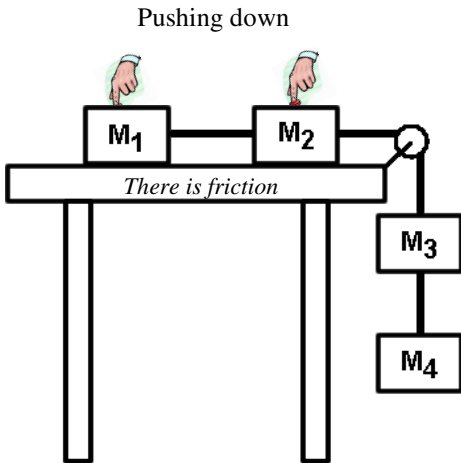   D. * Use $\sum F = ma$ to calculate F_2.

2. Slim Bim is pulling on a mass at constant speed.   There is friction on the floor.

   A. Draw all of the forces acting on the object.
   B. Since it is at constant speed, what is the acceleration of the object?
   C. Since it is moving across the floor is there static or kinetic friction?
   D. Use $\sum F = ma$ to calculate the force of friction.
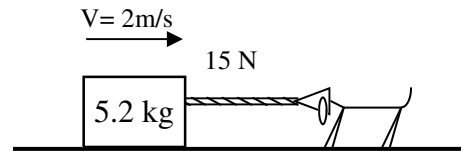
   E. In the y-direction, calculate the normal force.

   F. * Calculate the coefficient of friction for the floor ($Ff = \mu Fn$, where Ff is the force of friction, Fn is the normal force, and μ is the coefficient of friction).

V= 2m/s

15 N

5.2 kg

Pushing down

M_1 M_2

There is friction

M_3

M_4

F_{up}

M_5 M_6

no friction

M_7

Falling in a vacuum, so there is no air friction.

v

M_8

Looking down on an object that is sliding on ice.

M_9

On a tilted, frictionless ramp

F_N

F_W

F

F_f

T

F_N F_W

T

T

T F_W

3. * Identify the force diagrams for the nine masses above, putting the correct masses in the boxes (1, 2, etc). There are no repeats. Might help to draw the force diagrams for each one first.

F

T

F_N F_W

T

F_N F_W

T

F_W

4. * For the left-most mass in the second row, write the x and y second law equations.

T

F

F_f

T

F_N F_W

F_N F_W

F_W

5. Write the x and y second law equations for the left most mass in the third row.

1D) 0.29   2E) $F_2 = -8N$

F
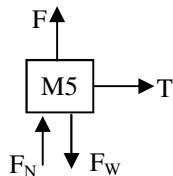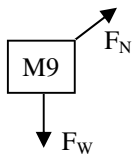
Q4:   x-dir: T = ma   (only the horizontal forces)
        y-dir: $F_N + F - F_W = ma$ (only the vertical forces)