Name: _____

Period: _____

Advanced Forces Practice

23

1. Match the following equations with the correct masses. These equations could be in either the x or y-direction. There is one duplicates.

A. 5 $T = ma$ K-dir

B. 3 $T - T - F_W = ma$

C. 1 $F_N - F - F_W = ma$

D. 14 $T - T\cos\theta = 0$

E. 1 $T - F_f = ma$

F. 12 $F_W \sin\theta = ma$

G. 5 $F_N + F - F_W = ma$

~~H. $F_N - F_W = mv^2/r$~~

I. 14 $T\sin\theta - F_W = 0$

J. 2 $F_N + F - F - F_W = ma$

K. 8 $T - F_f = 0$

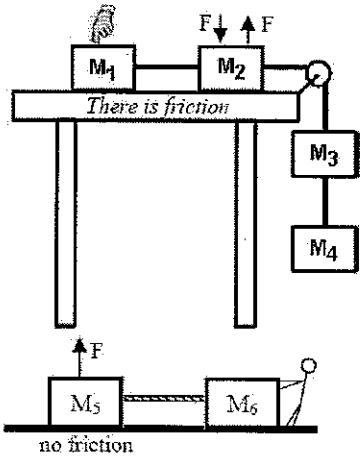
L. 2 $T - T - F_f = ma$

M. 7 $F_W = ma$

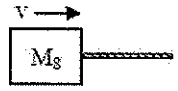
N. 4 $T - F_W = ma$

~~O. $F_N + F_W = mv^2/r$~~

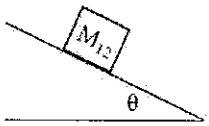
P. 6 $F_N - F_W = ma$



Falling in a vacuum



At constant speed; with friction; looking down on the object.



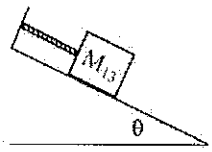
No friction

Q. 6 $F - T = ma$

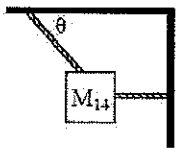
~~R. $F_N - mv^2/r$~~

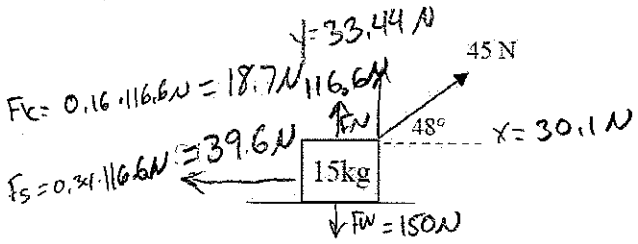
S. 12, 13 $F_N - mg\cos\theta = ma$

T. 13 $F_W \sin\theta - T = ma$



No friction





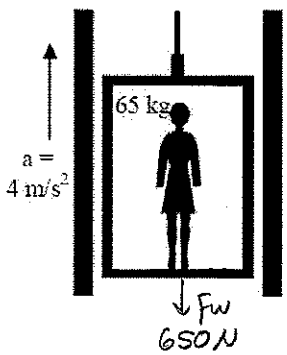
2. A 15 kg mass has a 45 N force pulling on it at an angle of 48° above the horizon. The mass is on a surface that has the following coefficients of friction: $\mu_s = 0.34$ and $\mu_k = 0.16$.

A. Decide if it will move, if it starts at rest.

No $F_x < F_s$

B. Calculate the acceleration if it is already moving.

$$a = \frac{\Sigma F = 30.1N - 18.7N}{m = 15kg} = 0.76 m/s^2$$



3. A. Calculate how heavy the 65 kg lady in the elevator feels.

$\Sigma F = ma$

$F_N - F_W = ma$ Heavier

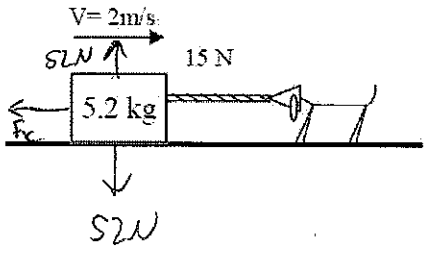
$F_N - 650N = 65kg \cdot 4 m/s^2 = 910N$

B. What would a scale (reading weight) read that is under her feet?

910N (scale reads F_N always

C. What would a scale read if the elevator's cable was cut?

0N



4. Slim Jim's dog "Bim" is pulling 15N on a 5.2 kg mass at a constant velocity of 2 m/s. There is friction between the mass and the floor.

A. Draw and label all of the forces acting on the mass.

B. What is the acceleration of the object?

$0 m/s^2 = a$ constant velocity

C. Calculate the force of friction on the mass.

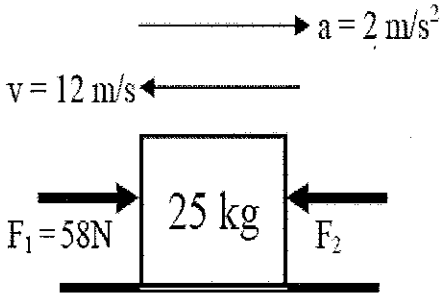
$\Sigma F = ma = T - F_f = m(0 m/s^2)$

$T = F_f = 15N$

D. Calculate the coefficient of friction of the floor.

$F_f = \mu \cdot F_N = 15N = \mu \cdot 52N$

$\mu = .29$



5. A 25 kg object has a velocity of −12 m/s and has an acceleration of +2 m/s².
   A. Is the object moving to the left, to the right, or at rest?
   B. Is the object speeding up or slowing down?
   C. Are the forces balanced or unbalanced?
   D. How do you know? acceleration
   E. Which force is greater F_1 or F_2?
   F. Calculate the net force acting on the object.

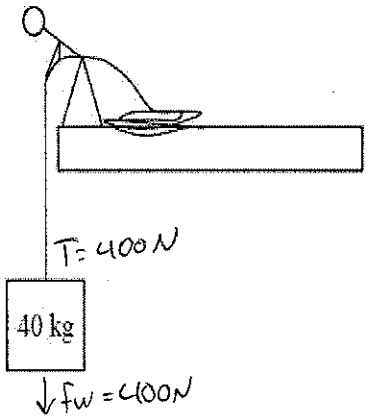
$\Sigma F = ma$

$\Sigma F = 25kg \cdot 2m/s^2 \qquad \Sigma F = 50N$

G. Calculate the magnitude of force 2.

$58N - F_2 = 50N$

$F_2 = -8N$



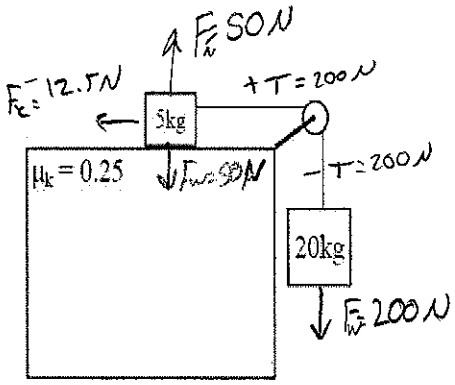
7. Slim Jim has a rope attached to an 40 kg box.
   A. If the box is not moving or at constant speed, what is it's acceleration? $0 m/s^2$
   B. What is the tension in the rope? 400 N
   C. If Slim Jim pulls the object up with an acceleration of 2.5 m/s², find the tension in the rope.

$\Sigma F = ma$

$= 40kg \cdot 2.5m/s^2 = 100N$

$T - F_w = 100N \qquad T - 400N = 100 \qquad T = 500N$

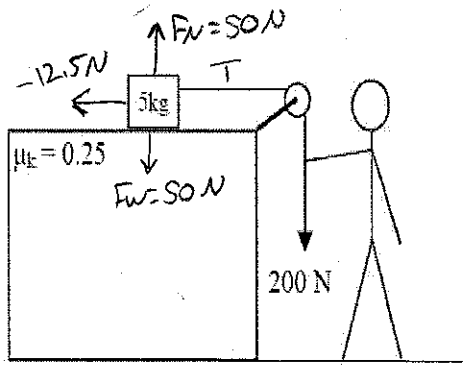
8. Find the acceleration for each of the 5 kg masses below. On the right there is only one mass and Slim Jim pulls down with 200 N.



$\Sigma F_{system} = m_{system} \cdot a$

$200N - 12.5N = 25kg \cdot a$

$a = 7.5 m/s^2$



$\Sigma F = m \cdot a$

$200N - 12.5N = 5kg \cdot a$

$37.5 m/s^2$