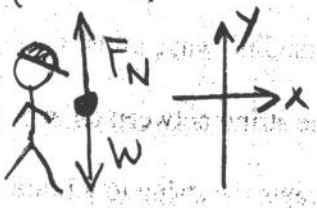
5) A 70.0 kg guy stands on a scale located on the floor of an elevator that moves downward with an acceleration of magnitude 3.00 m/s^2. The reading of the scale is (Use 10 m/s^2 for gravity):

a) 490 N
b) 200 N
c) 590 N
d) 840 N
e) 420 N

$F_{net} = F_N - W = (70kg)(-3 m/s^2)$



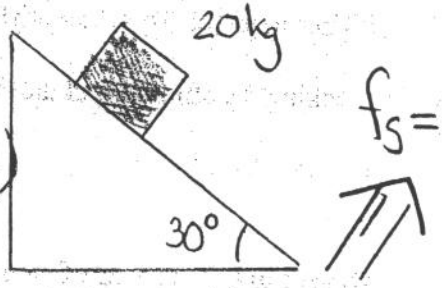
Thus,

$F_N = 700N - 210N$
$= 490N$

6) A 20.0 kg-block is resting on an 30°-inclined rough surface with coefficients of static and kinetic friction $\mu_s = 0.70$ and $\mu_k = 0.20$. The magnitude of the friction force exerted by the surface on the block is (Use 10 m/s^2 for gravity):

a) 100 N
b) 200 N
c) 75.0 N
d) 50.0 N
e) 34.6 N

$f_s^{MAX} = F_N(0.7)$
$= [200 \cos 30°N](0.7)$
$= 121.2 N$



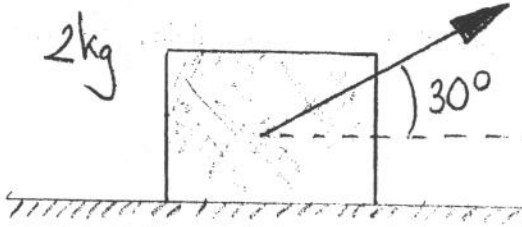
$f_s = 100N$

OBSERVE $W \sin 30° = 100N < 121.2N$

7) A force of 10 N directed at 30^0 above the horizontal is acting on a 2.0 kg-block, which is initially at rest on a rough horizontal surface. The coefficients of static and kinetic friction are respectively $\mu_s = 0.30$ and $\mu_k = 0.20$. (Use 10 m/s^2 for gravity):

The friction force acting on the body is:

a) 7.0 N
b) 3.0 N
c) 5.0 N
d) 6.0 N
e) 4.0 N



$F_N = 20 - 10 \sin 30°$
$= 15N$

$f_s^{MAX} = (15N)(0.3)$
$= 4.5N$

$F_{net_x} = 10 \cos 30° N = 8.7N > 4.5N \rightarrow f_k = F_N \cdot \mu_k$
$= 15N(0.2)$
$= 3N$

8) A 50 kg cart on a roller coaster is travelling with a speed of 30 m/s while it is at the bottom of a loop of radius $R = 10$ m. The speed of the cart at the top of the loop is: (Neglect friction and use 10 m/s^2 for gravity):