1. Static (Fs) or Kinetic (Fk) Friction?

K Tries to stop an object when it's moving.
K How much force to keep an object sliding.
K Slows down a sliding object.
S How much it takes to start an object sliding.
K Car tires when they "spin out".
both Requires $F_N$ to calculate.
K Calculate with $\mu_k$.
K On a playground slide.
K Sliding friction.
S Car tires normally.
S Is greater.
S Gripping friction
S Calculate with $\mu_s$.

2. More or less friction?

A. M On a rougher surface.
B. M If $F_N$ increases.
C. L If the surface is smoother.
D. L If $\mu$ is less.
E. M If the object has more mass.
F. M If you push down on the object.
G. L If you pull up on the object.
H. M If $\mu$ increases.


3. An object is moving to the left. Which way does friction act? Right

4. A force is pulling on an object to the left. Draw an arrow showing the direction of static friction.


5. If $F_N = 50$ N and $\mu_s = .26$, find the force of static friction.

$F_N = 50N$ $\mu$ 0.26 $F_s = ?$

$F_s = F_N \mu$

$= 50N \cdot 0.26 = 13N$

6. If $F_N = 25$ N and $\mu_k = .13$, calculate kinetic friction.

$F_k = \mu F_N$

$.13 \cdot 25N = 3.25N$

7. A. How much force is necessary to start the 12 kg object moving? 30N+
B. How much force is necessary to keep it moving? 15N
C. If it starts at rest, will it start sliding? Yes 40N > 30N
D. Calculate the acceleration of the object.

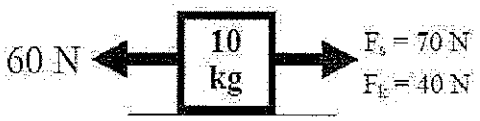

$F_{net} = -15N + 40N = 25N$

m 12kg

a =

$F = ma$ $a = \frac{F}{m}$ $\frac{25N}{12kg} = 2.1 m/s^2$

8. A. Does the object start sliding? No
B. If not, how much extra force is necessary? 10N+
C. If it is moving calculate the acceleration of the object?



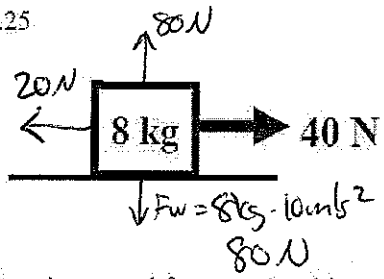

$F_{net} = -60N + 40N = -20N$

$m = 10kg$

$a = ?$

$F = ma$ $a = \frac{F}{m} = \frac{-20N}{10kg} = -2 m/s^2$

$\mu_s = .4$ $\mu_k = .25$




9. A. Calculate the normal force on the object.
B. Calculate both static and kinetic friction.

$F_s = 0.4 \cdot 80N = 32N$

$F_k = 0.25 \cdot 80N = 20N$

C. Does the object start moving? Yes
D. Calculate the acceleration if it is moving.

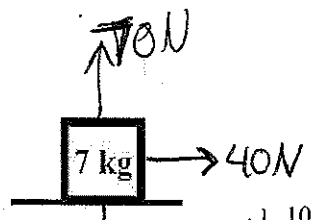
$F_{net} = -20N + 40N = 20N$

$m = 8kg$

$a = ?$

$F = ma$ $a = \frac{F}{m}$ $\frac{20N}{8kg} = 2.5 m/s^2$

$\mu_s = .6$ $\mu_k = .3$




10. A. Calculate $F_N$.

B. Using $F_N$, calculate $F_s$ and $F_k$.

$F_s = 70N \cdot 0.6 = 42N$

$F_k = 70N \cdot 0.3 = 21N$

C. Will the object slide? NO
D. Calculate the acceleration of the object if it does slide.

$F_{net} = 40N - 21N = 19N$

$m = 7kg$

$a = ?$

$F = ma$ $a = F/m$ $\frac{19N}{7kg} = 2.7 m/s^2$