AP Physics Force Review Name: KEY

The coefficient of static friction between a 4kg box and the floor is .3. What is the maximum horizontal force that can be applied to the carton before it slips?

11.76N Fh $\mu = .3$ $m = 4$ $F_N = F_w$ $.3 = \frac{F_f}{4 \cdot 9.8}$

In a game of shuffleboard, a senior citizen's dentures are given an intial speed of 9m/s. It slides 8m before stopping. What was the coefficient of kinetic friction?

.51 $\mu = \frac{a}{g}$ $\frac{5.06}{9.8}$ $0 = 9^2 + 2a(8)$ $a = 5.06 m/s^2$

A kid slides down a slide of 40° and an acceleration of 3.2m/s2. Determine the coefficient of friction between his pants and the slide.

.41 $\mu = \frac{F_f}{F_N}$ $\frac{mg\sin\theta - ma}{mg\cos\theta}$ $\frac{9.8\sin 40 - 3.2}{9.8\cos 40}$

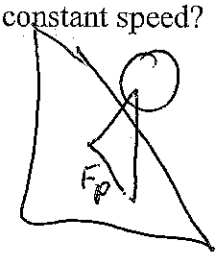
A 4500n crate is on a 25° hill. If the coefficient of kinetic friction is .4, find the acceleration of the crate down the hill.

.857 m/s^2 $.4 = \frac{mg\sin\theta - ma}{mg\cos\theta}$ $\frac{9.8\sin 25 - a}{9.8\cos 25} = .4$

$a = .857$

A 60 kg crate is on a 35° ramp. If kinetic friction is .2, what force parallel to the incline is needed to push it up at constant speed?

96.3 N F



$F_p = F_f$ $\mu = \frac{F_f}{F_N}$ $.2 = \frac{F_f}{mg\cos\theta}$

96.3 $.2 = \frac{F_f}{60 \times 9.8\cos 35}$

μ k between a metal block and an incline is .3. If the incline is 20° and the block's mass is 90kg, what force is needed to pull the block up the plane at constant speed?

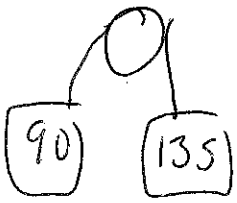
248.6 n $.3 = \frac{F_f}{mg\cos\theta}$

$.3 = \frac{F_f}{90 \times 9.8\cos 20}$ 248.6

A box of 90 kg is connected to a 135 kg box over a pulley. Find the acceleration and tension of the system

1.96 m/s²

1058.4 N



$1323 - T = 135a$

$1323 - (882 + 90a) = 135a$

$1323 - 882 - 90a = 135a$

$441 = 225a$

$a = 1.96$

$T - 882 = 90a$

$T = 882 + 90a$

$T = 882 + 90(1.96)$

$T = 1058.4$

based on your acceleration, how far will the heavy box travel down in 3 seconds?

8.82m

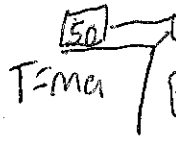
$x = \frac{1}{2}at^2$

$x = \frac{1}{2}(1.96)(3)^2$

A 50kg box is on a flat surface connected by a rope to a 22 kg box over the edge of the surface. If no friction is present, find tension and acceleration.

2.99 m/s²

149.7



$F_w - T = ma$

$215.6 - T = 22a$

$215.6 - 50a = 22a$

$215.6 = 72a$

$2.99 = a$

$T = 50(2.99)$ 149.7

What is the force exerted by a shotputter on a 5kg shot if the shot is moved through a distance of 1.8m and is released with a speed of 12m/s?

200N n

$v^2 = v_0^2 + 2ax$

$12^2 = 0 + 2 \cdot 1.8a$

$144 = 3.6a$

$a = 40$

$F = ma$

$F = 5 \cdot 40$

200 N

A elevator(mass=5050kg) is designed so that the maximum acceleration is .7g's. What are the maximum and minimum forces the motor should exert on the cable?

84133 n max

14847 n min

$max = F_w + F_a = 5050 \times 9.8 + 5050(.7 \times 9.8)$

$49490 + 34643$

84133

$min = F_w - F_a$

The cable supporting a 2350kg elevator has a maximum strength of 32500n. What maximum upward acceleration can it give the elevator without breaking?

5.17 m/s2

$F_{max} = F_w + F_a$

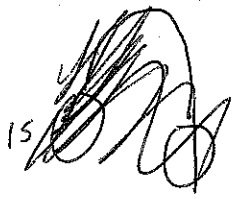
$32500 = 2350 \times 9.8 + 2350a$

5.17

A 15 kg mass is connected by a string to a 30 kg mass. If the system is accelerated up at 5m/s/s. What is the tension in each rope?

~~T_1 597~~

$T_2 = 1041$



$T_2 = T_1 + F_w + F_a$

$T_2 = 597 + 30 \times 9.8 + 30 \cdot 5$

$T = 15 \cdot 9.8 + 15 \cdot 30$

$147 + 450$

T_1 597