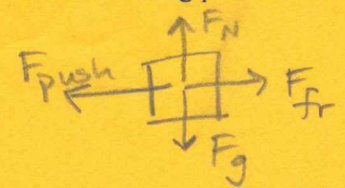
MC - 2 pts each

30 pts

PROBLEMS: Forces Test Honors IPC Flenniken Name: ANS KEY

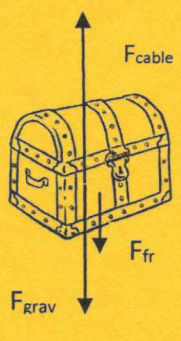
- Remember! You must neatly show your work for partial credit. Each problem is worth 5 points.

1. Draw a ***free-body diagram*** of a box. The box is being pushed across a rough floor such that it has a leftward acceleration that is relatively small.



F_{push} must be larger than F_{fr} & must be left-going

2. A treasure chest was found in a shallow sea. A team recovered it using steel cables to lift the treasure up and out of the water. Using the given information, determine the missing values. (Use 9.81 m/s^2 for g.)



(2) F_{cable} = 1986.4 N up

mass of chest = 182 kg

F_{fr} = 110 N

net acceleration = .5 m/s^2 up

(2) F_{grav} = 1785.4 N down

ΣF = 91 N up (1)

91 up = $F_g + F_{cable} + F_{fr}$

$-1785.4 + F_{cable} - 110N$

3. Ganymede is the largest moon of our solar system. It orbits Jupiter. How far apart are Jupiter and this moon? The mass of Ganymede is 1.38 x 10^{23} kg, the mass of Jupiter is 1.89813 x 10^{27} kg, and the gravitational force between the two masses is 1.6361 x 10^{22} N.

$r = \sqrt{\frac{Gm_1m_2}{F_g}}$

$\sqrt{\frac{6.67\times10^{-11}\cdot 1.38\times10^{23}\cdot 1.89813\times10^{27}}{1.6361\times10^{22}\ N}}$

$r = 1.033 \times 10^9$ m

4. If an object has a *weight* of 846.71 N on Mars, what will its weight be on Venus?

$F_{g,mars} = 846.71$

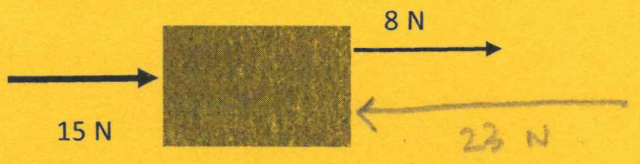
$846.71 = (m)(3.7\ m/s^2)$

$m = 228.84$ kg

$F_{g,venus} = (228.84)(8.83)$

$F_g = 2020$ N

5. What additional force is needed to establish equilibrium for this object? Draw in the force and give the value.



6. A bullet is fired out of a rifle. The rifle endures a force of 20.91 N as the bullet leaves the barrel of the gun. If the mass of the rifle is 4.5 kg, and the mass of the bullet is 4.2 g. what is the acceleration of the bullet as it is fired?

$a = \frac{20.91\ N}{.0042\ kg} = 4978.6\ m/s^2$