Practice Test - Forces

Name - _____

1.) Define the net force on an object.

2.) Explain how an object travels at a constant velocity using Newton's **First** Law in your answer.

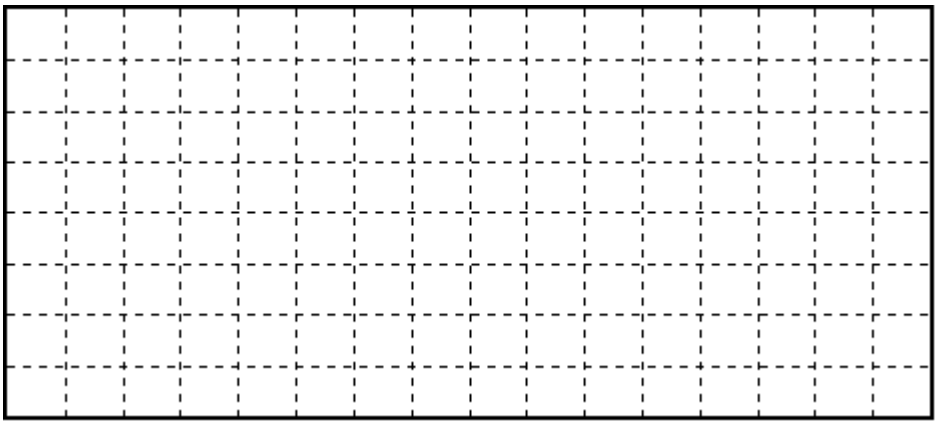
3.) Calculate the force of friction between sandpaper and a desk if $\mu = 0.60$ and the sand paper has a $0.50\ kg$ mass resting on it.

4.) A $1200\ kg$ car travelling at $+25\ \frac{m}{s}$ stops after travelling a distance of 30.0 m. What was the force provided by the brakes if friction is ignored?

5.) A $60\ kg$ runner achieves a speed of $+15\ \frac{m}{s}$ in 10.0 s when starting at rest. What is the force applied to accelerate the runner if the force of friction was $20\ N$?

6.) Use the data below and the graph paper to determine the coefficient of friction.

$\vec{F}_f$	$\vec{F}_n$
0	0
0.25	1
0.63	2
0.94	3
1.15	4

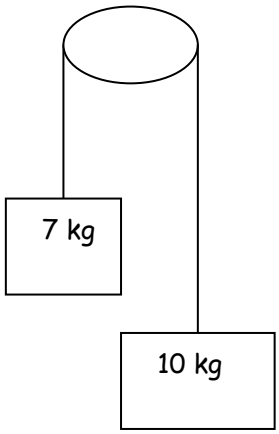


7.) Find the force applied to accelerate a $10.0\ kg$ object at $+2.5\frac{m}{s^2}$ if the force of friction is $15\ N$.

8.) Calculate the coefficient of friction in the problem above, assume a horizontal surface.

9.) What is the spring constant of a coil which has length $10\ cm$ but stretches to $15\ cm$ when a $3.0\ kg$ mass is hanging on it?

10.) What would be the acceleration of the system below?



11.) Joe has mass $75\ kg$, he sits on a spring with $k = \ 7500\frac{N}{kg}$, how much will the spring compress?

12.) What is the acceleration due to gravity on the moon if its mass is $7.4 \times 10^{22}\ kg$, its radius is $1.74 \times 10^{6}\ m$?

13.) What would be the acceleration due to gravity at twice the earth's radius?

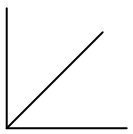
14.) Calculate the acceleration of a $100\ kg$ astronaut toward the space shuttle ($23000\ kg$) if the astronaut is $7.0\ m$ away.

15.) What is the difference between weight and mass?

Answers - 1.) Total of all forces acting on an object. 2.) Newton's first law states that an object will continue at constant velocity until an unbalanced force acts on it, so as long as all forces are balanced then the object stays at same $\vec{v}$.

3.) 2.94 N 4.) $\vec{a} = -10.4\frac{m}{s^2}, \vec{F}_{net} = -1.25 \times 10^{4}\ N$ 5.) $\vec{F}_{applied} = \vec{F}_{net} + \vec{F}_f = m\vec{a} + 20 = 110\ N$

6.)



calc slope = 0.30

7.) $\vec{F}_{applied} = \vec{F}_{net} + \vec{F}_f = m\vec{a} + 15 = 40\ N$ 8.) $\frac{\vec{F}_f}{\vec{F}_n} = \frac{15}{mg} = 0.153$ 9.) $\frac{\vec{F}}{x} = k = 3 \times \frac{9.81}{0.05} = 589\frac{N}{m}$

10.) $+1.73\frac{m}{s^2}$ 11.) $x = \frac{\vec{F}}{k} = 9.81 \times \frac{75}{7500} = 0.0981\ m$

12.) $g = \frac{Gm}{r^2} = -1.63\frac{m}{s^2}$ 13.) $\frac{-9.81}{4} = -2.45\frac{m}{s^2}$ 14.) $\vec{a} = \frac{\vec{F}}{m} = \frac{\frac{Gm_1m_2}{d^2}}{m} = 3.13 \times 10^{-8}\frac{m}{s^2}$

15.) Mass is # of atoms, weight is force of gravity on those atoms.