Forces - More Practice

Section 1 - $\vec{F}_g$

1.) Calculate the force of gravity on a $25\ kg$ mass at the surface of the earth.

2.) A $75\ kg$ mass is on the surface of Mars when an astronaut lifts it with a spring scale. The scale has a reading of $259\ N$. What is the gravitational field strength on Mars?

3.) How much force must a horizontal surface exert to hold up a $2.0\ kg$ book and what is the name of that force?

Section 2 - $\vec{F}_{net}$

1.) A cat is dragged at a constant velocity of $+3.0\frac{m}{s}$ across sandpaper. What is the total force on the cat?

2.) A $1200\ kg$ car is pushed by three students from rest to $+5.0\frac{m}{s}$, $30\ m$ along a level surface. What was the unbalanced force used on the car?

3.) Assuming the force of friction on the car in problem 2 was 100 N how much combined force did the students have to exert?

4.) What is the acceleration of a $5.0\ kg$ mass when pulled with $10\ N\ [E]$ and $12\ N\ [N]$?

5.) What is the net force of a mass when pulled with a force of $10\ N$ at $30°\ S\ of\ W$ and $12\ N$ at $40°\ W\ of\ N$.

Section 3 - $\vec{F}_f\ and\ \vec{F}_n\ (level\ surfaces)$

1.) A $10\ kg$ mass is pulled along a level surface using a force of $25\ N$. What is the coefficient of friction?

2.) A force of $7.5\ N$ is used to pull a rubber friction block across a table at constant speed. If the coefficient of friction is 0.35 what is the mass of the block?

3.) What shape is a graph of $\vec{F}_f\ vs.\ \vec{F}_n$ and what is the slope?

Section 4 - $\vec{F}_e$

1.) Calculate the extension of a spring whose spring constant is $20\ \frac{N}{m}$ when a $0.50\ kg$ mass is hung on it.

2.) What is the spring constant of a desk if a force of 784 N compresses it from height $1.00\ m$ to $0.92\ m$?

Section 5: Forces on Ramps

1.) What is the normal force and force down the ramp on a $5.0\ kg$ mass resting on a $40°$ slope?

2.) What is the acceleration of a $3.0\ kg$ mass on a $30°$ frictionless slope?

3.) What is the normal force on the mass in #2 above?

4.) What is the force of friction on the mass in #3 above if $\mu = 0.2$?

5.) What would be the acceleration of the mass in #4 above given $\mu = 0.2$?**

Answers

1.) -245 N 2.) $-3.45\ N \times kg$ 3.) $+19.6\ N, \vec{F}_n$ 1.) $0\ N$ 2.) $+500\ N$ 3.) $+600\ N$ 4.) $3.12\frac{m}{s^2}\ at\ 50.°\ N\ of\ E$ 5.) $16.9\ N\ at\ 14o\ N\ of\ W$

1.) 0.26 2.) $2.18\ kg$ 3.) $linear, \mu$ 1.) $0.245\ m$ 2.) $9800\frac{N}{m}$

1.) $\vec{F}_n = +37.6\ N \quad \vec{F}_{down} = -31.5\ N$ 2.) $-4.9\frac{m}{s^2}$ 3.) $+25.5\ N$ 4.) $-5.1\ N$ 5.) $-3.21\frac{m}{s^2}$