Astronomy

Define the following:

The Solar System:_____

The Milky Way:_____

A Galaxy: _____

The Universe:_____

Why do planets orbit the Sun? _____

_____

_____

How do the orbits of comets differ to the orbits of planets? _____

_____

Which two things does the gravitational force between two objects depend on? _____

Write the equation that links orbial speed, orbital radius, and time.

Calculate the speed of a satellite orbiting the Earth (radius 6400 km) at a height of 300 km. The satellite orbits once every 2 hours. _____

_____

_____

_____

_____

Forces Revision Booklet

Name: Class:

Forces can change three things. Write these below:

1.

2.

3.

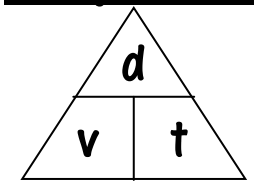
Forces are vectors and are measured in newtons. One newton is defined as:

The force required to accelerate a 1 kg mass by 1 m/s^2.

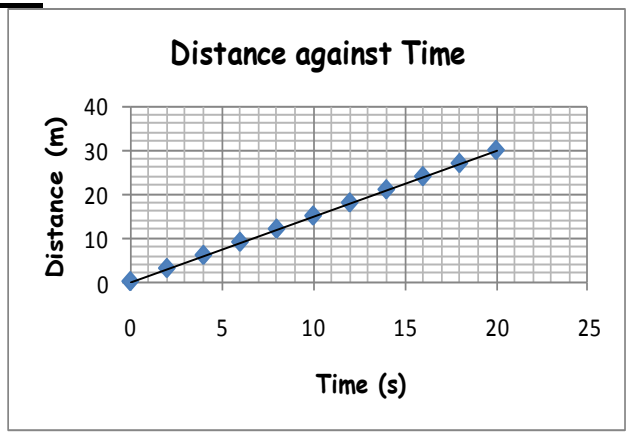
Complete the table showing what different types of forces can do.

Magnetic	
Electrostatic	
	Opposes the motion of two surfaces sliding past each other.
Upthrust	
Air Resistance/Drag	

Graphs of Motion



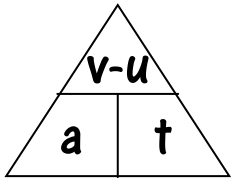
Velocity =



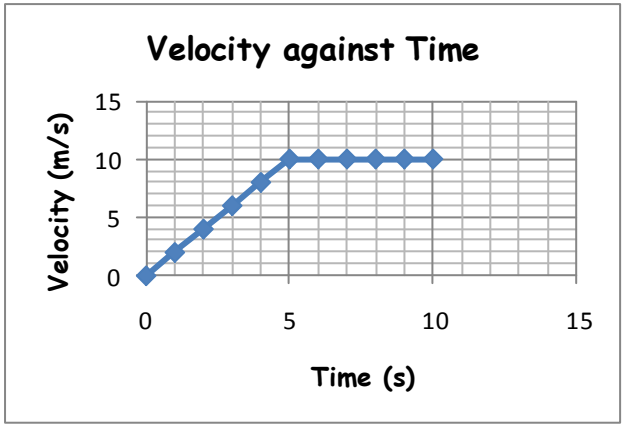
Calculate the velocity shown by the graph.

_____

_____



Acceleration =



Calculate the acceleration between 0 - 5 s

_____

_____

Calculate the total distance travelled in 10 seconds. _____

_____

_____

Turning Effect of Forces & Stability

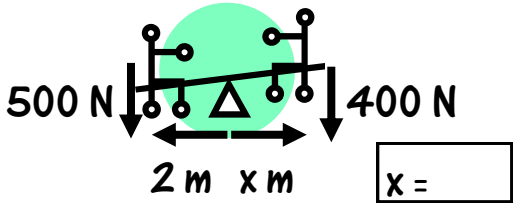
The turning effect of a force is called its _____. The size of the turning effect depends on two things; the _____ and the _____ from the pivot.

Write the equation above and use it to calculate the moments of the following:

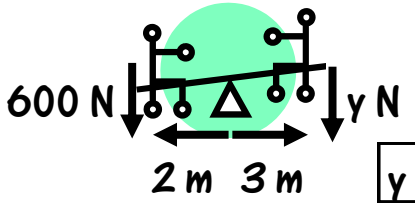
A 300 N weight acting at 2 m from a pivot. _____

A bike pedal 20 cm from the pivot being pushed with 50 N of force. _____

Use the principle of moments to balance the two see-saws below.



x =



y =

Stability

Define centre of gravity:

Outline a method of finding the centre of gravity of a 2D piece of card. Explain how your method works.

_____

_____

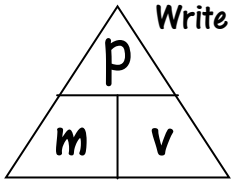
_____

_____

_____

_____

Momentum



Write below the equation that links momentum, mass and velocity.

Which of the following has more momentum; a 5 000 kg truck moving at 1 m/s, or a 2 kg meteorite moving at 3 000 m/s? _____

_____

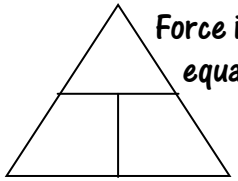
Define the term "conservation of momentum:" _____

_____

A toy train, mass 1 kg, is travelling at 3 m/s when it collides with a second train of equal mass. They stick together due to magnetic catches. How fast do they move away from the point of collision?_____

_____

_____



Force is defined as the rate of change of momentum. Write the equation that shows this relationship.

Frank Lampard takes a penalty and the ball hits the back of the net at 20 m/s. The ball has a mass of 0.5 kg and is in contact with the boot for 0.1 seconds. Calculate the force applied to the ball.

_____

_____

_____

Forces & Shape

Each team has 8 players in a scrum. Each red player pushes with 300 N, each white player pushes with 320N. What is the total force exerted by the red team? _____

What is the total force exerted by the white team? _____

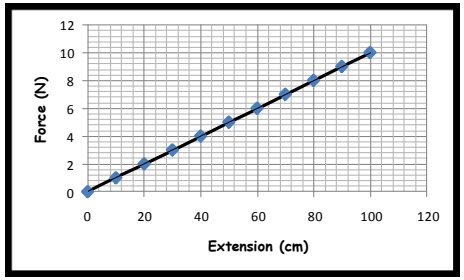
What is the resultant force? _____

Which team will win? _____

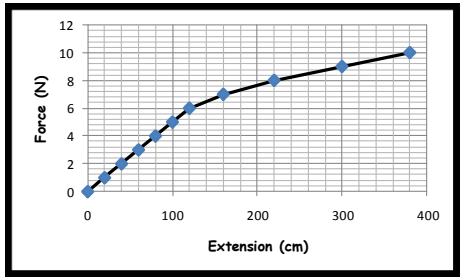
Friction resists the motion of two surfaces sliding against each other. Draw an arrow to show the direction friction is acting on the mouse. Are the forces balanced or unbalanced? Explain your answer.

_____

A



B



The two graphs show two different materials. Which material obeys Hooke's law for the full 10 N range? _____

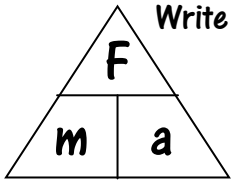
Which material is the stiffest? _____

_____

Name a material that does not obey Hooke's law: _____

A material that returns to its original shape when a load is removed is said to be: _____. If stretched beyond the _____ _____ the sample will deform permanently.

Forces & Movement

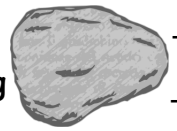


Write below the equation that links force, mass and acceleration.

An equal force is applied to the two masses below. Which will have the greatest acceleration? Explain your answer.

Masses

5 kg

10 kg 

A BMW Z4 accelerates to 27 m/s (≈ 60 mph) in 5.2 s, while a Bugatti Veyron does it in 2.4 s. Calculate the acceleration of each.

The Bugatti has a mass of 1 888 kg, the BMW has a mass of 1 500 kg. Calculate the force needed for maximum acceleration.

Complete the following:

Thinking distance is _____

Breaking distance is _____

Stopping distance is _____

Two factors that affect stopping distance are _____

Explain the term "acceleration due to gravity."

Assuming air resistance is negligible, how fast would ball be travelling as it hits the floor after free-falling from rest for 5 seconds?

Calculate the weight of a 65 kg man on Earth.

The gravitational field strength on the moon is a sixth of the Earth's. How much would he weigh on the Moon?

Terminal Velocity

In reality air resistance does affect the acceleration of an object in free-fall. Complete the sentences using the words below.

As an object first starts to fall there is zero _____. The only force acting on the object is _____, causing the object to _____ downwards. As the object starts to move the drag force starts to _____. The drag force acts _____ against the movement. Resultant Force = Weight - Drag Force. As the object moves _____ the drag force continues to increase, _____ the resultant force downwards, until the weight force and the drag force are _____. When the forces are balanced the resultant force is _____ and there is no _____. The object has reached _____ _____.

Words: zero terminal velocity equal upwards acceleration weight drag faster accelerate increase reducing

Complete the diagrams showing the acceleration leading to terminal velocity