

Title: Measuring Forces

Learning objective: Explain how forces can be measured and represented.

Instructions: Complete each activity either in your exercise book or on lined paper and self-assess all answers.

Do Now:

1. Complete the two sentences below:
 - a) A contact force is a force which... (1)
 - b) A non-contact force occurs... (1)
2. Name the force acting downwards on a falling ball (1)
3. Define accurate data (1)
4. Give the resolution on this ruler (1)
5. Round the following number to 2 significant figures: 2.14 (1)



Challenge: Explain why electrons are held in orbit around the nucleus of an atom.

New Knowledge:

Last lesson we learned that forces are pushes or pulls that we cannot see, but that are responsible for all objects moving, changing shape or changing speed.



We learned that if we want to change the motion or shape of an object, we need to exert a force onto it. For example, if we do not exert a force on this rocket, it will not launch.



Today we are going to learn how to measure forces so that we can then understand how much force needs to be applied to change an objects motion or shape. For example, how much force to we need to exert to get this rocket to launch?

The units of force is the Newton which has the symbol N, named after the English Scientist, Isaac Newton.

Newton (N)



We can measure force using a newton meter. The newton meter works by stretching a spring. As the mass being measured increases, the force downwards, due to gravity increases, stretching the spring further.

Key knowledge:

Spend 5 minutes completing 'Look, Cover, Write, Check' of this knowledge, or get someone to quiz you on it.

Which piece of equipment do we use to measure forces?	A Newton meter.
What is the unit of force?	Newton which has the symbol N
How does the Newton meter work?	By stretching a spring.
What happens to the spring when a larger force is applied?	It is stretched further
What happens to the spring when a smaller force is applied?	It is stretched less

Quiz:

Which unit do we use to represent forces?

1. Newton Meter (NM)
2. Newton (N)
3. Meter (M)

Which piece of equipment for we use to measure forces?

1. Newton meter
2. Meter ruler
3. Newtometer

Choose the correct statement

1. The sky diver experienced a force of 500m acting downwards.
2. The table exerted a force of 10N on the book.
3. The man pushed the box with a force of 200Nm.

Independent Task:

A student carried out the following experiment.

Aim: We are going to investigate the force of different objects using a Newton Meter.

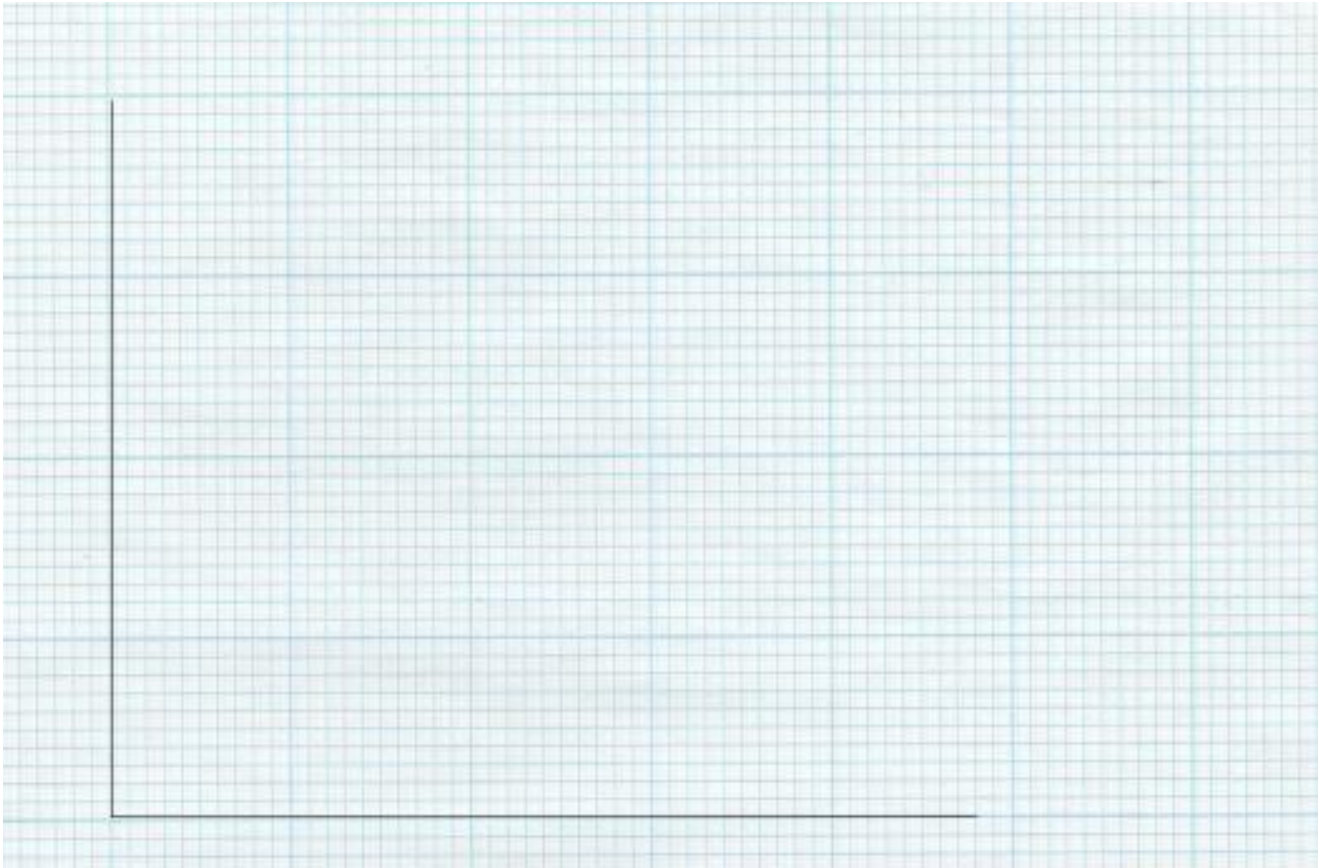
Method:

1. Attach the object to the end of the newton meter.
2. Make sure we are at eye level.
3. Read the force reading from the Newton meter and record the result.
4. We repeat this 3 times for the same object and find a mean.

Object	Weight (N)			
	1	2	3	Mean
Pencil Case	9.8	9.8	9.7	
Blazer	7.1	7.3	7.2	
Exercise Book	6.8	6.8	6.7	
Ruler	3.1	3.5	3.4	



1. Calculate the mean values for each measurement.
2. Plot the data on the graph below:



3. Explain your choice of graph.

Answers:

Do Now:

1. Define the following key terms:
a) A contact force is a force which occurs between two objects which are physically touching b) A non-contact force occurs between two objects which are physically separated.
2. Weight
3. Data that is close to the true value
4. 1mm
5. 2.1

Challenge: Electrons are negative and the protons in the nucleus are positive. The electrons are held in orbit by the electrostatic force of attraction between them and the protons.

Quiz

Which unit do we use to represent forces?

4. Newton Meter (NM)
5. Newton (N)
6. Meter (M)

Which piece of equipment for we use to measure forces?

4. Newton meter
5. Meter ruler
6. Newtometer

Choose the correct statement

4. The sky diver experienced a force of 500m acting downwards.
5. The table exerted a force of 10N on the book.
6. The man pushed the box with a force of 200Nm.

Independent Task:

1.

Object	Weight (N)			
	1	2	3	Mean
Pencil Case	9.8	9.8	9.7	9.8
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2. Bar chart drawn with a pencil.

X axis (horizontal) should be the object

Y axis (vertical) should be the Force (N)

3. A bar graph because the variable for the x axis is a categorical variable.