What are Forces and Magnets?

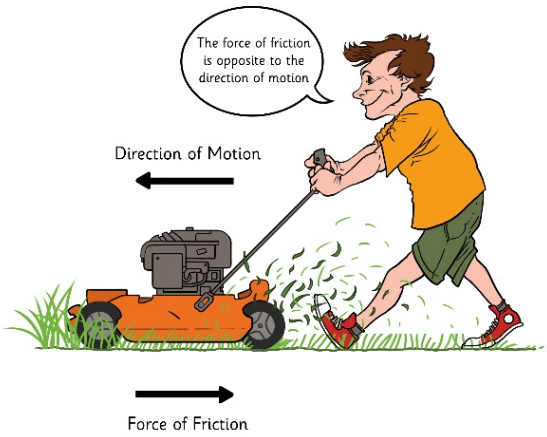
Forces

Forces are all around us. They are acting on anything and everything. We already know that we can push, pull, stretch and even twist something to make it move or make it change shape. There are more different types of forces that are acting on things that we can't even see.

Gravity

We have all heard of gravity, but what actually is it? Gravity is a force that acts on anything that is on Earth. Gravity is a pulling force. It pulls all the objects to the centre of the Earth. This is what keeps us and all objects on Earth and is the reason we don't float off into the air. The idea that Gravity is acting on everything was first discovered by a man called Isaac Newton and so it's called Newton's law. You can read more about Isaac Newton below.

Gravity acts on everything on Earth.



Friction

Friction is a force that is applied to objects when they come into contact with a surface. When one thing is trying to slide over another, friction occurs.

Discovering Force

Isaac Newton was a scientist who lived in the 17th century. He made many discoveries in his lifetime involving mathematics, optics and movement. Isaac was also very knowledgeable about space and astronomy. Arguably his most famous discovery was that of force.

Albert Einstein, another very famous scientist, believed that Isaac Newton was the most intelligent man that ever lived. Isaac Newton made the discovery of gravity.

There is a famous story surrounding his discovery. It is said that Isaac Newton was sitting under an apple tree. An apple fell out of the tree prompting Isaac to think about why the apple fell straight down to Earth.

Now we can measure forces in newtons or in joules. We use a newton meter to measure the force something exerts.

Magnets

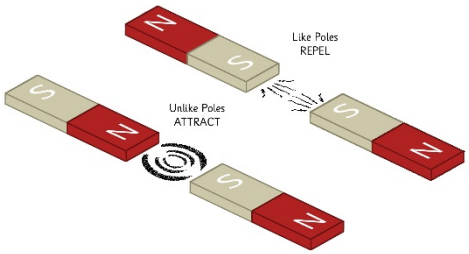
Magnets are objects that give out a magnetic force around it called a magnetic field. Magnetic fields cannot be seen by the human eye but we can tell they are there by what happens to objects when near the magnet. Magnetic objects are affected by magnets. Magnets can attract some objects and can repel others. These objects are magnetic. Some objects are not affected at all by a magnet. We call these non-magnetic.

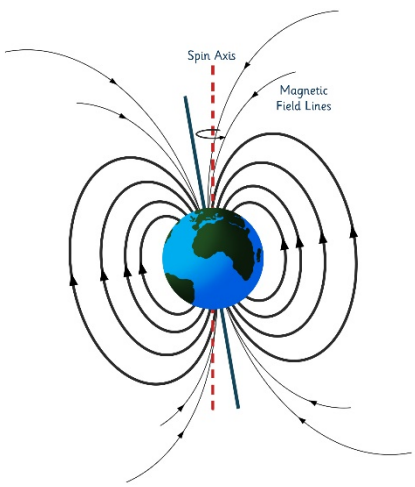
Magnetic	Non-Magnetic
iron	glass
nickel	plastic
cobalt	wood
steel	some metals such as copper, silver, gold, aluminium

This table shows which materials are magnetic and which are not. You could test these by seeing if they respond to a magnet.

Magnetism can push or attract magnetic materials. To do this the object has to be close to the magnet so that it is in its magnetic field.

Magnets have a magnetic north pole and a magnetic south pole. If the same pole of two magnets are placed near each other they will push away (repel), while if different poles are placed near each other they will pull together (attract). The diagram below shows what happens.





The core of the Earth is thought to be made up of two magnetic metals. It is an molten alloy (mix) of nickel and iron. This means that the Earth has its own magnetic field.

It too has its own magnetic poles; north and south. That is where the names The South Pole and The North Pole come from!

This magnetic field around Earth keeps us safe from space radiation and particles.

When we try to draw magnetic fields we use lines to show the direction and the intensity of the magnetic field, just like this picture of the Earth showing its magnetic field.

Why is the text arranged in paragraphs? How does this help the reader? (AF4/TC2) Easier for the reader to read. It breaks up the writing and groups similar information together.

Use the text to find a piece of information that the rest of the class may not know. (AF2/S4) Personal response. Hopefully the children will think that there is information in the text that they do not already know.

Does the layout and colour of the text have an impact on the reader? (AF4/C8) The layout is organised in a way where it is easier to locate information. The headers help direct the reader to the relevant parts of the text.

Why is there an exclamation mark in this section of text? What effect does this have? (AF4/C8) *That is where the names The South Pole and The North Pole come from!* The exclamation mark indicates that the reader may find the sentence surprising. The exclamation mark gives impact on the sentence. The reader may exaggerate the last part of the sentence when there is an exclamation mark.

Why has the author written this text? What do you think the author thinks about this topic? (AF6/S4) The author wants to inform the audience. The text is factual. The author may know a lot about this subject and/or may have done some research.

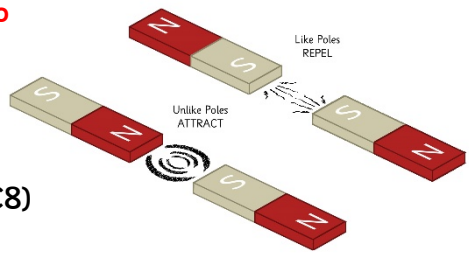
What is the use of the diagrams and tables? How do they help the reader? (AF4/C8) They visually show what is being talked about in the text. It helps the reader to understand the scientific processes.

What did Albert Einstein think about Isaac Newton? How do you know? (AF3/C9) Einstein thought Newton was very intelligent. It says in the text 'Albert Einstein, another very famous scientist, believed that Isaac Newton was the most intelligent man that ever lived.'

How do we know that Isaac Newton was important in the discovery of forces? (AF3/C4) It says in the text that he discovered forces. The force measurer is called a newton meter after Isaac Newton. The law of gravity is named after Isaac Newton - Newton's Law.

Name 3 different features of this text type (information text). Give an example of each one. (AF4/TC2) Title, headings, paragraphs, diagrams, tables, factual information and technical language.

Look at this diagram and its captions. What does it explain to you? Why does the writer choose to include them? (AF6/C8) It tries to explain how the poles of magnets can repel or attract each other. It helps us to understand that is hard to explain and difficult to imagine.



How can the information be organised in a different way? (AF6/C8) Personal response. The children should give reasons why they would change the layout.

Is the aim of the text to persuade or inform? How do you know? (AF6/S4) Inform. We know this because the text uses facts. There is no viewpoint shown. The text is written to educate the reader rather than to influence their thoughts.

What are Forces and Magnets? – Follow Up Work

Why is the text arranged in paragraphs? How does this help the reader? (AF4/TC2)

_____

_____

Use the text to find a piece of information that the rest of the class may not know. (AF2/S4)

_____

_____

Does the layout and colour of the text have an impact on the reader? (AF4/C8)

_____

_____

Why is there an exclamation mark in the section of text below? What effect does this have? (AF4/C8)

That is where the names The South Pole and The North Pole come from!

_____

_____

Why has the author written this text? What do you think the author thinks about this topic? (AF6/S4)

_____

_____

What is the use of the diagrams and tables? How do they help the reader? (AF4/C8)

_____

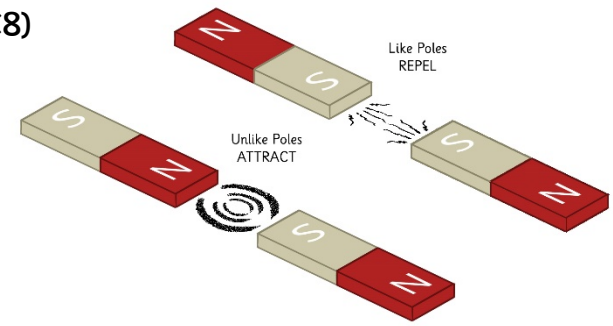
_____

What did Albert Einstein think about Isaac Newton? How do you know? (AF3/C9)

How do we know that Isaac Newton was important in the discovery of forces? (AF3/C4)

Name 3 different features of this text type (information text). Give an example of each one. (AF4/TC2)

Look at the captions and diagram below. What does it explain to you? Why does the writer choose to include them? (AF6/C8)



How can the information be organised in a different way? (AF6/C8)

Is the aim of the text to persuade or inform? How do you know? (AF6/S4)

What are Forces and Magnets? – Vocab 1

Write the meaning of each of the words. (AF2)

gravity _____

Isaac Newton _____

friction _____

applied _____

surface _____

discoveries _____

optics _____

astronomy _____

knowledgeable _____

arguably _____

surrounding _____

prompting _____

joules _____

exerts _____

magnetic force _____

magnetic field _____

magnetic _____

repel _____

non-magnetic _____

nickel _____

cobalt _____

magnetism _____

attract _____

magnetic north pole _____

magnetic south pole _____

molten _____

alloy _____

space radiation _____

particles _____

intensity _____

What are Forces and Magnets? – Vocab 1

Write the meaning of each of the words. (AF2)

gravity – the force that attracts a body to the centre of the Earth

Isaac Newton – an English scientist and mathematician that lived in the 1700s

friction – the force that occurs when one object slides against another

applied – to use or exert something

surface – the outside part of something

discoveries – the action of finding out something new

optics – the scientific study of sight and light

astronomy – an area of science to do with space and stars

knowledgeable – to know a lot of information

arguably – it could be argued that

surrounding – around a particular place or thing

prompting – indicating

joules – measurement of energy or force

exerts – applies or uses

magnetic force – a power that pulls things together

magnetic field – a region around a magnetic object where magnetism occurs

magnetic – capable of being influenced by a magnet

repel – the action that happens when two like poles of magnets meet, push back

non-magnetic – an object that is not influenced by a magnet

nickel – magnetic metal that is silvery-white in colour

cobalt – a hard magnetic metal, again silvery-white in colour

magnetism – the name given to the phenomena that occurs between magnets and other materials

attract – pull

magnetic north pole – the direction a compass will point to when finding north **note that magnetic north pole and grid north pole are not at the same place**

magnetic south pole – the opposite direction the compass will point to when finding magnetic north

molten – liquid, melted

alloy – a metal made from a mixture of other metals

space radiation – particles found in space that can cause damage to humans

particles – a minute size of matter, speck, spot, fleck

intensity – a measurable amount

What are Forces and Magnets? – Vocab 2

Task A

Rewrite the following sentences using a synonym for the purple word in each case. Make sure you use a different word each time.

There is a famous story surrounding his discovery.

_____

_____

It is a molten alloy of nickel and iron. This means that the Earth has its own magnetic field.

_____

_____

Task B

Choose the correct word from the list below to fit in the following sentences.

friction surrounding magnetic fields knowledgeable intensity applied

Friction is a force that is _____ to objects when they come in contact with a surface.

Isaac was also very _____ about space and astronomy.

When we try to draw magnetic fields we use lines to show the direction and the _____ of the magnetic field.

_____ cannot be seen by the human eye but we can tell they are there by what happens to objects when near the magnet.

There is a famous story _____ his discovery.

_____ is a force that is applied to objects when they come in contact with a surface.

What are Forces and Magnets? – Vocab 2

Task A

Rewrite the following sentences using a synonym for the purple word in each case. Make sure you use a different word each time.

There is a famous story surrounding his discovery.

There is a famous story about his discovery.

It is a molten alloy of nickel and iron. This means that the Earth has its own magnetic field.

It is a liquid/melted/flowing mix/blend of nickel and iron. This means that the Earth has its own magnetic field.

Task B

Choose the correct word from the list below to fit in the following sentences.

friction surrounding magnetic fields knowledgeable intensity applied

Friction is a force that is applied to objects when they come in contact with a surface.

Isaac was also very knowledgeable about space and astronomy.

When we try to draw magnetic fields we use lines to show the direction and the intensity of the magnetic field.

Magnetic fields cannot be seen by the human eye but we can tell they are there by what happens to objects when near the magnet.

There is a famous story surrounding his discovery.

Friction is a force that is applied to objects when they come in contact with a surface.

What are Forces and Magnets? – SPAG

Punctuation

Rewrite the sentence putting in capital letters where they are needed.

an apple fell out of the tree prompting Isaac newton to think about why the apple fell straight down to earth.

_____

_____

Prefixes

Add a prefix at the beginning of each word to make it mean the opposite.

____honest

____correct

____tied

Conjunctions

In the following sentences circle the correct connective to put into the sentence.

and because despite yet

We know that the instrument used to measure force is called the Newton metre _____ Isaac Newton first discovered forces.

and as well also despite

Isaac Newton was an astronomer and scientist _____ as a mathematician.

Despite Unless Although However

_____ we cannot see magnetic fields, we know they are there because of how materials and objects react.

What are Forces and Magnets? – SPAG

Punctuation

Rewrite the sentence putting in capital letters where they are needed.

an apple fell out of the tree prompting Isaac newton to think about why the apple fell straight down to earth.

An apple fell out of the tree prompting Isaac Newton to think about why the apple fell straight down to Earth.

Prefixes

Add a prefix at the beginning of each word to make it mean the opposite.

dishonest

incorrect

untied

Conjunctions

In the following sentences circle the correct connective to put into the sentence.

and because despite yet

We know that the instrument used to measure force is called the Newton metre because Isaac Newton first discovered forces.

and as well also despite

Isaac Newton was an astronomer and scientist as well as a mathematician.

Despite Unless Although However

Although we cannot see magnetic fields, we know they are there because of how materials and objects react.

Classroom Secrets Codes for New Curriculum Reading Expectations

Comprehension

Year 1	C1	Discuss word meanings, making links to known vocabulary
	C2	Raise simple questions about texts they read and that are read to them
	C3	Answer simple, information retrieval questions about texts
	C4	Drawing on what they already know or on background information and vocabulary provided by the teacher
Year 2	C5	Listening to, discussing and expressing views about a wide range of contemporary and classic poetry, stories and non-fiction at a level beyond that at which they can read independently
	C6	Discussing the sequence of events in books and how items of information are related
	C7	Explaining the meaning of words in context
Year 3/4	C2	Asking questions to improve their understanding of a text
	C8	Identifying how language, structure and presentation contribute to meaning
	C9	Retrieve and record information from non-fiction
	C7	Explains and explores the meaning of words in context
	C10	Identifies main ideas
Year 5/6	C8	Identifies language, structural and presentational features of texts
	C9	Retrieve and record information from non-fiction
	C11	Makes comparisons within the text
	C12	Distinguishes between fact and opinion

Predictions and Making Inferences

Year 1	PMI1	With support can link own experiences to what they read
	PMI2	Make predictions about reading from the title and front cover and what has been read so far
	PMI3	Making inferences on the basis of what is being said and done
Year 2	PMI4	Answering and asking questions
	PMI2	Predicting what might happen on the basis of what has been read so far
Year 3/4	PMI5	Recognising simple recurring literary language in stories and poetry
	PMI6	Discussing their favourite words and phrases
	PMI2	Predicts what might happen from details stated and implied
Year 5/6	PMI3	Makes inferences from the text
	PMI7	Explains inferences and justifies them with evidence from the text

Summarising

Year 1	S1	Link title to key events in a text
Year 2	S2	Checking that the text makes sense to them as they read and correcting inaccurate reading
Year 3/4	S3	Listening to and discussing a wide range of fiction, poetry, plays, non-fiction, reference books or textbooks
	S4	Identifying main ideas drawn from more than one paragraph and summarising
Year 5/6	S4	Summarises the main ideas drawn from more than one paragraph
	S4	Identifies key details that support the main ideas

Language for Effect

Year 1	LE1	Recognise and join in with predictable phrase.
Year 2	LE2	Recognising simple recurring literary language in stories and poetry
	LE3	Discussing their favourite words and phrases
	LE4	Discussing and clarifying the meanings of words, linking new meanings to known vocabulary
Year 3/4	LE4	Using dictionaries to check the meaning of words
	LE5	Preparing poems and play scripts to read aloud and to perform, showing understanding through intonation, tone, volume and action
Year 5/6	LE6	Identifies and/or comments on writers' use of words, phrases and language features including figurative language

Themes and Conventions

Year 1	TC1	Retell familiar stories, fairy stories, traditional tales and rhymes
	TC2	Can talk about some of the key features of above texts
Year 2	TC1	Becoming increasingly familiar with and retelling a wider range of stories, fairy stories and traditional tales
	TC4	Being introduced to non-fiction books that are structured in different ways
Year 3/4	TC4	Reading books that are structured in different ways
	TC5	Identifying themes and conventions in a wide range of books
Year 5/6	TC5	Identifies the themes and conventions of a range of texts
	TC2	Discusses/comments on themes and conventions in different genres and forms

Reading for Pleasure

Year 1	RP1	Participate actively in listening and sharing a wide range of books.
	RP2	Choose to read
	RP3	Continuing to build up a repertoire of poems learnt by heart, appreciating these and reciting some, with appropriate intonation to make the meaning clear
Year 2	RP2	Develop pleasure in reading, motivation to read, vocabulary and understanding
	RP4	Discuss books, poems and other works that are read to them and those that they can read for themselves, taking turns and listening to what others say
	RP5	Discuss their understanding of books, poems and other material, both those that they listen to and those that they read for themselves.
Year 3/4	RP2	Develop positive attitudes to reading and understanding of what they read
	RP6	Reading for a range of purposes
	RP7	Recognising some different forms of poetry
	RP4	Discuss both books that are read to them and those they can read for themselves, taking turns and listening to what others say.
	RP8	Becomes increasingly familiar with a wide range of texts – myths, legends, traditional stories, modern fiction, books from other cultures and traditions, books from our literary heritage
Year 5/6	RP4	Recommends texts and explains choices
	RP9	Reads for sustained periods of time
	RP10	Engages in book discussions with adult support
	RP11	Responds to reading in a written form

Word Reading

Year 1	WR1	Reads accurately by blending sounds speedily
	WR2	Reads common exception words accurately
	WR3	Re-reads with fluency and confidence
	WR4	Recognises when a word does not make sense
Year 2	WR5	Read most words quickly and accurately, without overt sounding and blending, when they have been frequently encountered
	WR6	Read aloud books closely matched to their improving phonic knowledge, sounding out unfamiliar words accurately, automatically and without undue hesitation
	WR3	Re-read these books to build up their fluency and confidence in word reading
Year 3/4	WR8	Apply their growing knowledge of root words, prefixes and suffixes (etymology and morphology) as listed in English Appendix 1, both to read aloud and to understand the meaning of new words they meet
	WR2	Read further exception words, noting the unusual correspondences between spelling and sound, and where these occur in the word
	WR7	Checking that the text makes sense to them, discussing their understanding
	WR8	Applies a growing knowledge of root words, prefixes and suffixes to read aloud
Year 5/6	WR9	Uses a range of reading strategies to work out unfamiliar words
	WR10	Shows understanding through intonation, tone and volume