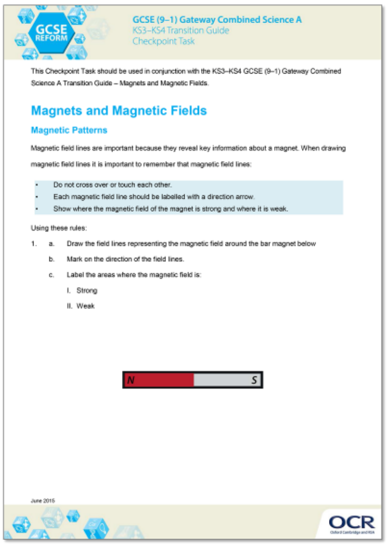
This Checkpoint Task should be used in conjunction with the KS3–KS4 GCSE (9–1) Gateway Combined Sicence A Transition Guide – Magnets and Magnetic Fields.

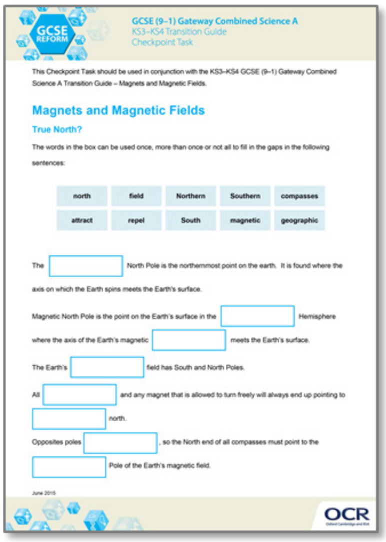
PROVISIONAL

Magnets and Magnetic Fields

Instructions and answers for teachers

***These instructions should accompany the OCR resource '*Magnets and Magnetic Fields*' activity** which supports OCR GCSE (9–1) Gateway Combined Science A*





The Activity:

This activity offers an opportunity for English skills development.

Associated materials:

'Magnets and Magnetic Fields' Checkpoint Task learner activity sheets ('True North' and 'Magnetic Patterns')

'Magnets and Magnetic Fields' Checkpoint Task supporting PowerPoint

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This resource is an exemplar of the types of materials that will be provided to assist in the teaching of the new qualifications being developed for first teaching in 2016. It can be used to teach existing qualifications but may be updated in the future to reflect changes in the new qualifications. Please check the OCR website for updates and additional resources being released. We would welcome your feedback so please get in touch.

Teacher's notes

The checkpoint task is centred on the use of a PowerPoint containing six different activities. The task has been designed to consolidate KS3 learning and aid the move up to GCSE.

These suggestions link to each numbered slide and should be used to accompany the PowerPoint presentation.

Slide 2: **Is a bigger magnet, a stronger magnet?**

The aim of this simple activity is to remind learners that it is not the physical size of a magnet which determines the strength of the magnet. This activity is possible to run in the classroom if you have examples of bar, horseshoe and small neodymium magnets.

Learners are shown/given several magnets of varying sizes and field strength. Learners simply predict which one they think will be the strongest. They can then use the magnets including electromagnets and paperclips to discover if their predictions were correct.

Slide 3: **What links these pictures?**

The aim of this activity is to promote questions and discussions about:

- How do electromagnets work?
- Uses of electromagnets
- The advantages of electromagnets over bar magnets
- How can electromagnets be made stronger?

This activity can also be used to promote interest in KS5 science and beyond.

Useful links:

http://home.web.cern.ch/topics/large-hadron-collider

Time lapse

http://home.web.cern.ch/about/updates/2013/06/timelapse-giant-magnet-flies-through-alice-cavern

Slide 4: **Drawing magnetic fields**

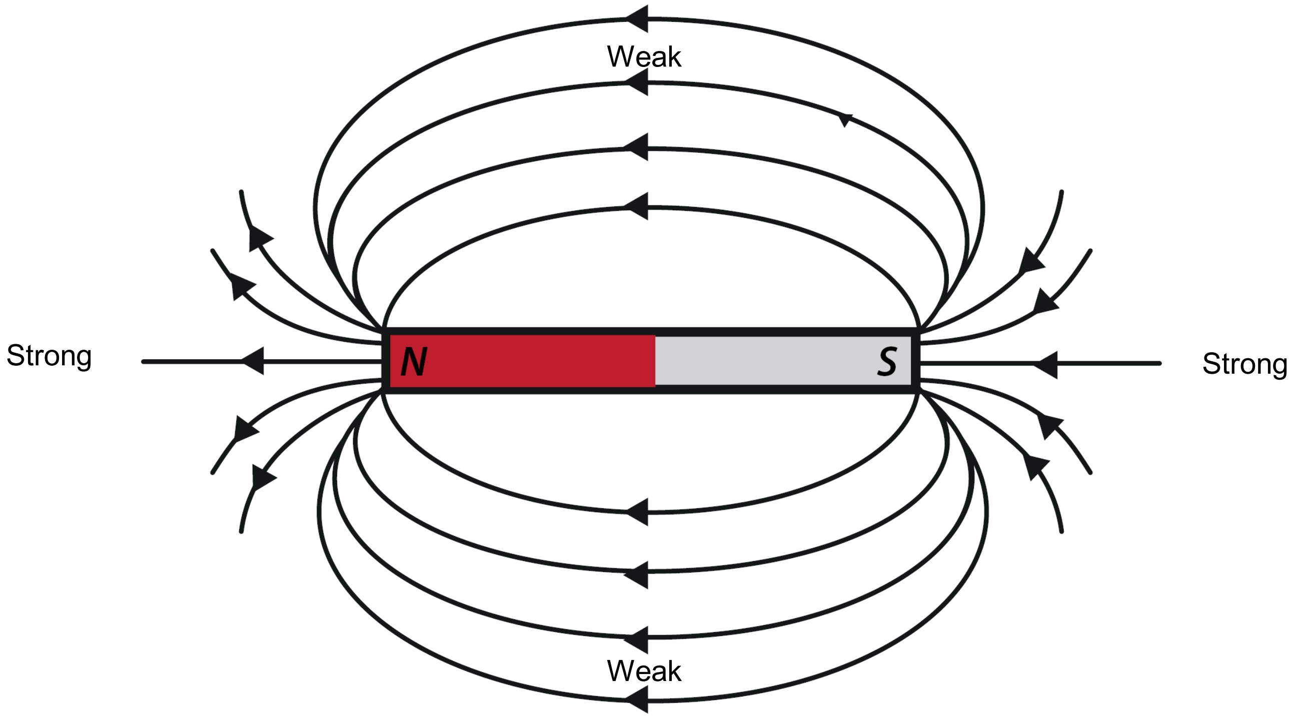
The aim of this activity is to use the pictures to ensure that learners:

- recognise that magnetic field are three-dimensional
- can correctly draw and recognise magnetic fields
- realise that the same rules apply to magnets of varying shapes and sizes.

The Magnetic Patterns Student Task Sheet can be used to accompany this slide.

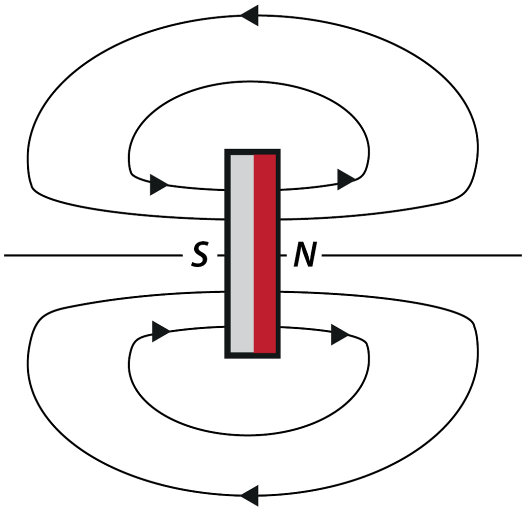
Suggested answers for Magnetic Patterns Student Task Sheet:

1.



2. No. Physical size is not an indication of the strength of a magnet. If the number of field lines drawn in question 1 is greater than the number of field lines shown in the example, the magnet is stronger. If the number of field lines drawn in question 1 is less than the number of field lines shown in the example, the magnet is weaker.

3. a.



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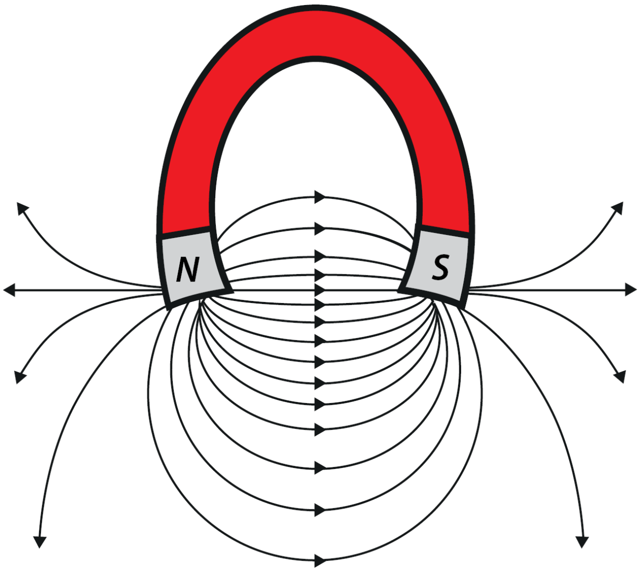

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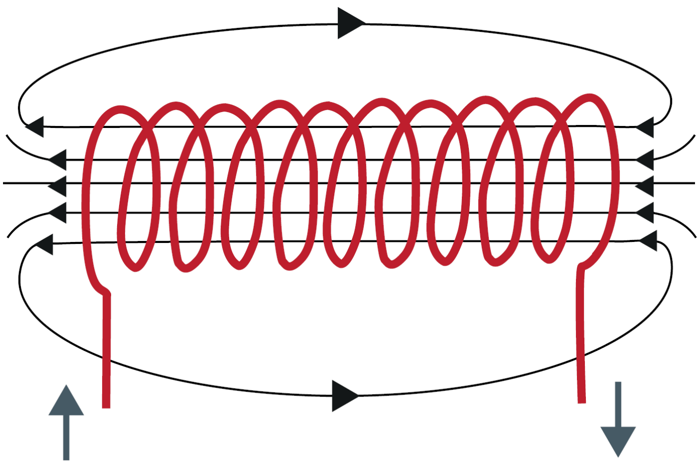

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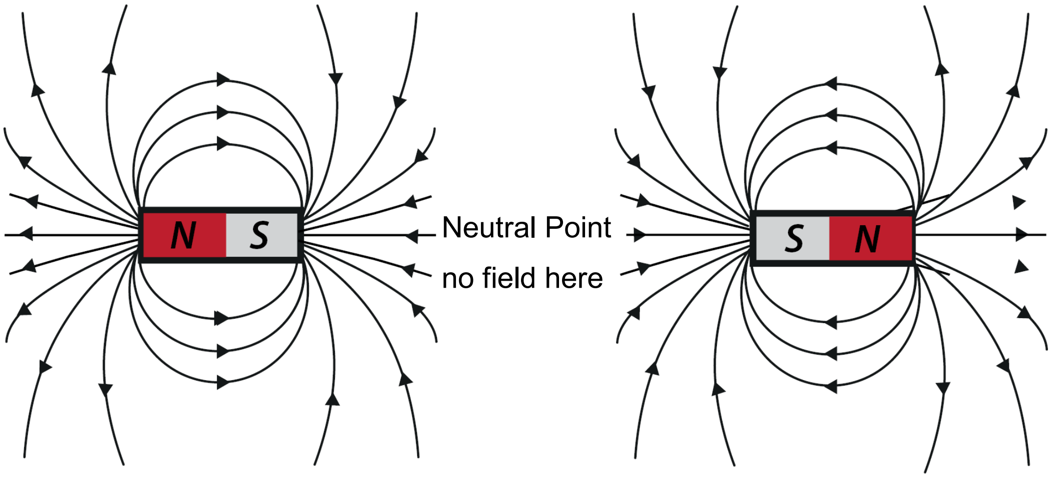
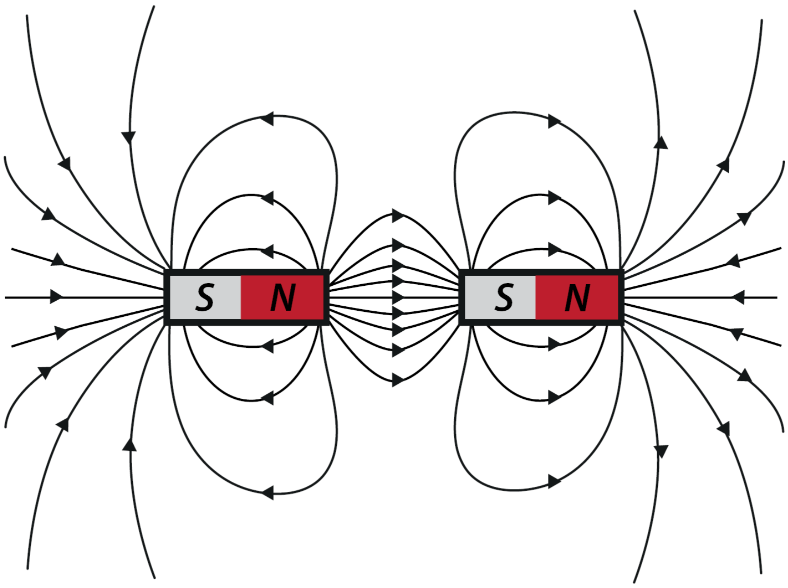




Slide 5: **Mystery object**

The aim of this activity is to ensure understanding of how a compass works and the existence, shape and direction of the Earth's magnetic field.

Discussions could be based around:

- What is a compass?
- What are the differences and similarities between a standard compass and a dipping compass?
- The existence, shape and three-dimensional aspect of the Earth's magnetic field.
- Magnetic North is found at the geographical south pole of the Earth.
- How a compass behaves at the North and South poles and the existence of dip?

Useful web sites:

http://www.physics.org/article-questions.asp?id=65

http://physics.kenyon.edu/EarlyApparatus/Electricity/Dip_Needle/Dip_Needle.html

http://science.howstuffworks.com/dip-needle-info.htm

http://www.howmagnetswork.com/earths_magnetic_fields.html

Slide 6: **Current in a wire**

The aim of this activity is to review the existence of a magnetic field around a single wire.

Discussions could be based around:

- Why do currents in wires affect compasses?
- How can we increase the strength of the field?
- How do we know the direction of the field?
- How can we change the direction of the field?
- How the strength of field varies with distance away from the wire?

Although this slide contains an animation, it would be quite easy to set up the necessary equipment or a demonstration even in a non-lab situation.

Slide 7: **Is it true that compasses do not point to the North Pole?**

The aim of this activity is to review understanding of the Earth's magnetic field and the difference between geographic and magnetic poles.

Discussions could be based around:

- Why do compasses not point to the geographic North Pole?
- Why do we have a magnetic North Pole and the geographic North Pole?
- Where is the magnetic North Pole? Where is the magnetic South Pole?
- What is magnetic variation and how does this explain the difference between the locations of magnetic North Pole and the geographic North Pole?
- Are magnetic North and South poles static or do they move?
- Is the Earth's magnetic field useful?

The accompanying Student task Sheet True North? may be useful for this activity.

Useful websites:

http://adventure.howstuffworks.com/survival/wilderness/true-north.htm

http://www.magnetic-declination.com/

http://www.gns.cri.nz/Home/Our-Science/Earth-Science/Earth-s-Magnetic-Field

Suggested answers for True North Student Task Sheet

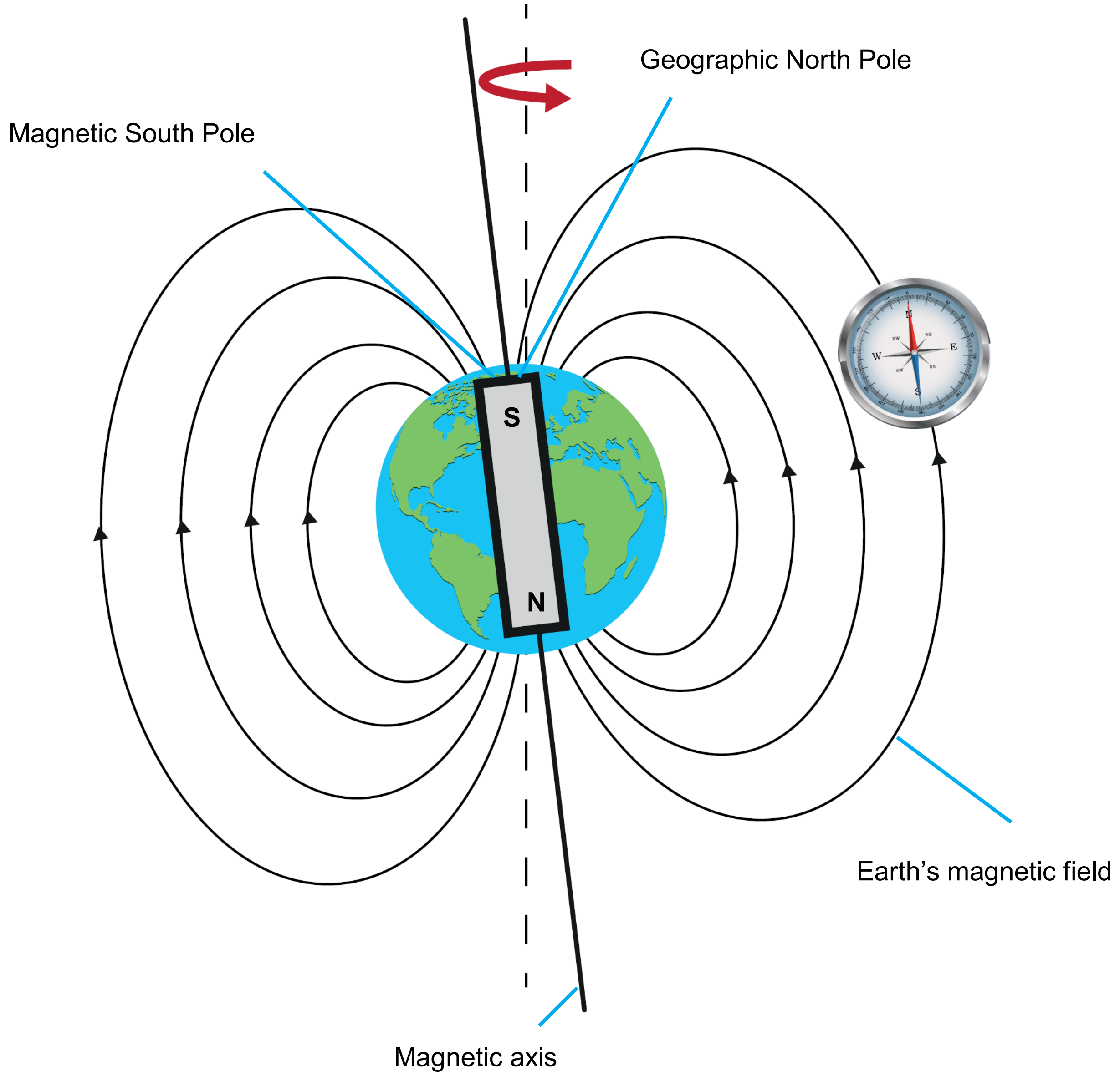
The [geographic] North Pole is the northernmost point on the Earth. It is found where the axis on which the Earth **spins** meets the Earth's surface.

Magnetic North Pole is the point on the Earth's surface in the [Northern] Hemisphere where the axis of the Earth's magnetic [field] meets the Earth's surface.

The Earth's [magnetic] field has South and North Poles.

All [compasses] and any magnet that is allowed to turn freely will always end up pointing to [magnetic] north.

Opposites poles [attract], so the North end of all compasses must point to the [South] Pole of the Earth's magnetic field.



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