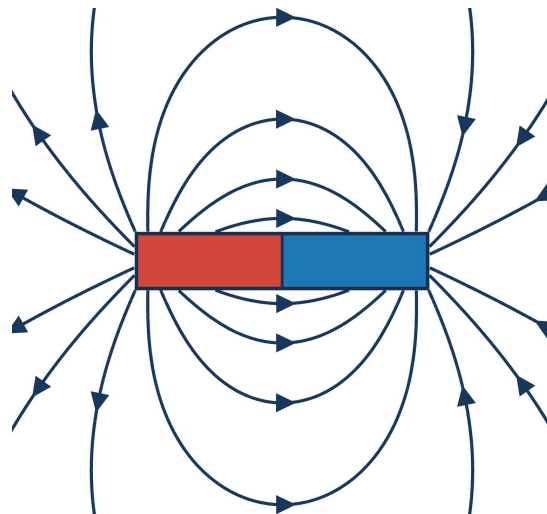


Magnets and Magnetic Fields

Poles, field lines and what a magnet will pull



7

printable sheets

17

pages

All

answer keys included

Magnets and Magnetic Fields Teaching Pack

Poles, field lines and what a magnet will pull

How to use this pack. The sheets are in a suggested teaching order: show the labeled diagram, have students label the blank one, then work through the practice sheets and finish with the quiz. Use them all over a week or pick the ones you need. The answer keys are together at the back.

What is inside

1. Teach

Magnetic Field Diagram 3

2. Label

Blank Magnetic Field 4

3. Match

Magnet Words 5

4. Read

The Pull of a Magnet 6

5. Apply

Attract, Repel or No Pull? 8

6. Review

Magnets Crossword 9

7. Check

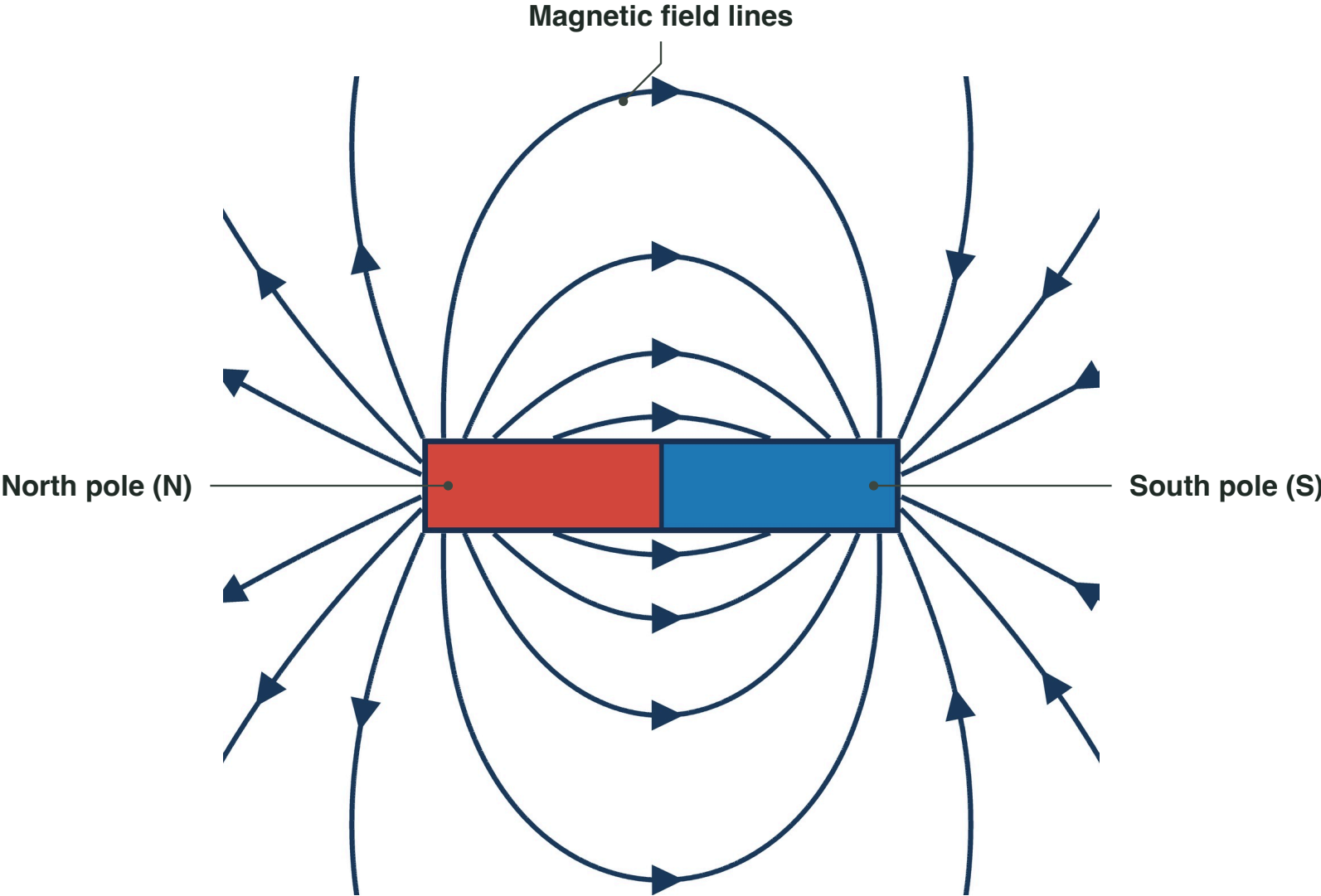
Magnets and Magnetic Fields Quiz 10

Answer keys

Every answer key, in the same order 12

More free teaching packs. Parts of an Atom, States of Matter, Forms of Energy, Waves and the Electromagnetic Spectrum, Acids, Bases and the pH Scale and more at printablescholar.com/teaching-packs/

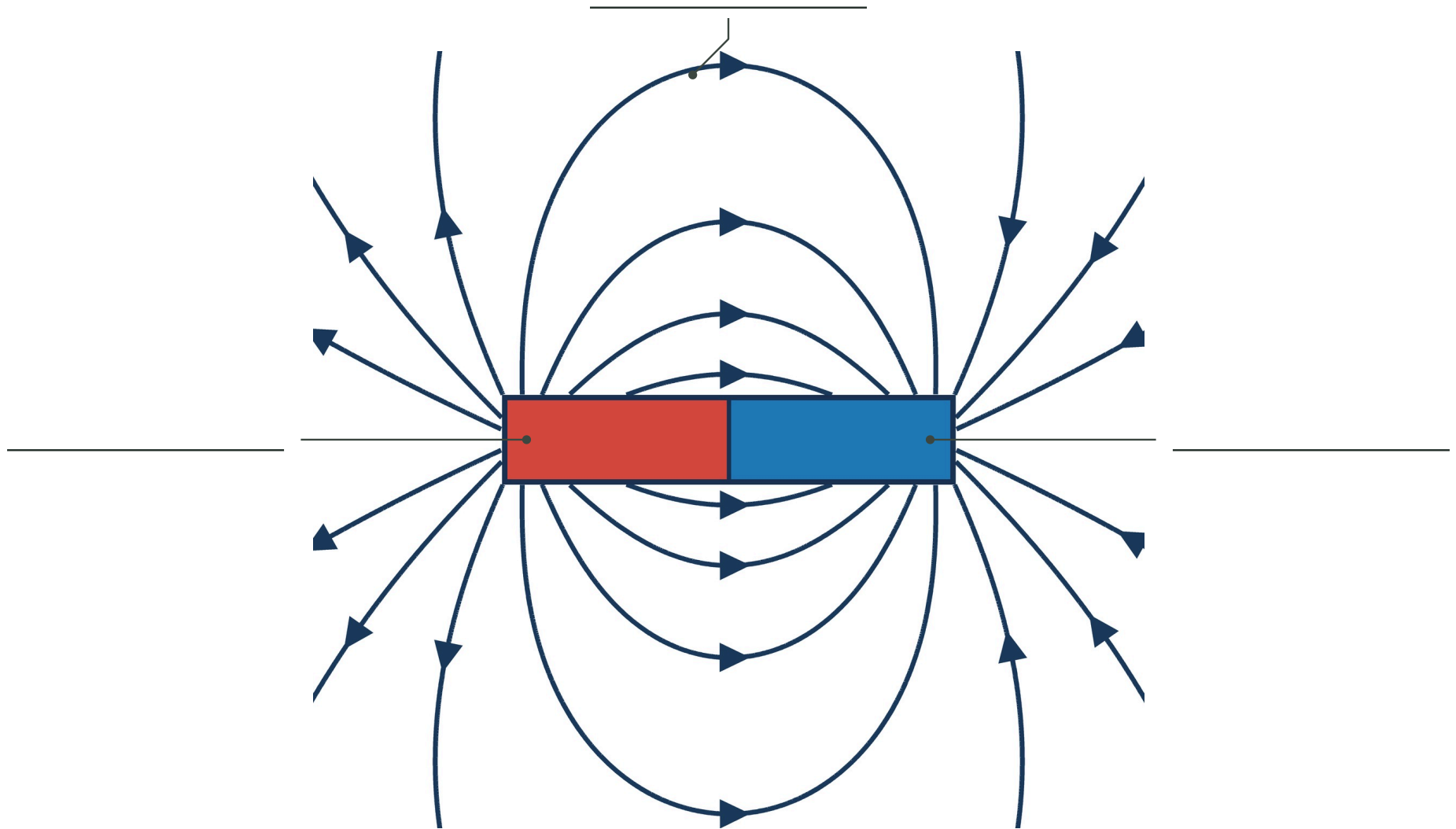
Magnetic Field of a Bar Magnet



Magnetic Field of a Bar Magnet

Name: _____

Write the name of each part on its line. Use the word bank.



Word bank

Magnetic field lines

North pole (N)

South pole (S)

Magnet Words

Use the labeled magnetic field diagram to help you.

Part A. Write the word that fits each description.

Word bank

Attract Compass Electromagnet Iron Magnetic field Magnetic field lines
North pole (N) Permanent magnet Repel South pole (S)

1. To pull together, as two unlike poles do. _____
2. The end of a magnet that the field lines point away from. _____
3. A tool with a needle that is a small magnet. One end of the needle points north. _____
4. The space around a magnet where its force acts. You cannot see it. _____
5. A common metal that magnets pull strongly. Steel is made mostly of it. _____
6. To push apart, as two like poles do. _____
7. Curves drawn around a magnet to show the shape and direction of its force. _____
8. A coil of wire that is a magnet only while electric current flows through it. _____
9. The end of a magnet that the field lines point back into. _____
10. A magnet that keeps its magnetism all the time, like a bar magnet. _____

Part B. Answer the questions.

1. Outside the magnet, which way do the field lines run?

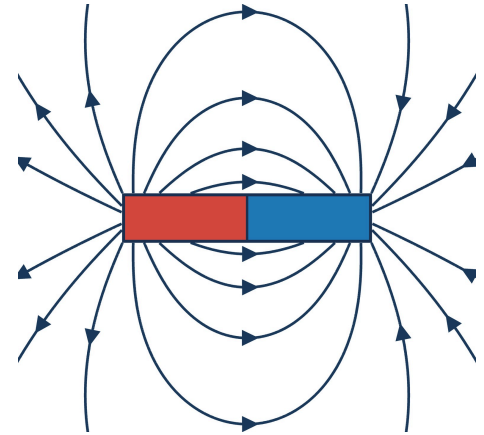
2. Where is the field of a bar magnet strongest? How does the diagram show this?

3. How is an electromagnet different from a permanent magnet?

The Pull of a Magnet

Read the text. Then answer the questions on the next page.

- ① Hold a magnet near a steel paper clip, and the clip jumps to it. A **magnet** can pull on some things without touching them. It pulls on iron, nickel and cobalt, and on steel, which is mostly iron. It does not pull on most other materials. Aluminum, copper, plastic, wood and glass do not stick to a magnet.
- ② Every magnet has two **poles**, a north pole and a south pole. On a bar magnet, they are the two ends. Bring two magnets together and you will feel a rule at work. Unlike poles **attract**, or pull together. Like poles **repel**, or push apart. So a north pole and a south pole snap together, but two north poles push each other away.
- ③ The space around a magnet where its force acts is called its **magnetic field**. You cannot see the field, but you can draw it with **field lines**. Outside the magnet, the lines run from the north pole around to the south pole. Where the lines are close together, the field is strong. They are closest near the poles.
- ④ Earth acts like a giant magnet with a magnetic field of its own. A **compass** uses that field. Its needle is a small magnet that can spin freely. The needle turns until it lines up with Earth's field, so one end points north.
- ⑤ What if you cut a bar magnet in half? You get two smaller magnets, each with a north pole and a south pole. Some magnets can be switched on and off. An **electromagnet** is a coil of wire that is a magnet only while electric current flows through it. A scrapyard crane uses one. The operator switches the current on, and the electromagnet picks up a load of steel. The crane swings the load over a truck. Then the operator switches the current off, and the steel drops.



A bar magnet and its magnetic field. The north pole is red and the south pole is blue.

The Pull of a Magnet: Questions

Go back to the text to find each answer. The paragraphs are numbered to help you.

1. What is this text mostly about?

- ☐ How steel is made
- ☐ How magnets and their fields work
- ☐ How to read a map
- ☐ How a truck is loaded

2. Which of these will a magnet pull?

- ☐ An aluminum can
- ☐ A copper wire
- ☐ A steel paper clip
- ☐ A glass marble

3. What is the rule for like poles and unlike poles?

4. Outside a magnet, which way do the field lines run?

- ☐ From the south pole to the north pole
- ☐ From the north pole to the south pole
- ☐ Straight up from both poles
- ☐ In circles around the middle only

5. Where is a magnet's field strongest?

- ☐ In the middle of the magnet
- ☐ Far away from the magnet
- ☐ Near the poles
- ☐ It is the same everywhere

6. Why does a compass needle point north?

7. What do you get when you cut a bar magnet in half?

8. Number the steps 1, 2 and 3 to show how a scrapyard crane works (paragraph 5).

- ☐ The crane swings the load over a truck.
- ☐ The current is switched off, and the steel drops.
- ☐ The current is switched on, and the electromagnet picks up steel.

Attract, Repel or No Pull?

Read each test and predict what will happen. Write Attract, Repel or No pull. You will use each answer more than once.

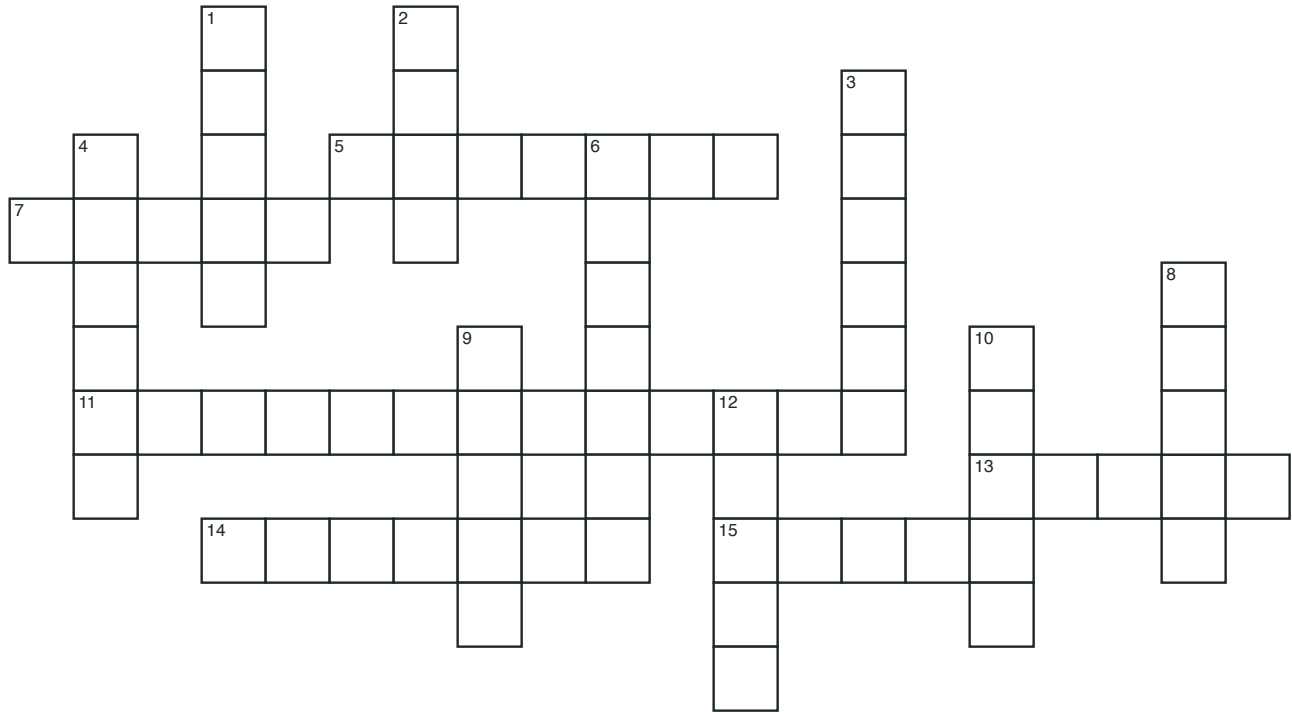
WHAT IS TESTED	THE TEST	WHAT HAPPENS?
1. Two magnets	The north pole of one is brought near the north pole of the other.	_____
2. Steel paper clip	A magnet is held close to it.	_____
3. Aluminum can	A magnet is held close to it.	_____
4. Two magnets	The north pole of one is brought near the south pole of the other.	_____
5. Plastic spoon	A magnet is held close to it.	_____
6. Iron nail	A magnet is held close to it.	_____
7. Two magnets	The south pole of one is brought near the south pole of the other.	_____
8. Copper wire	A magnet is held close to a piece of it.	_____
9. Wooden pencil	A magnet is held close to it.	_____
10. Two magnets	The south pole of one is brought near the north pole of the other.	_____
Word bank Attract No pull Repel		

Your turn

A steel paper clip sticks to the north pole of a magnet. You turn the magnet around and try the south pole. What happens? Explain.

Magnets Crossword

Read each clue. Write the answer in the puzzle, one letter in each box. Use the word bank if you get stuck.



ACROSS

5. A tool with a needle that points north.
7. Field ____ are drawn to show the shape of a magnet's force.
11. A coil of wire that can be switched on and off to pick up steel.
13. The planet that acts like a giant magnet.
14. Electric ____ flows through a wire.
15. To push apart, as like poles do.

DOWN

1. Paper clips are usually made of this metal.
2. The metal that steel is mostly made of.
3. An object that pulls on iron and steel.
4. A metal, other than iron and cobalt, that magnets pull.
6. To pull together, as unlike poles do.
8. Field lines point back into this pole.
9. The two ends of a bar magnet.
10. The space around a magnet where its force acts is its magnetic ____.
12. Field lines point away from this pole.

Word bank

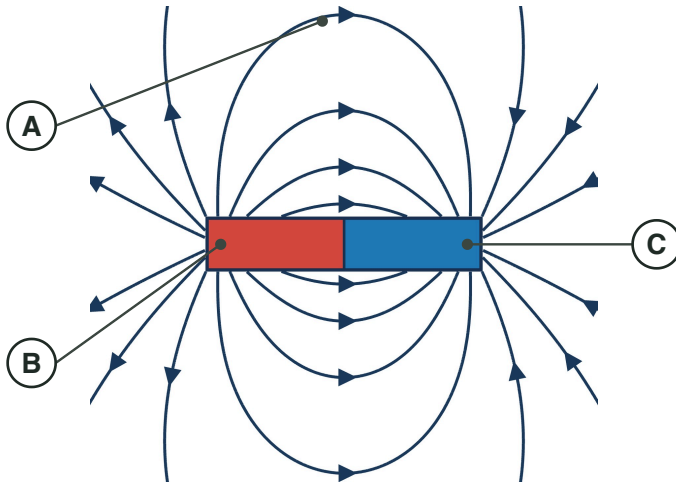
attract compass current Earth electromagnet field iron lines magnet
nickel north poles repel south steel

Magnets and Magnetic Fields Quiz

Score _____ / 11

In the picture, the arrowheads show the direction of the magnetic field.

Part A. This is a bar magnet and its field. Write the name of each part.



A _____

B _____

C _____

Magnetic field lines · North pole (N) · South pole (S)

Part B. Choose the best answer.

1. Two north poles are brought close together. What do they do?

- ☐ Attract
- ☐ Repel
- ☐ Nothing
- ☐ Spin in circles

2. Which object will a magnet pull?

- ☐ An aluminum can
- ☐ A plastic spoon
- ☐ A copper wire
- ☐ An iron nail

3. Where is the magnetic field of a bar magnet strongest?

- ☐ Near the poles
- ☐ In the middle
- ☐ Far from the magnet
- ☐ It is the same everywhere

4. What is the needle of a compass?

- ☐ A piece of copper
- ☐ A tiny battery
- ☐ A small magnet
- ☐ A piece of plastic

5. A bar magnet is cut in half. What do you get?

- ☐ One north pole and one south pole
- ☐ Two pieces that are not magnets
- ☐ Two magnets, each with two poles
- ☐ One magnet and one plain bar

6. What makes an electromagnet work?

- ☐ Heat from the sun
- ☐ Electric current in a coil of wire
- ☐ A very large iron nail
- ☐ A spinning compass needle

Part C. Write your answer.

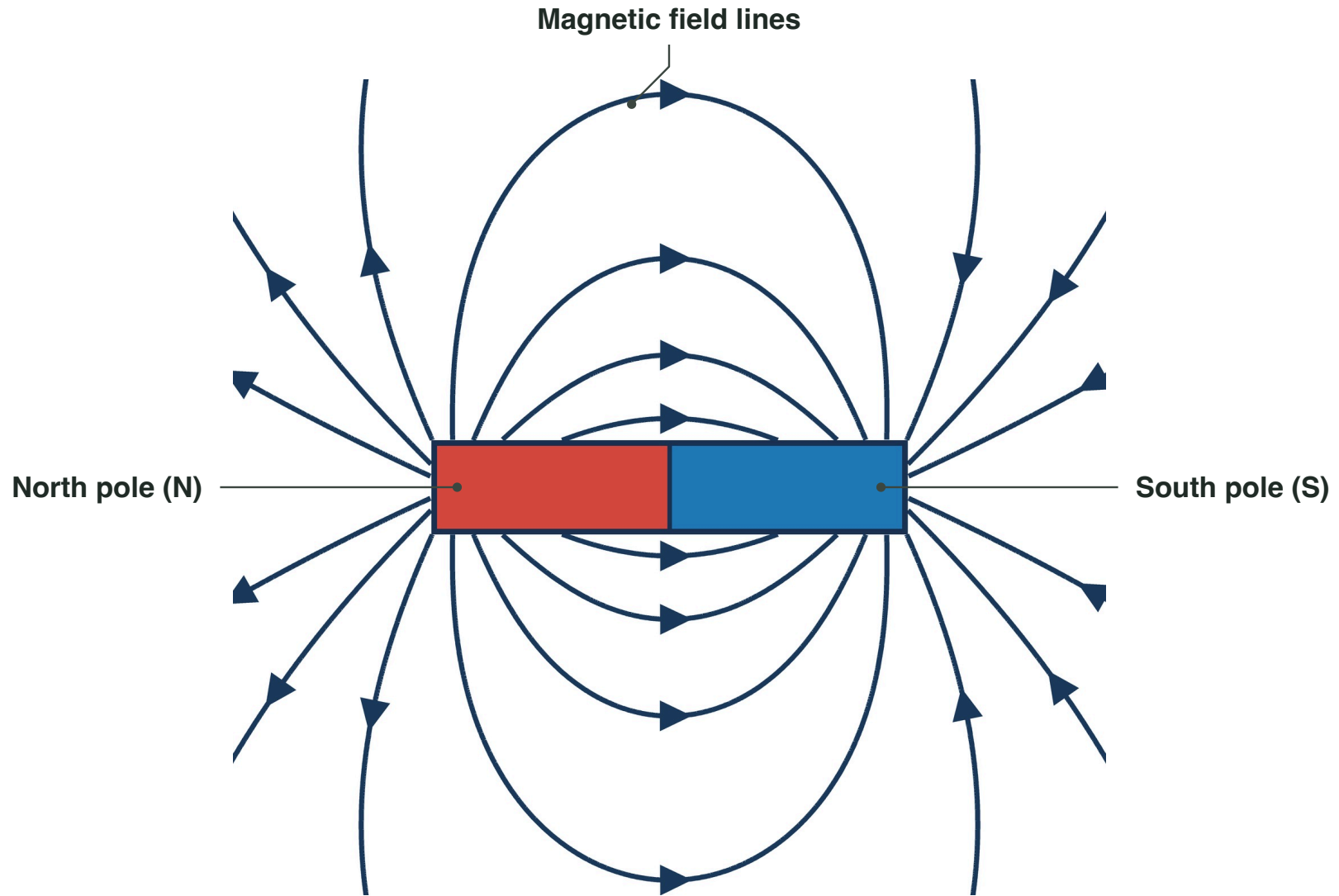
7. Outside a magnet, which way do the field lines run?

8. A scrapyard crane uses an electromagnet, not a permanent magnet. Why?

Answer Keys

In the same order as the sheets.

Magnetic Field of a Bar Magnet: Answer Key



Magnet Words: Answer Key

Answers are in green. Written answers will vary; these are examples.

Part A. Write the word that fits each description.

Word bank

Attract Compass Electromagnet Iron Magnetic field Magnetic field lines
North pole (N) Permanent magnet Repel South pole (S)

1. To pull together, as two unlike poles do.	Attract
2. The end of a magnet that the field lines point away from.	North pole (N)
3. A tool with a needle that is a small magnet. One end of the needle points north.	Compass
4. The space around a magnet where its force acts. You cannot see it.	Magnetic field
5. A common metal that magnets pull strongly. Steel is made mostly of it.	Iron
6. To push apart, as two like poles do.	Repel
7. Curves drawn around a magnet to show the shape and direction of its force.	Magnetic field lines
8. A coil of wire that is a magnet only while electric current flows through it.	Electromagnet
9. The end of a magnet that the field lines point back into.	South pole (S)
10. A magnet that keeps its magnetism all the time, like a bar magnet.	Permanent magnet

Part B. Answer the questions.

1. Outside the magnet, which way do the field lines run?
From the north pole around to the south pole.
2. Where is the field of a bar magnet strongest? How does the diagram show this?
Near the poles. The field lines are closest together there.
3. How is an electromagnet different from a permanent magnet?
An electromagnet is a magnet only while electric current flows, so it can be switched on and off. A permanent magnet is a magnet all the time.

The Pull of a Magnet: Answer Key

Answers are in green. Written answers will vary; these are examples.

1. What is this text mostly about?

- ☐ How steel is made
- ☒ **How magnets and their fields work**
- ☐ How to read a map
- ☐ How a truck is loaded

2. Which of these will a magnet pull?

- ☐ An aluminum can
- ☐ A copper wire
- ☒ **A steel paper clip**
- ☐ A glass marble

3. What is the rule for like poles and unlike poles?

Like poles repel (push apart). Unlike poles attract (pull together).

4. Outside a magnet, which way do the field lines run?

- ☐ From the south pole to the north pole
- ☒ **From the north pole to the south pole**
- ☐ Straight up from both poles
- ☐ In circles around the middle only

5. Where is a magnet's field strongest?

- ☐ In the middle of the magnet
- ☐ Far away from the magnet
- ☒ **Near the poles**
- ☐ It is the same everywhere

6. Why does a compass needle point north?

The needle is a small magnet. It lines up with Earth's magnetic field.

7. What do you get when you cut a bar magnet in half?

Two smaller magnets, each with a north pole and a south pole.

8. Number the steps 1, 2 and 3 to show how a scrapyard crane works (paragraph 5).

- 2** The crane swings the load over a truck.
- 3** The current is switched off, and the steel drops.
- 1** The current is switched on, and the electromagnet picks up steel.

Attract, Repel or No Pull?: Answer Key

Answers are in green. The last answer will vary; one example is given.

WHAT IS TESTED	THE TEST	WHAT HAPPENS?
1. Two magnets	The north pole of one is brought near the north pole of the other.	Repel
2. Steel paper clip	A magnet is held close to it.	Attract
3. Aluminum can	A magnet is held close to it.	No pull
4. Two magnets	The north pole of one is brought near the south pole of the other.	Attract
5. Plastic spoon	A magnet is held close to it.	No pull
6. Iron nail	A magnet is held close to it.	Attract
7. Two magnets	The south pole of one is brought near the south pole of the other.	Repel
8. Copper wire	A magnet is held close to a piece of it.	No pull
9. Wooden pencil	A magnet is held close to it.	No pull
10. Two magnets	The south pole of one is brought near the north pole of the other.	Attract
Word bank Attract No pull Repel		

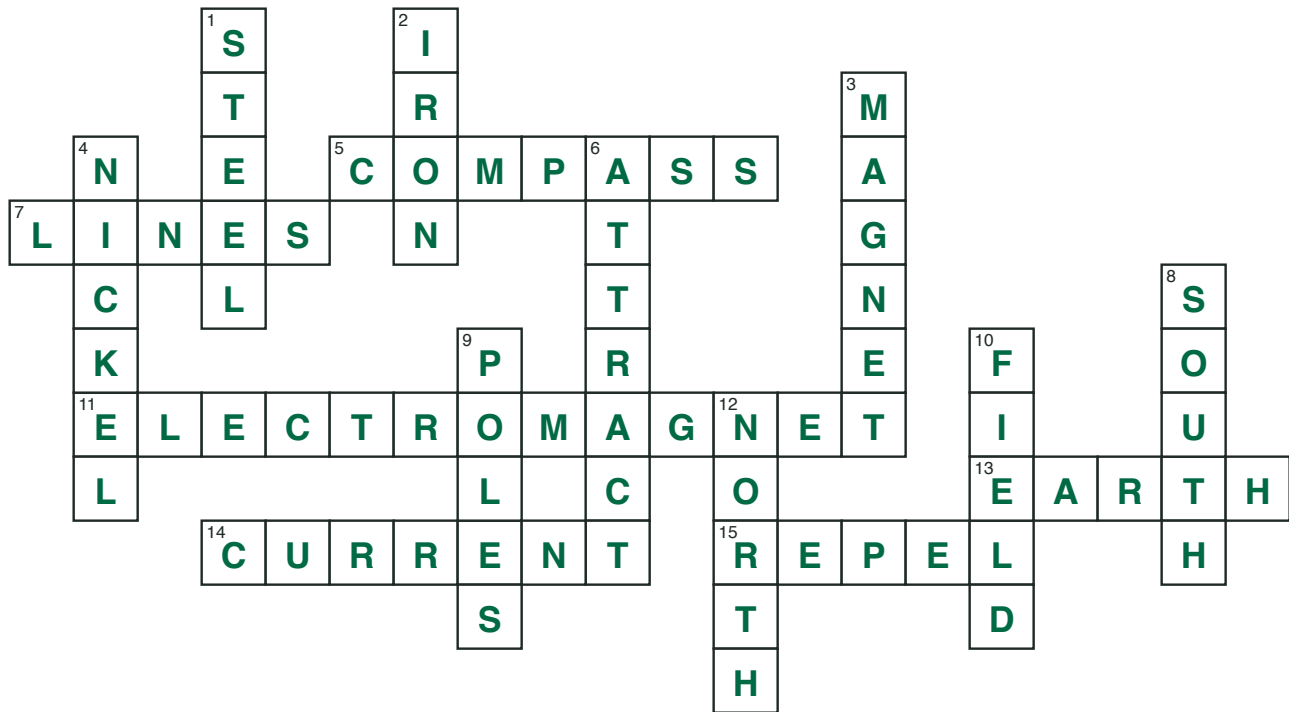
Your turn

A steel paper clip sticks to the north pole of a magnet. You turn the magnet around and try the south pole. What happens? Explain.

The paper clip sticks to the south pole too. A magnet attracts steel with either pole. Only another magnet can be repelled.

Magnets Crossword: Answer Key

Answers are in green.



ACROSS

5. A tool with a needle that points north.
7. Field ____ are drawn to show the shape of a magnet's force.
11. A coil of wire that can be switched on and off to pick up steel.
13. The planet that acts like a giant magnet.
14. Electric ____ flows through a wire.
15. To push apart, as like poles do.

DOWN

1. Paper clips are usually made of this metal.
2. The metal that steel is mostly made of.
3. An object that pulls on iron and steel.
4. A metal, other than iron and cobalt, that magnets pull.
6. To pull together, as unlike poles do.
8. Field lines point back into this pole.
9. The two ends of a bar magnet.
10. The space around a magnet where its force acts is its magnetic ____.
12. Field lines point away from this pole.

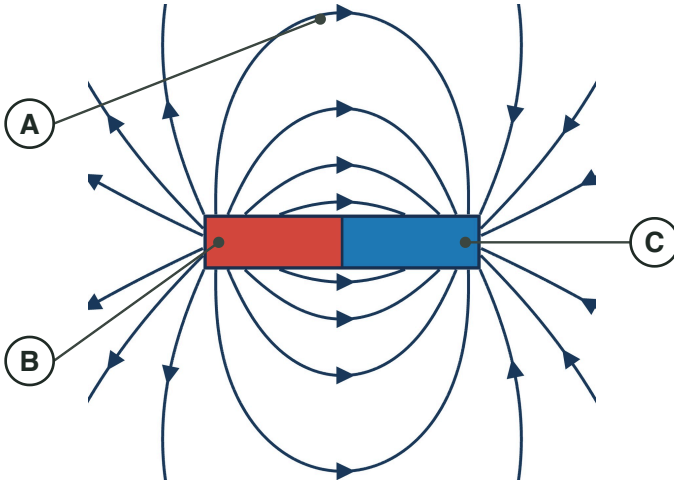
Word bank

attract compass current Earth electromagnet field iron lines magnet
nickel north poles repel south steel

Magnets and Magnetic Fields Quiz: Answer Key

Answers are in green. Written answers will vary; these are examples.

Part A. This is a bar magnet and its field. Write the name of each part.



A Magnetic field lines

B North pole (N)

C South pole (S)

Magnetic field lines · North pole (N) · South pole (S)

Part B. Choose the best answer.

1. Two north poles are brought close together. What do they do?

- ☐ Attract
- ☒ **Repel**
- ☐ Nothing
- ☐ Spin in circles

2. Which object will a magnet pull?

- ☐ An aluminum can
- ☐ A plastic spoon
- ☐ A copper wire
- ☒ **An iron nail**

3. Where is the magnetic field of a bar magnet strongest?

- ☒ **Near the poles**
- ☐ In the middle
- ☐ Far from the magnet
- ☐ It is the same everywhere

4. What is the needle of a compass?

- ☐ A piece of copper
- ☐ A tiny battery
- ☒ **A small magnet**
- ☐ A piece of plastic

5. A bar magnet is cut in half. What do you get?

- ☐ One north pole and one south pole
- ☐ Two pieces that are not magnets
- ☒ **Two magnets, each with two poles**
- ☐ One magnet and one plain bar

6. What makes an electromagnet work?

- ☐ Heat from the sun
- ☒ **Electric current in a coil of wire**
- ☐ A very large iron nail
- ☐ A spinning compass needle

Part C. Write your answer.

7. Outside a magnet, which way do the field lines run?

From the north pole around to the south pole.

8. A scrapyard crane uses an electromagnet, not a permanent magnet. Why?

It can be switched off to drop the steel. A permanent magnet cannot be switched off.