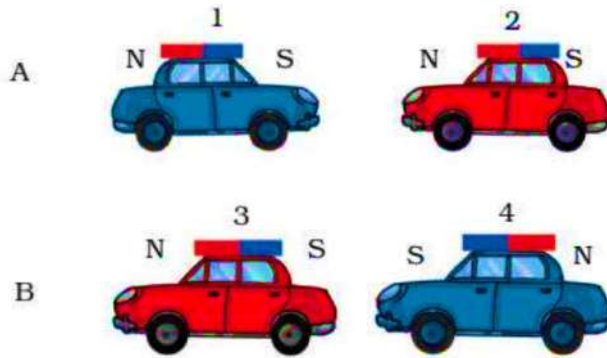


NCERT Exemplar Solutions for Class 6 Science
Chapter 13: Fun with Magnets

Multiple Choice Questions

Question 1

Observe the pictures A and B given in the figure carefully.



Picture A: Cars 1 and 2 facing each other with opposite poles (N-S and N-S)

Picture B: Cars 3 and 4 facing each other with same poles (N-S and S-N)

Which of the following statement is correct for the above given pictures?

- (a) In A, cars 1 and 2 will come closer and in B, cars 3 and 4 will come closer. (b) In A, cars 1 and 2 will move away from each other and in B, cars 3 and 4 will move away. (c) In A, cars 1 and 2 will move away and in B, 3 and 4 will come closer to each other. (d) In A, cars 1 and 2 will come closer to each other and in B, 3 and 4 will move away from each other.

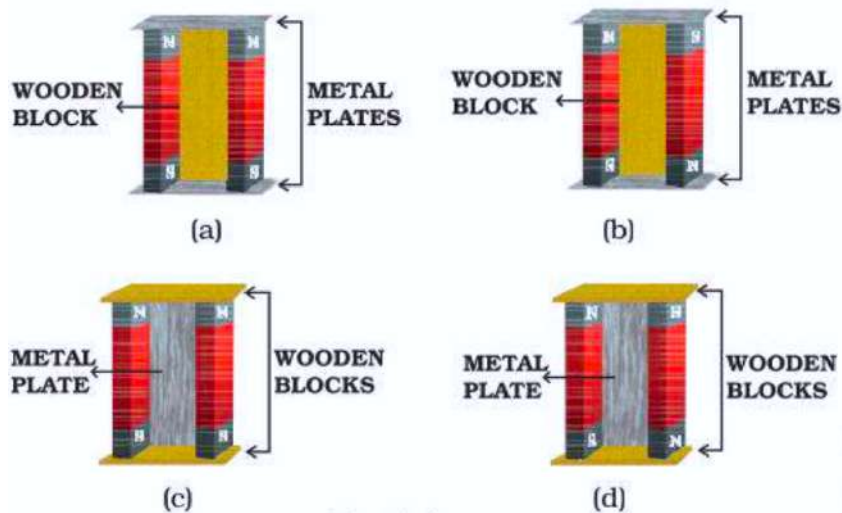
Solution: (d) In A, cars 1 and 2 will come closer to each other and in B, 3 and 4 will move away from each other.

Explanation:

- Unlike poles attract each other while like poles repel each other.
- In case A: Cars 1 and 2 are facing each other with opposite poles, hence they get attracted.
- In case B: Cars 3 and 4 are facing each other with same poles, hence they get repelled.

Question 2

The arrangement to store two magnets is shown by figures (a), (b), (c) and (d). Which one of them is the correct arrangement?

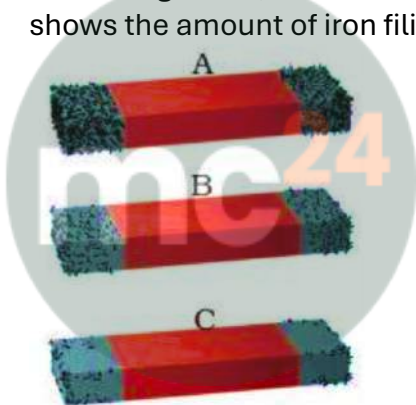


Solution: (b) Option 'b' is the correct arrangement.

Explanation: The correct way to store bar magnets is by placing them with opposite poles together and using metal plates (keepers) across the poles with a wooden block separating the magnets. This arrangement helps maintain the magnetic strength.

Question 3

Three magnets A, B and C were dipped one by one in a heap of iron filings. The figure shows the amount of iron filings sticking to them.



Myclass24
Your Class. Your Pace.

The strength of these magnets will be:

- (a) $A > B > C$
- (b) $A < B < C$
- (c) $A = B = C$
- (d) $A < B > C$

Solution: (a) $A > B > C$

Explanation: The amount of iron filings sticking to magnets is directly proportional to their magnetic strength. Since magnet A attracts the most iron filings, followed by B, then C, the order of strength is $A > B > C$.

Question 4

North pole of a magnet can be identified by:

- (a) Another magnet having its poles marked as North pole and South pole.
- (b) Another magnet no matter whether the poles are marked or not.
- (c) Using an iron bar.
- (d) Using iron filings.

Solution: (a) Another magnet having its poles marked as North pole and South pole.

Explanation: To identify the north pole of an unknown magnet, we need a reference magnet with clearly marked poles. The north pole of the known magnet will repel the north pole of the unknown magnet and attract its south pole.

Question 5

A bar magnet is immersed in a heap of iron filings and pulled out. The amount of iron filings clinging to the:

- (a) North Pole is almost equal to the South Pole.
- (b) North pole is much more than the South Pole.
- (c) North pole is much less than the South Pole.
- (d) Magnet will be same all along its length.

Solution: (a) North Pole is almost equal to the South Pole.

Explanation: The magnetic strength of both poles of a magnet is equal. Therefore, both the north and south poles will attract approximately the same amount of iron filings.

Very Short Answer Questions

Question 6

Fill in the blanks: (i) When a bar magnet is broken, each of the broken part will have _____ pole/poles. (ii) In a bar magnet, magnetic attraction is _____ near its ends.

Solution: (i) two (ii) more

Explanation: (i) When a magnet is broken, each piece becomes a complete magnet with both north and south poles. (ii) The magnetic force is strongest at the poles (ends) of a magnet and weakest at the center.

Question 7

Paheli and her friends were decorating the class bulletin board. She dropped the box of stainless steel pins by mistake. She tried to collect the pins using a magnet. She could not succeed. What could be the reason for this?

Solution: The pins are made of stainless steel, which is a non-magnetic material. Stainless steel contains chromium and nickel, which make it resistant to magnetism. Hence, Paheli was unsuccessful in collecting the pins using a magnet.

Question 8

How will you test that 'tea dust' is not adulterated with iron powder?

Solution: We can use a magnet to test whether tea dust is adulterated with iron powder.

Procedure:

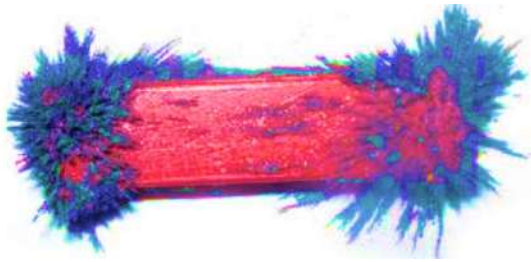
1. Bring a strong magnet close to the tea dust
2. If iron powder is present, it will be attracted to the magnet and stick to it
3. Pure tea dust will not be attracted to the magnet

If iron filings stick to the magnet, it indicates adulteration.

Question 9

Boojho dipped a bar magnet in a heap of iron filings and pulled it out. He found that iron filings got stuck to the magnet.

(i) Which regions of the magnet have more iron filings sticking to it? (ii) What are these regions called?



Solution: (i) The **ends** of the magnet have more iron filings attached to it. (ii) These regions are called **poles** of the magnet. Magnets have two poles: **North Pole** and **South Pole**.

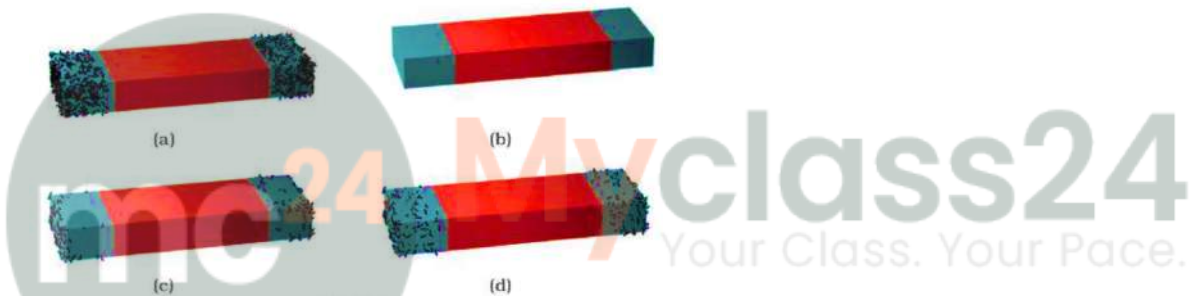
Explanation: The magnetic force is strongest at the poles, which is why maximum iron filings accumulate at the ends of the magnet.

Short Answer Questions

Question 10

Four identical iron bars were dipped in a heap of iron filings one by one. The figure shows the amount of iron filings sticking to each of them.

- (a) Which of the iron bars is likely to be the strongest magnet?
 (b) Which of the iron bars is not a magnet? Justify your answer.



Solution: (a) **Iron bar (a)** is likely to be the strongest magnet since the maximum amount of iron filings have stuck to it compared to any other bars.

(b) **Iron bar (b)** is not a magnet since no iron filings stick to it at all.

Explanation: The strength of a magnet is directly proportional to the amount of magnetic material it can attract. A non-magnetic iron bar will not attract any iron filings.

Question 11

A toy car has a bar magnet laid hidden inside its body along its length. Using another magnet, how will you find out which pole of the magnet is facing the front of the car?

Solution: We can use the principle that unlike poles attract each other while like poles repel each other.

Procedure:

1. Take a known magnet with marked poles
2. Bring the north pole of the known magnet close to the front of the toy car
3. **If attraction occurs:** The front of the car has a south pole
4. **If repulsion occurs:** The front of the car has a north pole
5. Verify by testing with the south pole of the known magnet

Question 12

Match Column I with Column II (One option of A can match with more than one option of B):

Column I

- (a) Magnet attracts
- (b) Magnet can be repelled by
- (c) Magnet if suspended freely
- (d) Poles of the magnet can be identified by

Column II

- (i) rests along a particular direction
- (ii) iron
- (iii) another magnet

Solution:**Column I**

- (a) Magnet attracts
- (b) Magnet can be repelled by
- (c) Magnet if suspended freely
- (d) Poles of the magnet can be identified by

Column II

- (ii) iron, (iii) another magnet, (iv) iron filings
- (iii) another magnet
- (i) rests along a particular direction

Question 13

You are provided with two identical metal bars. One out of the two is a magnet. Suggest two ways to identify the magnet.

Solution: Method 1: Using Iron Filings

- Dip both bars in iron filings
- The magnet will attract iron filings, especially at its ends
- The non-magnetic bar will not attract any iron filings

Method 2: Using Another Known Magnet

- Bring a known magnet close to each bar
- The magnetic bar will show both attraction and repulsion depending on pole orientation
- The non-magnetic bar will only show attraction (being attracted to both poles of the known magnet)

Long Answer Questions**Question 14**

Three identical iron bars are kept on a table. Two out of three bars are magnets. In one of the magnets, the North-South poles are marked. How will you find out which of the other two bars is a magnet? Identify the poles of this magnet.

Solution: Step 1: Identifying the Magnet

- Use the magnet with marked N-S poles as a reference
- Bring it close to both unknown bars
- Both the magnet and the non-magnetic bar will be attracted to the known magnet
- To distinguish between them, use the **repulsion test**

Step 2: Repulsion Test

- Bring the marked north pole close to one end of each unknown bar
- The magnetic bar will show **repulsion** when like poles meet
- The non-magnetic bar will only show **attraction**

Step 3: Identifying Poles

- Once the magnet is identified, use the marked magnet to find its poles
- North pole of marked magnet repels north pole of unknown magnet

- North pole of marked magnet attracts south pole of unknown magnet

Question 15

Describe the steps involved in magnetizing an iron strip with the help of a magnet.

Solution: Materials Required:



- Iron strip to be magnetized
- Strong bar magnet
- Wooden table

Procedure:

1. **Setup:** Place the iron strip on a wooden table
2. **Positioning:** Hold one end of the bar magnet and place the other end at one edge of the iron strip
3. **Rubbing:** Rub the magnet along the length of the strip in one direction only, without lifting the magnet
4. **Repetition:** Repeat this process several times (at least 10-15 times)
5. **Testing:** Test the magnetization by bringing iron filings near the strip

Important Points:

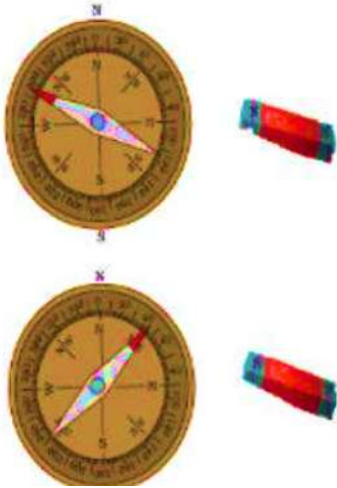
- Always rub in the same direction
- Do not lift the magnet during rubbing
- Use a strong magnet for better results
- The end where rubbing starts becomes opposite to the pole used for rubbing

Question 16

A magnetic compass is shown in the figure. What will happen to the position of its needle if you bring a bar magnet near it? Draw a diagram to show the effect when different ends of the bar magnet are brought near it.



Solution: Effect on Compass Needle: The magnetic needle of the compass will get **deflected** from its normal north-south position.



Explanation:

- Normally, a compass needle aligns with Earth's magnetic field
- When a bar magnet is brought near, the needle experiences a stronger local magnetic field
- The needle will align with the combined magnetic field of Earth and the bar magnet
- **North pole of compass needle** is attracted to the **south pole** of the bar magnet
- **North pole of compass needle** is repelled by the **north pole** of the bar magnet

Observations:

- **When south pole of bar magnet approaches:** Needle's north pole turns toward the magnet
- **When north pole of bar magnet approaches:** Needle's north pole turns away from the magnet

Question 17

Suggest an activity to prepare a magnetic compass by using an iron needle and a bar magnet.

Solution: Materials Required:

- Iron needle
- Strong bar magnet
- Cork or lightweight material
- Water
- Shallow dish/bowl

Procedure:

1. Magnetization:

- Place the iron needle on a wooden surface
- Rub the bar magnet along the needle in one direction repeatedly (30-40 times)
- Always rub from the same end to the same end

2. Preparation:

- Carefully push the magnetized needle through a small piece of cork
- Ensure the needle is balanced horizontally

3. Setup:

- Fill a shallow dish with water

- Gently place the cork with needle on the water surface
 - Ensure it can rotate freely
4. **Testing:**
- The needle will align itself in the north-south direction
 - Test by bringing a known magnet near it to confirm magnetization

Question 18

Boojho kept a magnet close to an ordinary iron bar. He observed that the iron bar attracts a pin. What inference could he draw from this observation? Explain.



Solution: Observation: Iron bar attracts a pin when a magnet is nearby.

Inference: The iron bar has acquired **temporary magnetic properties** due to **magnetic induction**.

Explanation:

1. **Magnetic Induction:** When a magnet is brought close to an iron bar, the iron bar becomes temporarily magnetized
2. **Induced Magnetism:** The end of the iron bar closer to the magnet becomes the opposite pole
3. **Temporary Effect:** This magnetism lasts only as long as the magnet is nearby
4. **Chain Effect:** The magnetized iron bar can now attract other magnetic materials like the pin

Scientific Principle:

- Iron is a **ferromagnetic material**
- It can be easily magnetized by induction
- The induced magnetism disappears when the inducing magnet is removed

Question 19

A bar magnet is cut into two pieces A and B from the middle. Will the two pieces act as individual magnets? Mark the poles of these two pieces. Suggest an activity to verify your answer.



Solution: Answer: Yes, both pieces A and B will act as **individual complete magnets**.

Explanation:

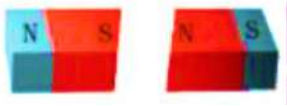
- Each piece will have its own north and south poles
- **Piece A:** Will have N pole at the original end and S pole at the cut end
- **Piece B:** Will have N pole at the cut end and S pole at the original end

Pole Formation:

Original Magnet: [N ===== S]

After cutting: [N === S] [N === S]

Piece A Piece B



Verification Activity:

1. Iron Filings Test:

- Dip each piece in iron filings
- Both pieces should attract filings at their ends

2. Repulsion Test:

- Bring the cut ends of both pieces together
- They should repel each other (both are same poles)

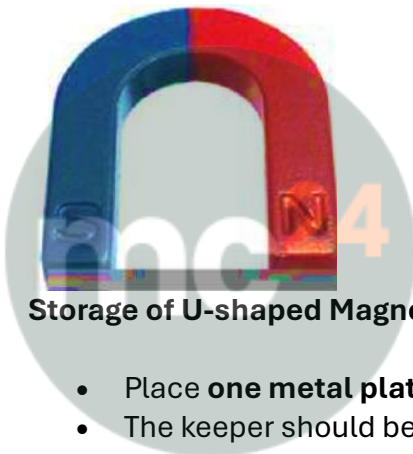
3. Attraction Test:

- Bring cut end of one piece to the original end of another
- They should attract each other (opposite poles)

Question 20

Suggest an arrangement to store a U-shaped magnet. How is this different from storing a pair of bar magnets?

Solution:



Myclass24
Your Class. Your Pace.

Storage of U-shaped Magnet:

- Place **one metal plate (keeper)** across both poles of the U-shaped magnet
- The keeper should be in contact with both north and south poles
- This creates a closed magnetic circuit

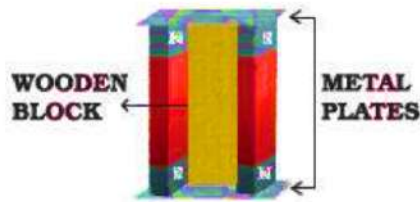
Storage of Bar Magnets:

- Use **two metal plates (keepers)** and **one wooden block**
- Place magnets with **opposite poles together** (N-S and S-N)
- Put wooden block between the magnets to separate them
- Place metal keepers across the poles

Key Differences:

Aspect	U-shaped Magnet	Bar Magnets
Keepers Required	One metal plate	Two metal plates
Separators	Not needed	Wooden block needed
Arrangement	Single keeper across poles	Opposite poles together
Purpose	Close magnetic circuit	Prevent demagnetization

Why These Arrangements?



- **Magnetic Circuit:** Keepers provide a path for magnetic field lines
- **Prevent Demagnetization:** Reduces loss of magnetic strength over time
- **Safety:** Prevents accidental attraction of metallic objects

Key Concepts Summary

Important Properties of Magnets:

1. **Poles:** Every magnet has two poles - North and South
2. **Attraction & Repulsion:** Like poles repel, unlike poles attract
3. **Magnetic Materials:** Iron, nickel, cobalt are attracted to magnets
4. **Non-magnetic Materials:** Wood, plastic, copper, aluminum are not attracted
5. **Breaking:** When broken, each piece becomes a complete magnet
6. **Induction:** Iron can be temporarily magnetized by a magnet

Applications:

- Magnetic compass for direction finding
- Separating magnetic materials
- Testing for magnetic materials
- Storage and transportation of magnets

