STEM in

LESSON PLAN

The Magic of Magnets

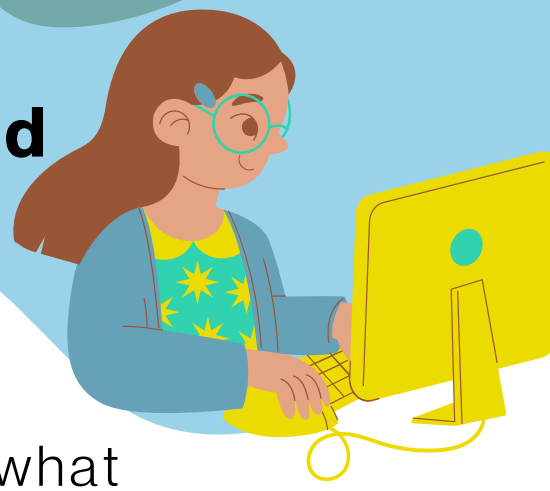
Students explore magnetism by testing materials, discovering attraction and repulsion, and completing a magnet maze challenge.

45 - 60 min

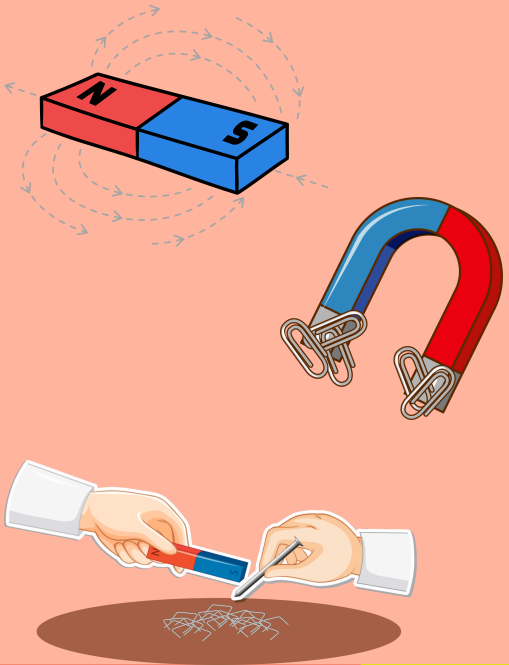
Duration

Recommended age for this game

6-9 years old



Learning Objectives



- Understand what magnetism is and identify objects that are magnetic and non-magnetic.
- Describe how magnets work, including the concepts of attraction and repulsion.

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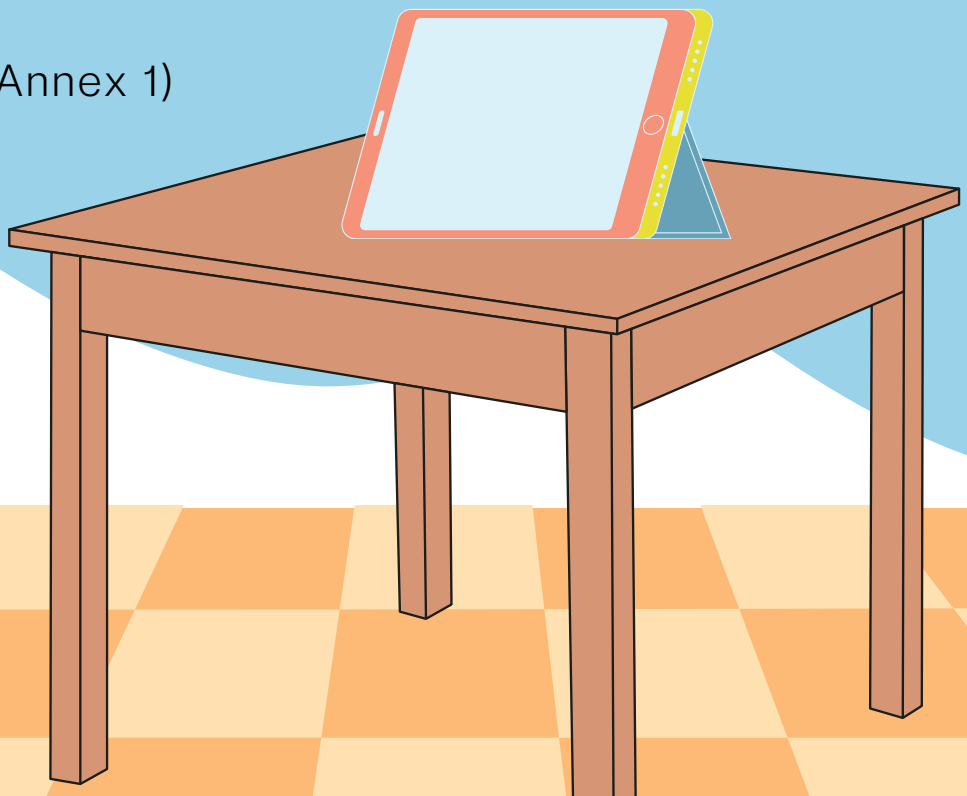
Materials and tools needed

- Various magnets (bar magnets, horseshoe magnets, ring magnets)
- Small objects to test (paper clips, coins, rubber bands, plastic pieces, aluminum foil)
- Magnetic vs. Non-Magnetic Sorting Chart (worksheet - see references).
- Pre-made magnet maze templates (printed sheets with paths for moving an object - see references)
- Small metal object (like a paperclip) to move through the maze
- Tape to secure mazes to desks
- Digital tool: PhET 'Magnets & Electromagnets' simulation (see references)
- Kahoot! Quiz (See Annex 1)



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Activity description

1. Introduction & Demonstration: A teacher-led discussion and demonstration of magnets in action.
2. Hands-on Experimentation: Students test different materials to see which are magnetic.
3. Magnet Maze Challenge: Students use a hidden magnet to navigate a small object through a paper maze.
4. Technology Integration: Students interact with an online simulation to visualize how magnetism works.
5. Discussion & Reflection: A group discussion to review what they learned, followed by a fun quiz (See Annex 1 for quizz questions).

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Preparation

- Set up materials: Arrange stations with different objects for magnet testing.
- Prepare magnet maze worksheets: Print enough copies for small groups.
- Ensure technology is ready: Open PhET simulation on tablets or computers.
- Test demonstration magnets: Have working examples of attraction and repulsion ready.
- Prepare reflection worksheets and assessment materials.

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Implementation steps

1. Introduction & Demonstration
   - Show different types of magnets and ask students if they have seen them before.
   - Demonstrate how magnets attract and repel each other.
   - Introduce the concept of a magnetic field.
   - Ask: "What do you think makes something magnetic?"

2. Hands-on Experimentation
   - Distribute a variety of small objects to each group.
   - Ask students to test each item using a magnet and sort them into magnetic and non-magnetic.
   - Have students record their findings on the sorting chart worksheet.

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Implementation steps

3. Magnet Maze Challenge
   - Distribute pre-made magnet maze worksheets.
   - Tape the maze to the desk and place a small paperclip or metal object on top.
   - Have students move the object through the maze using a hidden magnet underneath the paper.
   - Discuss: "What happens when we move the magnet closer or farther away?"

4. Technology Integration
   - Guide students to use the PhET Magnets & Electromagnets simulation.
   - Have them explore how magnetic fields interact with different materials.
   - Encourage students to experiment with different magnet strengths and placements.

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Implementation steps

5. Discussion and reflection
   - Ask students: "What surprised you the most?"
   - Discuss real-world applications of magnets (e.g., fridge magnets, MRI machines, compasses).
   - Conduct a Kahoot! quiz or use a printed quiz to check understanding.
   - Have students complete their reflection worksheets.

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Follow-up and reflection

1. Observation During Activities
   - Were students able to correctly identify magnetic vs. non-magnetic materials?
   - Did they successfully complete the magnet maze challenge?

2. Student Worksheets
   - Magnetic Sorting Chart (Completed with correct answers?)
   - Reflection Worksheet (Thoughtful responses to learning questions?)

3. Quiz or Kahoot!
   - Score-based evaluation to check comprehension (See Annex 1 for quizz questions).

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Student Activities

Activity description	Expected outcome	Technology integration
Magnetic Sorting Challenge	Students will understand which materials are magnetic and non-magnetic.	Use a digital worksheet or app for recording results and predictions.
Magnet Maze Challenge	Students will use magnets to navigate a metal object through a maze, exploring magnetic force.	Use a simulation tool to visualize magnetic force in action.
Interactive Quiz on Magnetism	Students will reinforce their learning through assessment and feedback.	Use an interactive quiz platform like Kahoot to test knowledge and provide feedback.
Exploring Magnetic Fields	Students will observe and understand how magnetic fields interact with objects.	Use a PhET Interactive Simulation to experiment with different magnet strengths.
Designing a Magnetic Experiment	Students will design and test their own experiment involving magnetism.	Use digital documentation tools (e.g., Google Slides, Canva) to present their experiment results.

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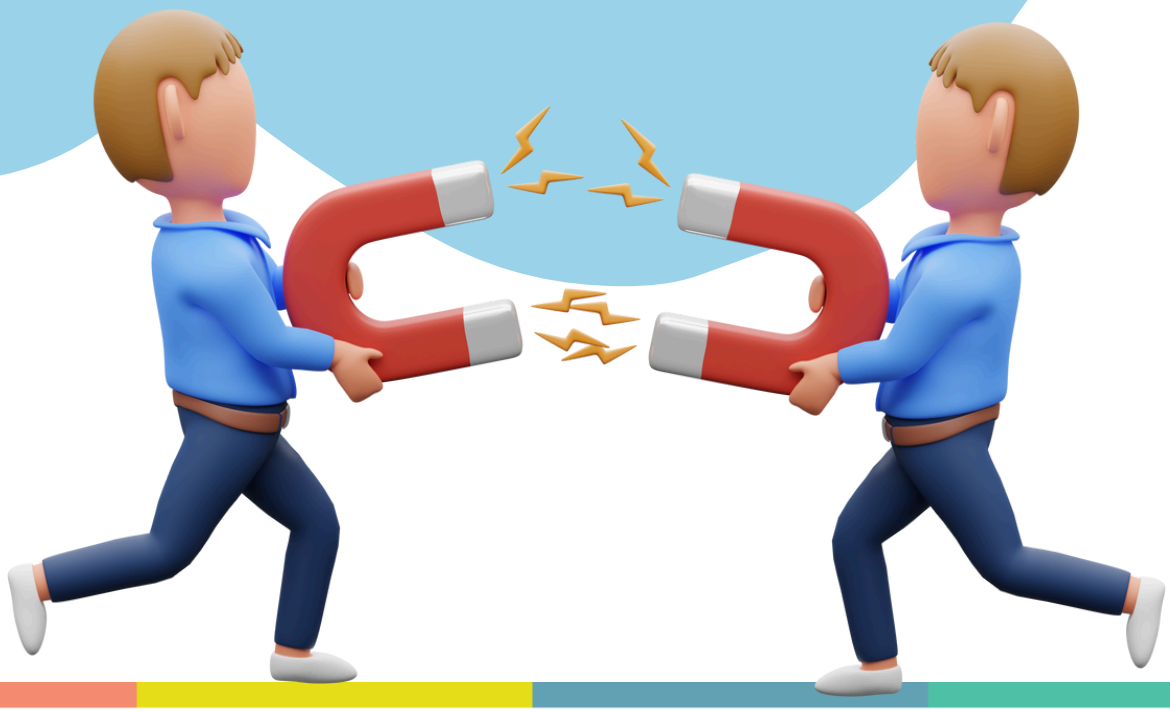
Reflective questions for students

- How did the magnet help you move the object through the maze?
- What happened when you tried different types of magnets?
- How do you think magnets are used in everyday life? Can you give some examples?
- If you had a stronger magnet, how do you think it would change the experiment?
- What would happen if we tried to use a magnet on water or glass? Why do you think so?



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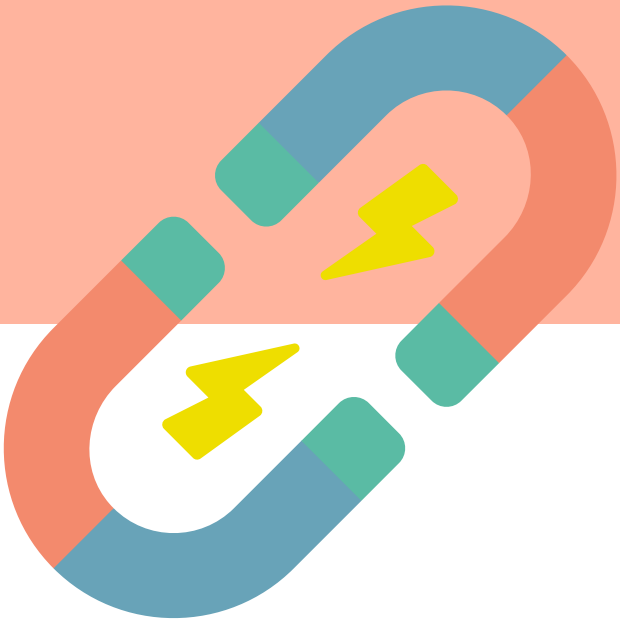
Differentiation ideas

For Advanced Learners:

- Challenge them to design their own magnet experiment (e.g., testing magnet strength at different distances).
- Introduce the concept of electromagnets and let them research how they are used in real life.

For Students Who Need Extra Support:

- Use larger, color-coded materials for easier handling.
- Pair students with a buddy for hands-on tasks.
- Provide a visual checklist to help them track their progress.



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Tips
Before the lesson

- Gather Materials in Advance – Ensure you have a variety of magnets, metal and non-metal objects, and magnet maze templates ready before class.
- Test Demonstrations First – Try out magnetic attraction and repulsion examples to ensure they work well for the class demonstration.
- Set Up Workstations – Organize the classroom into small groups with their own sets of materials to encourage hands-on participation.
- Check Technology – If using PhET magnet simulations or Kahoot! quizzes, test the technology beforehand to avoid disruptions.

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Tips
During the lesson

- Start with a Fun Question – Ask: “Can you name something in your house that uses a magnet?” to spark curiosity.
- Encourage Predictions – Before testing objects, have students guess whether something is magnetic and explain why.
- Use Inquiry-Based Learning – Instead of just explaining, let students explore and discover why some objects attract to magnets and others don’t.
- Facilitate Group Work – Pair students so they can discuss observations, which helps reinforce learning.

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Tips
After the lesson

- Ask Open-Ended Questions – Use reflection questions like “What surprised you the most?” to get students thinking.
- Assess Understanding Creatively – Instead of just a quiz, have students draw their own magnet experiment or explain a real-world use of magnets.
- Relate to Everyday Life – Encourage students to find magnets at home (e.g., fridge magnets, toy cars, speakers) and bring examples for the next class.

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Key Takeaways

- Magnets attract and repel depending on their poles.
- Not all materials are magnetic; only certain metals (iron, nickel, cobalt) are.
- Magnets have real-world applications in technology and daily life.
- Digital simulations help visualize magnetic fields in action.

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Additional materials and references

Video: "Magnetism?" https://www.youtube.com/watch?v=yXCeuSiTOug

Games and additional information
https://sciencetrek.org/topics/magnets/games

PhET Magnets
https://phet.colorado.edu/sims/html/magnets-and-electromagnets/latest/magnets-and-electromagnets_all.html

Kahoot https://create.kahoot.it/auth/register

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ANNEX 1

Questions for the quizzes

1. What happens when two like poles of a magnet are brought close to each other?
A) They attract
B) They repel
C) They stick together
D) Nothing happens

- 2. Which of the following materials is magnetic?

A) Plastic
B) Wood
C) Iron
D) Glass

- 3. What do we call the invisible area around a magnet where its force can be felt?

A) Gravity field
B) Electric field
C) Magnetic field
D) Attraction zone

- 4. What is an example of a real-life use of magnets?

A) A refrigerator door
B) A plastic spoon
C) A paper airplane
D) A rubber band

- 5. What happens when you bring a magnet close to a paperclip?

A) The paperclip moves away
B) The paperclip melts
C) The paperclip is attracted to the magnet
D) The paperclip disappears

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