Push or Pull? Predicting Magnet Poles

Teacher		**Class**	Year 3
Subject	Science	**Topic**	Magnets
Date		**Room**	
Lesson length	60 minutes	**Country**	United Kingdom

Pupils learn the pole rule for attract and repel. They predict for each pole pair then test it with bar magnets.

Curriculum links

- predict whether 2 magnets will attract or repel each other, depending on which poles are facing [1]
- observe how magnets attract or repel each other [1]

Learning objectives

- Students will name the north pole and south pole on a bar magnet.
- Students will predict attract or repel from the poles facing each other.
- Students will test predictions by bringing poles close without touching.

Success criteria

- I can point to the north pole and the south pole.
- I can say attract for N–S and repel for same poles.
- I can check my prediction by testing the magnets.

What students already know

Ask who has felt two magnets snap together or push apart, and ask what N and S on a magnet stand for (about 2 minutes).

Key words

north pole	one marked end of a bar magnet [4]
south pole	the other marked end of a bar magnet [4]
attract	to pull together, like opposite ends snapping together [5]
repel	to push apart, like same ends moving away [5]
predict	to say what will happen before you try it

Materials

- bar magnets with N and S marked, one pair for each pair of pupils
- prediction sheets with rows for North–South, North–North and South–South
- pencils
- N–S visual cards showing N–S with arrows together and N–N with arrows apart
- interactive whiteboard with Slides 1–5, 7, 9–10, 12

Before the lesson

- Print prediction sheets, one per pair, with tick boxes for attract and repel
- Print Worksheet Task C, one per pair, and cut into strips if needed
- Print N–S visual cards for support tables
- Check Slides 1–5, 7, 9–10, 12 display correctly; no video clips are used
- Set out bar magnets on trays and check N and S labels are clear

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- Worksheet Task C copies (Put the pole test in the right order)
- Arrange tables for pair work with space to slide magnets

Lesson outline

0–10 min **Starter** 10 min · Whole class

To hook curiosity and recall north and south poles before predicting.

YOU DO

1. Hold up two bar magnets with ends hidden, then show N facing N and let the top magnet jump away.
2. Say the hook and show Slide 1, then share Slide 2 objectives in pupil language.
3. Ask what the N and S ends are called and what pupils felt when the magnets pushed.
4. Model saying the facing poles aloud: North facing north.

STUDENTS DO

1. Watch the demo and describe what they saw with hands.
2. Join in saying north pole and south pole and repeat facing pairs.
3. Share one memory of magnets pulling or pushing.

Say: Watch my hands closely — I am not pushing, so why does this magnet jump? Today we will learn to guess what two magnets will do before they touch. Every magnet has two special ends we use to make our guess.

Ask: Why did the top magnet move when I was not pushing it? (The magnets pushed each other without touching, magnetism works over a distance [9].) · What are the two ends of every magnet called? (A north pole at one end and a south pole at the other [4].)

Check understanding: Hands up for north pole and south pole on teacher magnet; if mixed, point and label N and S together again before moving on.

Support: Point to large blue N and red S letters on the board while pupils repeat the names. **Stretch:** Ask pupils to guess which pole pair was facing when the magnet jumped and why.

Use: Slides 1–2

10–20 min **Teaching** 10 min · Whole class

To teach that opposite poles attract and same poles repel.

YOU DO

1. Show Slide 3 and explain attract means pull together and repel means push apart.
2. Show Slide 4 bar magnet and point to north at one end and south at the other [4].
3. Model a full predict then test: say poles facing, say prediction, then slowly bring ends close.
4. Repeat for a same-pole pair so pupils see and feel the push without touching [4].

STUDENTS DO

1. Chant the rule with actions: hands together for attract, hands push apart for repel.
2. Watch both demos and call out attract or repel before the magnets move.
3. Name the facing poles aloud with the teacher.

Say: Opposite poles pull together, so we say they attract. The same poles push apart, so we say they repel. We always look at the two ends that are facing, say our guess first, then test slowly.

Worked example: North facing south: I say North faces south, they are different, so I predict attract. I bring them slowly close and they snap together. North facing north: I say North faces north, they are the same, so I predict repel. I bring them slowly close and I feel them push apart [5].

Ask: If north faces south, will they pull together or push apart? (They will pull together, opposite poles attract [5].) · If south faces south, will they pull together or push apart? (They will push apart, the same poles repel [5].) · Do the magnets have to touch to pull or push? (No, they can exert a force on each other even if they are not touching [4].)

Check understanding: Show N–S fingers together or apart on mini whiteboards; reteach same versus different if many show repel for N–S.

Support: Keep Slide 3 displayed with Attract = pull together and Repel = push apart for pupils to copy.
Stretch: Ask pupils to predict what will change if one magnet is turned round before testing.

Use: Slides 3–4

20–30 min **Guided practice** 10 min · Whole class

To practise saying predictions quickly from facing poles together.

YOU DO

1. Show Slide 5 question and ask pairs to whisper the answer with a reason.
2. Show Slide 7 pole-pair cards one at a time: North to South, South to North, North to North.
3. Ask pupils to say the facing poles, then say predict attract or predict repel.
4. Bring two real bar magnets together slowly to check each class prediction.

STUDENTS DO

1. Think, pair, share the Slide 5 answer using because both poles are the same.
2. Call out attract or repel for each Slide 7 card before the teacher tests.
3. Use fists as magnet ends to mime snapping together or pushing apart.

Say: First name the two ends that are facing. Then use our rule to guess. If north faces north, will they pull together or push apart? Why? Tell your partner before we test.

Worked example: Card shows North to North. We say North and North are the same, so we predict repel. Teacher test shows the magnets push away, so our prediction was right [7].

Ask: North faces north: attract or repel, and why? (Repel, because the same poles push apart [5].) · South faces north: attract or repel, and why? (Attract, because opposite poles pull together [5].)

Check understanding: Thumbs up for attract and hold, thumbs down for repel and fall for each card; remodel N–S and N–N if split.

Support: Let pupils whisper the poles first, for example North and South, then choose attract or repel.
Stretch: Pupils take turns as caller and must explain why they chose attract or repel.

Use: Slides 5, 7

30–50 min **Main activity** 20 min · Pairs

To predict then test attract and repel for three pole pairs in pairs.

YOU DO

1. Give out two bar magnets, prediction sheets and Worksheet Task C strips.
2. Show Slide 9 and talk through the steps: say prediction, bring those poles slowly close, record with arrows.
3. Remind pupils every magnet has a north pole at one end and a south pole at the other [4], and the force works without touching [4].
4. Circulate, asking pairs to name facing poles before they move and to tick attract or repel after.

STUDENTS DO

1. Put Worksheet Task C steps in order, then follow them for each test.
2. Take turns to say prediction, test N–S, N–N and S–S slowly, and tick the sheet.
3. Compare results and practise explaining which facing poles proved it.

Say: Say attract or repel before you move magnets. Look at which ends are facing, say your guess out loud, then slowly bring those poles close together. Record attract with a pull arrow and repel with push arrows.

Worked example: Test 1 North to South: we predict attract because opposite poles pull together [5]. We hold N facing S, move slowly, they snap. We tick attract. Test 2 North to North: we predict repel because same poles push apart. We hold N facing N, move slowly, we feel a push with a small gap. We tick repel.

Ask: Before you move, what must you say and why? (Say which poles are facing and predict attract or repel, so we test the rule [1].) · Your pair shows N to S snapped together: attract or repel? (Attract, opposite poles pull together [5].)

Check understanding: Teacher checks ticked sheets for N–S attract, N–N repel, S–S repel; if pairs rushed to touch, remodel slow approach with a gap.

Support: Give a card showing N–S with arrows together and N–N with arrows apart to copy. **Stretch:** Ask students to predict what will happen if one magnet is turned round before testing.

Use: Slide 9; Worksheet Task C

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50–60 min **Plenary** 10 min · Whole class

To agree the pole rule and check every pupil can predict pole pairs.

YOU DO

1. Invite two pairs to share their ticked results for N–S and N–N.
2. Show Slide 10 and build the shared rule: opposite attract every time, same repel every time.
3. Stress the pull or push can be felt with a small gap because magnetism works over a distance [9].
4. Show Slide 12 exit ticket and ask pupils to write one sentence for North to north will… because…

STUDENTS DO

1. Report attract or repel for their pole pairs and point to facing poles.
2. Join in the class rule with together and apart actions.
3. Complete the Slide 12 exit sentence and one still-wonder question.

Say: We found opposite poles attract every time and same poles repel every time. Poles pull or push without touching. Now show me you can use that rule on your own.

Worked example: North to north will repel because both poles are the same and same poles push apart [5].

Ask: Where did the pull or push feel strongest? (At the ends of the magnets, the poles, where forces are strongest [5].) · If south faces north, what will happen? (Attract, opposite poles pull together [5].)

Check understanding: Collect exit sentences; if many mix same and opposite, retest N–N versus N–S as a class before dismissing.

Support: Give sentence starters such as I think it will repel because both poles are… **Stretch:** Ask pupils to describe where the pull or push feels strongest and why.

Use: Slides 10, 12

Common mistakes

Mistake	How to spot it	How to fix it
Thinking the same poles attract, predicting attract for North–North.	Pupil says attract when both facing poles are N or both are S.	Name both facing poles first, then use same means push apart and test slowly to feel the push [5].
Thinking magnets only work when touching.	Pupil pushes magnets together quickly and says nothing happened until they touched.	Hold a small gap and feel the pull or push, magnetism can act without direct contact [9].
Predicting without looking at which poles are facing.	Pupil shouts attract or repel without naming N or S.	Insist on saying North faces… then apply opposite attract, same repel [5].

Support

- Give a card showing N–S with arrows together and N–N with arrows apart to copy.

Stretch

- Ask students to predict what will happen if one magnet is turned round before testing.

For the LSE or teaching assistant

Sit with pairs who need help reading N and S; prompt them to say both facing poles before moving magnets and to tick the sheet after each test.

Check for understanding

Question	Answer
North to north will… because…	repel, because the same poles push apart [5]
North to south will… because…	attract, because opposite poles pull together [5]
Do magnets have to touch to attract or repel?	No, they can pull or push without touching [4]

Homework

Tell someone at home the pole rule and show attract and repel with your hands.

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