DESCRIBING FORCES

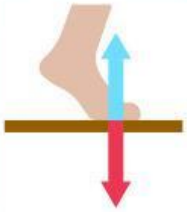
Use the RADAAR framework to support curriculum planning, building on the ideas that pupils bring to lessons: https://eef.li/RADAAR

Research and Anticipate

Anticipate potential hurdles

Children need to appreciate that:

- A force isn't a property an object **has**, it arises from an interaction between objects.
- Forces only happen when there's an interaction **between two objects**.
- The forces that arise from this interaction are on **different objects**.



Plan explanations and language

Reinforce these ideas using a fuller explanation of Newton's third law:

Instead of saying:

"For every action (force) there is an equal and opposite reaction"

Express it in full:

"The force of object A on object B is equal in size, and opposite in direction, to the force of object B pushing on object A."

Use this type of language explicitly for each example:

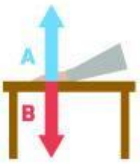
"If a person exerts a force on the floor, then the floor exerts a force of the same size that pushes up on the person."

Diagnose and Address

Diagnostic question

Forces **always** happen in pairs. Ask pupils which of these statements are correct, rating their confidence for each one.

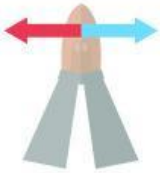
If I push the table, the table pushes my hand.



- **A** Force A is the force of the table on my hand
- **B** The direction of the force that the table pushes onto my hand is opposite to the direction of the force I push the table with.
- **C** If I push harder on the table, the table pushes harder on my hand.
- **D** The force the table pushes on my hand is the same size as the force I push the table with.

Explore further

If pupils aren't confident about the table pushing back on the hand, ask them to put their palms together with one palm acting as the table. If they push with one hand, they need to push back with the other to keep their hands still.



Encourage pupils to use the full expression:

"As my left hand pushes on my right hand, my right hand pushes back in the opposite direction with a force that is equal in size."

Ask pupils to describe how the forces change in response to one hand pushing harder.

Assess and Review

Revisit using further examples

Retaining this common language of object A pushing on object B can help pupils as they progress to more complex examples.

"The wall exerts a force on the man that is the same size and in the opposite direction to the force of the man pushing on the wall."

Children find it easier to imagine the floor pushing on a person standing on it than to appreciate the same reaction force from a wall when a person leans on it.

Check understanding

Pupils should recognise that an exerted force can only be as high as the reaction force that can be pushed back. You could ask them to explain why you can't push as hard on a floating object as on a fixed surface, because it can't push back as hard.

"If you exert a force on a balloon, it will exert an equal sized force in the opposite direction against your hand. If the force from your hand exceeds the force from the balloon, the balloon will accelerate in the direction of the force."

Education Endowment Foundation

BEST Best Evidence Science Teaching

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Text and activities informed by Best Evidence Science Teaching (BEST). Diagnostic questions taken from associated resources. All BEST resources developed by the University of York Science Education Group and the Salters Institute. http://www.[illegible]