

# Forces

## Before Reading

### Motivation / Purpose

The purpose of this text is to explain how forces work and how they affect us. This text links with the *Science* theme *Physical Science*.

### Text Type

Draw students' attention to the:

- title
- photographs
- questions.

Ask, 'What type of book is this?' (Factual). How do you know? What type of factual book is this? (Explanation). What clues are there that this is an explanation text?

### Visual Literacy

Look at the front cover. Talk about what the people in the photograph are doing. Why is this photograph used on the cover of a book about forces? Which force is acting on the people in the photograph?

Look at the first few spreads of the text. What is happening in each photograph? Describe what is happening in terms of pull or push.

### Background Knowledge

Ask students which force causes certain objects to move. (e.g. throwing a ball, running, lifting a box of books). Talk about *pushing* and *pulling* as forces. Explain that things can be moved by either of these two forces.

### Phonological Awareness

Make sure students know the following phonological patterns:

- /or/: ball (p.4), force (p.4), towards (p.5), draw (p.6), more (p.15), walk (p.19)
- long e: gravity (p.5), Greek (p.8), piece (p.8), leap (p.11), skis (p.23)

Set a time limit and select a letter combination. Ask students to write as many words as possible within the given timeframe which contain that sound/letter combination.

Locate words in the text which have a short vowel followed by a consonant, and double the final consonant before adding *-ing* (e.g. rub - rubbing; swim - swimming).

### Vocabulary

amber, attract, attraction, current, electrostatic, exert, force, friction, frictional, gravitational, gravity, magnet, magnetic, mass, negative, positive, repel, repulsion, satellites, sleek

### High Frequency Words

against, change, force, keeps, move, objects, poles, pull, push, reduce

Make single copies of high frequency words on cards and cut each one in half. Place the cards face down and allow students to turn over two pieces at a time. If the pieces make a word, the students keep the word. If the pieces don't match, the cards are turned face down and the next player takes a turn.

### During Reading

#### Vocabulary in Context

Write the words 'skis' and 'skies' on the board. Ask students to read the words aloud and differentiate between them. Look at the singular form of each word and discuss the rule for making plurals for words ending in *-y*.

Investigate the formation of adjectives from nouns by adding a suffix (e.g. magnet - magnetic; gravity - gravitational; friction - frictional). Look at how these words are used in the text.

#### Checking for Meaning

##### Literal:

What do forces do to objects? (They can push, pull, make things go faster, slow them down, stop or change direction.)

What happens when two magnets are brought together? (The two like poles will repel, but the unlike poles will attract each other.)

What causes static electricity? (Static electricity is caused by friction.)

##### Inferential:

What would happen to us if there was no gravity?

Which would have the greater gravitational pull - a tree or a bicycle? Why?

Why is it more difficult to swim when you are fully clothed?



Make sure students understand the difference between literal and inferential information.

#### Response:

What problems do astronauts experience in space, and how are these overcome?

List three examples of friction at work to slow down or stop moving objects.

#### Grammatical Patterns

Make sure students understand the following components of an explanation:

- Identifying statement about what is to be explained: *A force can either be a pull or a push* (p.4)
- Series of events known as the explanation sequence: (pp.6-7; pp.8-11; pp.12-17; pp.18-23). Note that this text is really a series of short explanation sequences about different types of forces.
- Use of general nouns: *aeroplane* (p.5), *magnets* (p.7), *objects* (p.15), *gravity* (p.17), *bicycle* (p.20)
- Use of action verbs: *discovered* (p.8), *leap* (p.11), *bounces* (p.18), *move* (p.22), *wax* (p.23)
- Use of simple present tense: *Magnets have magnetic forces* (p.6), *Gravity affects us every second of the day* (p.12)
- Use of conjunctions of time and cause: *when* (p.4), *because* (p.4), *if* (p.8), *but* (p.11), *so* (p.14)
- Use of noun groups: *bits of dried grass* (p.8), *the balance of positive and negative charges* (p.10), *objects on the Earth's surface* (p.16), *a pair of walking boots* (p.19), *a dry bitumen road* (p.21)
- Use of abstract nouns: *gravity* (p.12), *friction* (p.18)
- Use of adverbial phrases: *from an aeroplane, towards the Earth* (p.5), *on a piece of sheepskin* (p.8), *from one object to another* (p.11), *into a circular path around itself* (p.16), *in orbit around the Sun* (p.17)
- Use of complex sentences: *So, if a person who is riding a bicycle on flat ground stops pedalling, he or she will start to slow down.* (p.20)
- Use of technical language: *force* (p.4), *gravity* (p.5), *magnet, attraction, repulsion* (p.6), *friction* (p.10)
- Use of Glossary and Index: (p.24)

#### Fluency / Punctuation Patterns

Note that in this text, some sentences are short and simple to provide clarity for the reader, while others are longer and more complex. Discuss the varying sentence lengths and model the reading of each.

These punctuation patterns occur in the text:

- A comma is used to separate items in a list: *They include magnetic forces, gravitational force, electrostatic force and frictional force.* (p.5)
- Capital letters are used for the names of people: *Thales of Miletus* (p.8), *Dr William Gilbert* (p.9)
- A dash is used to add information to the sentence: *Gravity affects us every second of the day - it even keeps us on the Earth's surface.* (p.12)

- A comma is used before and after pieces of information added to a sentence: *The Earth has more mass than a person, for example, so it pulls really hard* (p.15), *This is because, after the ball bounces and rolls, frictional force acts ...* (p.18)

#### Critical Literacy

What is the purpose of this text? How can we use this information to better understand the world in which we live? Who is the intended audience for this text?

#### Linking Visual and Written

Look at the photograph on page 12. Talk about the effect of force on the boy. What sort of force has he had to exert to go up in the air? And what sort of force will bring him back to Earth?

Look at the photographs on pages 20 and 21. Talk about the ways in which forces affect how hard bicycle riders have to work. Compare the two photographs: which rider would have to work harder to overcome the effect of friction? Why? What other force is being exerted on these riders? (The weight of their backpacks.)

## After Reading

Use a magnet and some iron filings to demonstrate the extent of the magnetic field that surrounds the magnet. Use two magnets to confirm the effect of the north and south poles on each other.

Roll a ball along different surfaces (e.g. timber floor, carpet, concrete, grass) to determine which as the greatest and least amounts of friction.

### Activities

Students will:

- match sentences with similar meanings and locate page references
- use knowledge of spelling generalisations to complete new words
- write vocabulary words using a bank of letters
- identify structural and grammatical elements in an explanation.

Comprehension (meaning)    Vocabulary (structure)    Phonics (visual)    Writing (structure)

