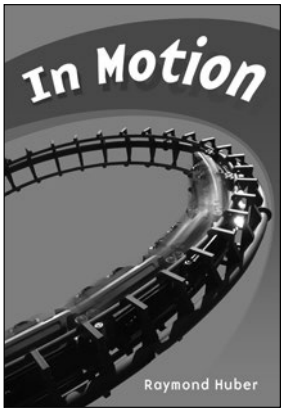
In Motion

by Raymond Huber



Book Summary

Forces hold our world together. They keep airplanes in the sky, allow running shoes to grip the track during a race, and keep Earth orbiting the sun. This book explores the forces that we can't see but are critical to our lives.

Features of the Book

- Scientific report with explanations
- Analogies and examples
- Diagrams and photographs
- Causes and effects
- Table of contents, glossary, and index

Purpose

In Motion can be used to introduce and reinforce the following skills and understandings:

- **S** using prior knowledge to make connections;
- **S** analysing and synthesising information;
- **S** understanding different kinds of motion as well as the effects of friction and gravity on moving objects;
- **S** exploring multiple meanings of words.

Investigation Tools

The Guided Reading Lesson

- **S** Using prior knowledge to make connections
- **S** Analysing and synthesising information
- **S** Understanding different kinds of motion as well as the effects of friction and gravity on moving objects

Introducing the text

Read the first part of the blurb aloud to the students (omit the last sentence). Discuss the questions, probing to find how familiar they are with the vocabulary and concepts associated with forces and motion. You could use words from the chapter headings (see page 2) or the glossary (page 31) as you evaluate their prior knowledge.

Tell the students that this book is about the forces that affect movement. They will need to draw on their prior knowledge to make connections that will help them to understand and synthesise information about scientific concepts.

Reading and discussing the text

Briefly discuss the allusion (to the *Star Wars* movies) in the title of the first chapter, then ask the students to read page 3 silently. Check to ensure that the students understand the broad concept (that all movement is caused by forces) then work through the information on page 4 together.

- *What connections can you make between what you already knew and what you're reading here?*
- *What other everyday examples could you give for each law?*

The students can read to the end of page 4 then discuss Newton's laws again.

- *What do you understand a law to be now?*
- *Do you think these laws have been tested enough to be sure that they can describe all movement?*

The students can now read Chapter 2, thinking about how they connect what they already know with the information in the text.

- *Can you describe a time when you've experienced the force of momentum?*
- *How would you explain the relationship between inertia, momentum, and speed?*

If necessary, model how to synthesise what you already know (about speed) with what you have read in the text (about inertia and momentum) and apply it to help understand how they are related (when inertia is overcome by a force, the momentum is shown by the speed at which the object moves). Discuss the examples on page 11, comparing the "objects", the forces used, and the momentum generated.

As the students read Chapter 3, ask them to continue thinking about how they connect what they already know with the text.

- *Think about some different kinds of bike rides or slides you've experienced. Tell us what the movement felt like and give a scientific explanation for this.*
- *Look at the explanation of joints on page 16. Why might some people experience pain or stiffness in their joints?*

The students can now read the remaining chapters, pausing to discuss what they are learning at places where you feel they may need support, for example: resistance on page 18, lift on page 22, centripetal force on page 27. Use the examples to help the students make connections with their own experiences and prior knowledge.

Revisiting the Text

The activities below can be used immediately after the guided reading lesson, during later reading sessions as mini-lessons, or as independent activities.

S Exploring multiple meanings of words

Discuss the last sentence on page 30.

- *What do you understand by this statement now? Do you agree or disagree?*
- *What other meaning could the statement have?*

The students can search for other words or phrases in the book that have more than one meaning and chart them, writing both meanings alongside each example. Further examples could include law (page 4), course (page 5), inertia (page 7), friction (page 12), cool (page 15), resistance (page 18).

S Using prior knowledge to make connections

The students can illustrate the scientific concepts in this book by finding other examples of forces in motion, based on their prior knowledge. Ask them to discuss the forces at work in their examples, referring to those in the book as models.

They can use the blackline master to record their examples.

S Understanding different kinds of motion as well as the effects of friction and gravity on moving objects

With the students, review the way that the investigation tool on page 28 shows the changes in forces as the roller coaster moves along the track. The students can suggest other examples of activities that demonstrate changes in forces (such as skateboarding, surfing, take-off or landing an airplane). They can select one activity, investigate it, then record their findings.