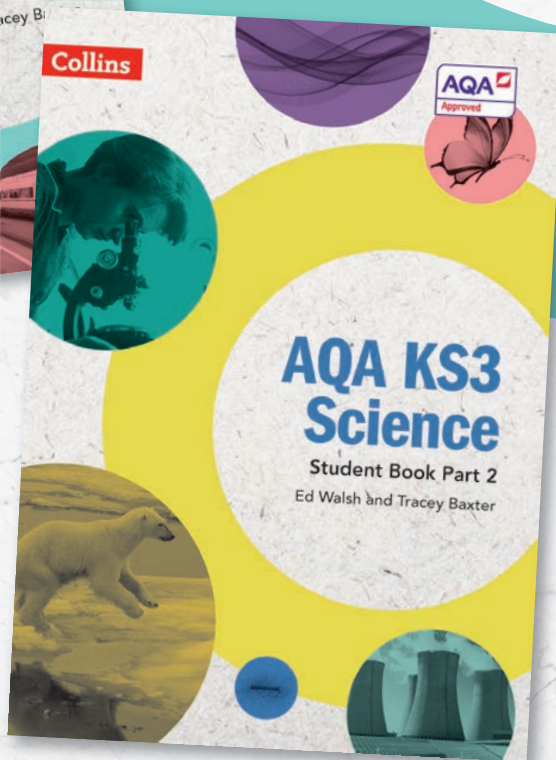
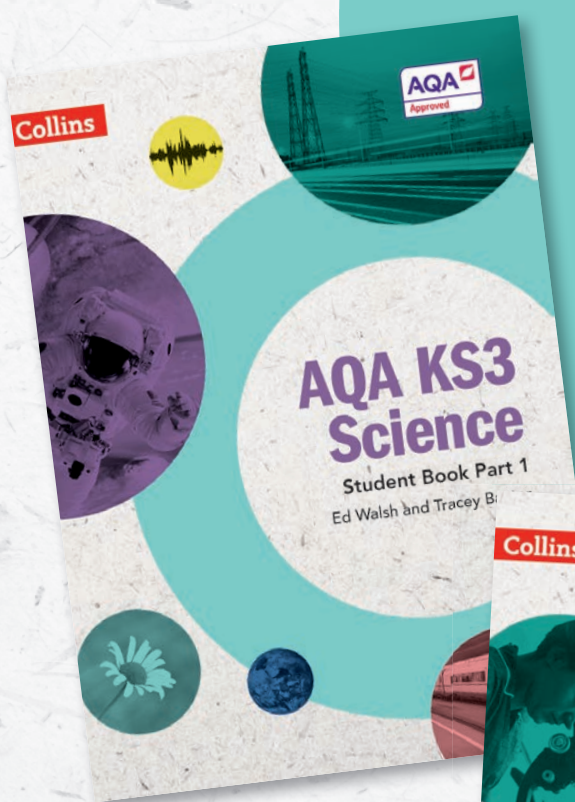


**Collins**



# AQA KS3 Science

Help students meet AQA's Mastery Goals with a bespoke two-year course, matched to the new AQA Key Stage 3 Science syllabus, Big Ideas principle and Enquiry Processes.



The student books have been approved by AQA

**Authors:**  
Ed Walsh  
and  
Tracy Baxter

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# Student Books

- **Cover the content effectively** with a two-book structure that reflects the AQA syllabus
- **Prepare students for the step up to GCSE** with maths and literacy skills integrated throughout and homework tasks that build confidence in answering longer GCSE-style questions
- **Develop the required key skills** with thorough coverage of the 16 AQA Enquiry Processes throughout
- **Support students in meeting the AQA Mastery Goals** which are reflected in the learning objectives for each lesson and the Check Your Progress charts at the end of each chapter
- **Check understanding and track student progress** with questions at the end of every topic and chapter
- **Engage and excite students** with material and activities that bring science to life
- **Teach with confidence**, the Student Books have been approved by AQA

Each lesson focuses on one or more of AQA's 16 Enquiry Processes


Material is clearly differentiated with the content increasing in difficulty

## Forces

### Speed and Gravity

**Ideas you have met before**

**Movement**  
Speed is a measurement of how quickly distance is being covered.  
The speed of an object can be calculated by dividing the distance travelled by the time taken.  
Speed is measured in units such as metres per second (m/s) and kilometres per hour (km/h).



**Force**  
Forces can be pushes, pulls or turning forces. They can be 'contact' forces – when objects are touching – or 'non-contact' forces – when the forces act at a distance.  
Force arrows drawn to scale show the size and direction of forces.  
A newton-meter allows us to measure the size of a force.  
Force is measured in newtons.



**Gravity**  
Gravity is a non-contact force.  
Large objects, like planets, exert strong gravitational forces on other objects. These objects are attracted towards the planet.  
Gravity pulls objects towards the Earth.  
Gravity keeps the Moon in orbit around the Earth and the planets around the Sun.



**In this chapter you will learn:**

- Speed and acceleration**
  - The greater the speed, the more distance a car can cover in a certain time.
  - An object's motion can be described by its distance–time graph.
  - A straight line on a distance–time graph shows constant speed.
  - The motion of an object can be described by its relative speed.
- Resultant force**
  - All the forces acting on an object can be combined to find a single force which has the same effect.
  - If the resultant force is zero, the object will stay at rest or change direction.
- Gravity**
  - Mass and weight are related.
  - Gravity is a non-contact force that acts on all masses.
  - Every object exerts a gravitational force on every other object.
  - A planet, like Earth, exerts a gravitational force on objects on its surface.
  - The gravitational force in the solar system is caused by the Sun.

Sample pages from AQA KS3 Science Student Book Part 1

## Waves

### Exploring sound

We are learning how to:

- Identify how sounds are made.
- Describe how sound waves transfer energy.
- Explain how loud and quiet sounds are made.

Sounds are made in different ways and by many different things. We need to understand what sound is, what all sounds have in common and how they vary.

**Making sounds**

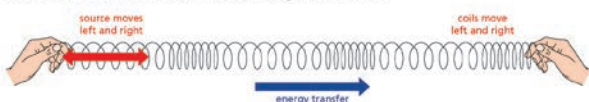
If you place a finger over your voice box when speaking or singing, you will feel the **vibration** of your voice box. This is where the sound comes from.

When an instrument is plucked or blown through, the string or the air vibrates. Often the vibrations are too small to see. All vibrations result in a sound. The vibrations from the object are passed on to air particles. These air particles bump into others and the wave progresses. Eventually the energy of the vibrations is transferred to your ears. The speed of sound in air is just over 343 m/s, around a million times slower than light.

1. What causes the sound when a bell is rung?
2. How does the sound from a concert reach the audience?

**Making waves**

Energy is transferred by sound in the form of waves. In Figure 1.4.1b a slinky spring provides a model that shows how these waves work. When you push the end of a slinky back and forth, some of the coils squash together and others pull apart. A wave of energy passes along the length of the spring. A wave like this which travels in the same line as the vibrations of the source is called a **longitudinal wave**.



**FIGURE 1.4.1b:** Why is this called a longitudinal wave?

**FIGURE 1.4.1a:** How does a guitar make a sound?

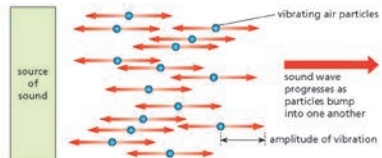
A sound wave works in the same way as the slinky spring. Vibrations push air particles together and also pull them apart, creating a longitudinal wave of energy. The energy is transferred from the source of the vibration to our ears.

3. Describe the movement of air particles in a longitudinal sound wave.
4. Explain how a longitudinal wave can transfer energy from one store to another.

**Loudness of sounds**

The **volume** of a sound is a measure of how loud the sound is. Sounds can be made louder by increasing the energy in the vibration. Plucking a string harder, blowing harder through a wind instrument or beating a drum harder will all transfer more energy. The loudness of sound is measured in a unit called a **decibel (dB)**. The loudest sound that humans can listen to without damage to their hearing is about 120 dB.


The size of a vibration is represented by its **amplitude**. Figure 1.4.1d shows that the amplitude is the maximum distance that a particle travels, from its middle position, in the to-and-fro vibration. The greater the amplitude, the greater the energy of the vibration and the louder the sound. In other words, a bigger wave will transfer more energy and be heard as a louder sound.



**FIGURE 1.4.1d:** What effect will a smaller amplitude have?

**Did you know...?**

The ocean-dwelling tiger pistol shrimp is known to produce sounds of over 200 dB. It uses the sound as a defence mechanism. The vibrations can kill prey and fish up to 2 metres away!



**FIGURE 1.4.1c:** A pistol shrimp.

Sound	Loudness (dB)
1 whisper	a) 80
2 phone ringtone	b) 140
3 jet engine	c) 100
4 motorbike	d) 30

**Know this vocabulary**

vibration  
longitudinal wave  
volume  
decibel (dB)  
amplitude

**5.** Look at Table 1.4.1. Match the sounds to the correct loudness.

**6.** The loudness of a sound also depends on the distance from the source. Explain what happens to the energy as you get further away.

Boost knowledge and understanding with key vocabulary with the Vocabulary Boost feature



# Teacher Packs

- **Get to grips with the new AQA syllabus** with an introduction, bespoke resources and a planning grid to make applying the principles of the syllabus easy
- **Ensure that the AQA Mastery Goals are met** – each lesson plan in the Teacher Pack will map to the Mastery Goals, with three levels of learning outcome
- **Integrate the 16 Working Scientifically Skills into activities** – each lesson has a Thinking Scientifically Skill and a Working Scientifically Skill focus
- **Make planning easy** with a comprehensive scheme of work and teaching concept route maps adapted to the ten Big Ideas
- **Teach your way** – all Teacher Pack resources are available as editable, printable documents on a CD ROM

The Teacher Packs have not entered the AQA approval process.



Chapter opening spreads connect topics within the Big Idea by showing how ideas are linked to earlier learning and where they will lead to next

Chapters are colour-coded to the Big Ideas in the AQA syllabus for ease of reference

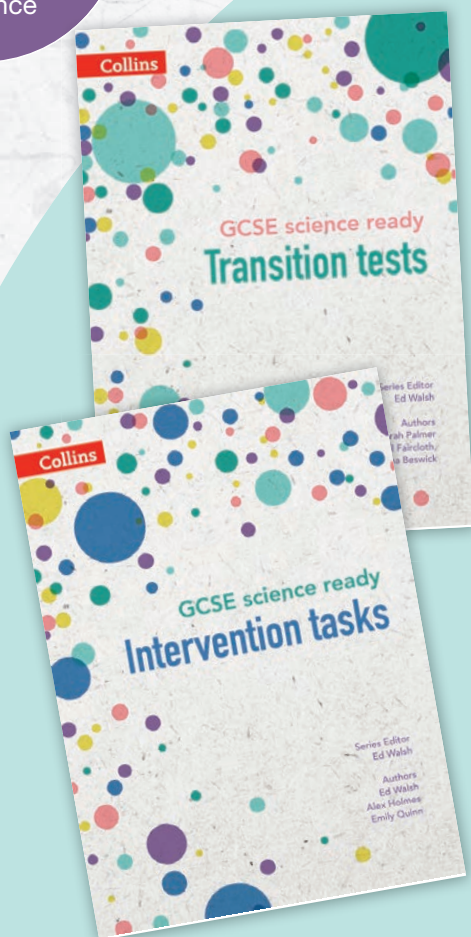
Literacy skills ensure students have the required vocabulary. 'Know this vocabulary' boxes in each topic

Pages from Science Book Part 1

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The 'GCSE science ready' series has not entered the AQA approval process.

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