

**Textbook** Stage 1-6



**Workbook** Stage 1-6



# Active Science



## Access to comprehensive Teacher's resources

- Teacher's guide (Lesson plan, scheme of work, printables)
- Specimen testpapers
- Topical worksheets
- Enrichment worksheets
- Reinforcement worksheets
- STEM activities
- Weblinks
- Answer keys
- Flash cards
- Manipulative list
- Online access ([www.AlstonDigital.sg](http://www.AlstonDigital.sg))



**Unique learning experience to develop scientific thinkers**

- 🔍 Combination of Singapore approach to teaching of science with the new Cambridge Primary Science (0097) Curriculum
- 🔍 Scientific investigation and concept development are facilitated using the Singapore approach of inquiry-based hands-on and experiential learning
- 🔍 Singapore approach to science teaching is proven with the strong performance of Singapore students in international TIMSS Science assessments, ranking 1st in 2015 and 2019



# Active Science

Focuses on developing learners "Thinking and Working Scientifically" skills using Problem-based Learning (PBL) instructional strategy

Consists of Active Learning activities for building content knowledge and developing critical thinking skills

**CHAPTER 1 / Skeletons and Muscles**

Tim accidentally knocked over the human body model on his science teacher's desk and tried to fix it. He realised that some internal organs would not stay in place and kept falling out of the model.

This is strange. These internal organs keep falling out! I think a part of this model is missing. Can you help me find the missing piece?

Looks like the missing piece is important to these internal organs!

What will I learn?

- List animals that have an exoskeleton.
- Identify vertebrates and invertebrates.
- Identify and name some important bones in the human body.
- Describe the functions of skeletons.
- Describe how pairs of muscles attached to bones help the bones move.

What are the internal organs that keep falling out of the model?

How are skeletons important to internal organs?

Which part of the skeleton is important to these internal organs?

## 1 Examine the problem scenario

- Providing an interesting real-world problem to spark the curiosity of learners
- Gathering clues to infer possible solutions

## 2 Recall prior knowledge

- Prompting learners to recall scientific concepts learnt

**Retrace our steps**

How does the arrangement of particles in solids and liquids look like? How do particles in solids and liquids move?

**Retrace our steps**

Can you think of other chemical reactions that require heat to occur?

## 6 Solve the problem

- Consolidating key scientific concepts learned using a mind map

**Mixtures**

Contain two or more materials that can be... Generally, each material retains its property within a mixture.

**Solid/solid** where one of the solids is... can be separated using Magnets

**Solid/liquid** with... can be separated using Filters

**Soluble solids** Solids that dissolve in liquids

**Insoluble solids** Solids that do not dissolve in liquids

**Can be separated using**

- Magnets
- Filters
- Sieves

**Can be separated using**

- Distillation
- Evaporation

**Can be separated using**

- Distillation
- Evaporation

**Can be separated using**

- Distillation
- Evaporation

**Materials**

can form New materials such as

- Oil
- Sand
- Glass
- Dough
- Bread
- Paper
- Ash
- Iron

can change in Shape by

- Squashing
- Stretching
- Bending

Movement

- Start moving
- Stop moving
- Move faster
- Change in direction

Forces

using

- Reasoning with scientific knowledge learnt to determine a solution

## 7 Understand scientific concepts

- Practising immediate reinforcement questions
- Applying scientific concepts learnt through questions of varied difficulties

**Solve this**

Yellow and black stripes are painted on roadblocks to prevent car drivers from driving into an area.

When the headlights of a car shine on a roadblock, which stripe will appear brighter? Circle the correct answers.

The (black / yellow) stripes will appear brighter as they reflect (more / less) light into our eyes.

**Worksheet 3: Move that muscle!**

Bones and muscles are important to help us move. For example, during dancing, several muscles in a dancer's body work together to help the dancer to move gracefully.

- Which part of the body connects bones to muscles for movement? [1]
- How do muscles work in pairs to move an arm or a leg? [1]
- One of the dance moves requires the dancer to bend and straighten her legs. What happens to the muscles in the dancer's leg as she bends and straightens them? Circle the correct answers. [2]

**Bending** **Straightening**

Muscle (contracts / relaxes) Muscle (contracts / relaxes)

## 3 Explore scientific concepts

**Let's Investigate!**

**Aim:** To find out how muscles in our arm work using a model.

**Instructions:**

- Pin two pieces of cardboard together using a paper fastener.
- Cut a rubber band in half and staple each rubber band in place. The rubber bands represent the muscles in our arm, while the two pieces of cardboard represent our arm bones.

**Model of our arm**

- Try moving the pieces of cardboard back and forth to show the bending and straightening of the arm. What do you observe about the rubber bands? Circle.
- When I bend the arm, Rubber band A becomes (shorter/longer) and Rubber band B becomes (shorter/longer).
- When I straighten the arm, Rubber band A becomes (shorter/longer) and Rubber band B becomes (shorter/longer).

- Carrying out, observing and explaining components in the investigation
- Building and developing scientific investigation skills

## 4 Learn scientific concepts

- Understanding the formal scientific terms through explanation and diagrams

**How can our skeleton move?**

Our skeleton can move with the help of our **muscles**. We can find muscles in many parts of our body, even in our eyes!

► We can find muscles in our shoulders, arms and legs.

► We use a few different muscles to blink!

**Shoulder muscles**  
**Arm muscles**  
**Leg muscles**

**Biceps**  
**Triceps**  
**Upper arm**  
**Tendon**  
**Bone**

Muscles are attached to bones by **tendons**. The muscles work in **pairs** to pull on the arm bones. This enables the arm to move. The main pair of muscles in the upper arm is called biceps and triceps.

**Watch out!**

Rainbows are curved. Are rainbows curved light rays?

We have learnt that light travels in straight lines so light rays cannot curve in the air. The rainbow appears curved to us because light rays from the Sun pass through water droplets in the sky and change direction before entering our eyes.

► We can learn more about rainbow formation by watching this video.

## 8 Review and reflect

- Evaluating the understanding of the learning objectives in the chapter

**Consolidation worksheet**

- Jarrad and Claire are looking at a lit candle through a straight tube and curved tube. [1]
- In the diagram above, draw light rays to show how light travels from the flame to their eyes. [2]
- Who is not able to see the candle? Explain why. [2]
- Catherine has a vase of flowers on a table. In the diagram below, draw light rays to show how Catherine sees the flowers. [1]

**You have a mission!**

Periscopes are often used in submarines to help people inside see objects above the surface of the water.

Let's make our own periscope!

**Materials:**

- Two empty milk cartons
- Two rectangular hand mirrors
- Scissors
- Tape

**Instructions:**

- Prepare a milk carton as shown in the diagram below. [1]
- Place the mirror into the carton. It should be facing the hole at an angle of 45 degrees. [1]

- Assessing learning through an explorative alternative assessment

## 5 Elaboration of scientific concepts

**Think-pair-share**

Turtles and tortoises have exoskeletons called shells too. Look at the X-ray images of a tortoise and a turtle.

Remember, only vertebrates have backbones!

Do they have a backbone? Are they vertebrates or invertebrates?

- Applying scientific knowledge learnt through collaboration and discussion

**Uses of sieving and filtering around us**

Thanks to farmers and peacocks, we get flour for baking! Farmers sieve wheat to remove straw, sticks and stones to make flour! Watch this video to find out more.

Clean drinking water is very important for us! There are filters in water purifiers to remove harmful substances in water.

In baking, flour is sieved to make sure that clumps of flour are broken down. This will make the cake mixture more even.

A filter is used when making coffee to remove ground coffee beans from the drink.

An air purifier uses multiple layers of filters that can trap different sizes of harmful substances in the air.

This video shows how an air purifier works.

**Class** Ground - To break something down into smaller particles by crushing.

## 9 Prepare for tests

- Providing opportunities for learners to gain exam confidence

**Mid-year Review Paper**

30

- Different bones form a skeleton in the human body. Label the bones of the skeleton. One has been done for you. [1]
- What is the function of the rib cage? [1]
- Which part of the body is attached to the bones to help them move? Circle the correct answer. [1]