UNIT 7

“Middle Ages

(& Dutifulness)”

Grades

0 - 6

SCIENCE &

TECHNOLOGY

Homeward

Education Support

Science & Technology (Grades 0-6)

“Middle Ages (& Dutifulness)”

SUMMARY:

Science in the Middle Ages invites students in Grades 0–6 to discover how people long ago explored, tested, and applied scientific ideas long before modern laboratories existed. Through stories, observation, hands-on activities, and discussion, students learn that medieval science was practical, thoughtful, and deeply connected to everyday life – shaping tools, buildings, music, medicine, transport, and communication. The course moves across cultures, highlighting both European and Chinese contributions, and shows how knowledge developed through careful observation, experimentation, and shared learning over time.

Throughout the course, science is presented not as abstract theory but as a human endeavour rooted in responsibility, care, and **dutifulness**. Students are encouraged to see science as a way of stewarding God’s creation wisely – using materials, energy, and ideas thoughtfully to serve communities and meet real needs. By the end of the course, learners gain a richer understanding of how scientific thinking has grown across history, and how curiosity, discipline, and moral responsibility continue to matter in scientific learning today.

RESOURCES:

This study guide is designed for ease of use with comprehensive instructions for the parent/tutor on what to say and do with the children.

The hands-on or creative activities are designed to use materials you will likely have already in your home, but you should maintain some **art and craft materials**.

Each child will also need a **Science Journal** (i.e., a lined exercise book or Botany book for nature study notes, writing responses to questions, and writing activities).

It is also helpful to have a good **dictionary**.

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Prior to starting each week, review the recommended resources.

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TOPIC 1	TOOLS, CRAFT & EARLY TECHNOLOGY

Lesson 1.1 – Blacksmithing & Metallurgy

Introduction

During the Middle Ages, almost every village depended on the work of a **blacksmith**. Blacksmiths made tools for farmers, weapons for soldiers, hinges for doors, nails for buildings, and horseshoes for travel. Their work required careful observation, patience, and skill – and it relied on an early understanding of **materials, heat, and change**.

In this lesson, students will explore how medieval blacksmiths worked with metals, how heating and cooling changed materials, and how people in the past used practical science to meet real needs.

Science links: materials, heat, forces, reversible and irreversible change, science as a human endeavour.

Science Terminology

- **Metal** – a strong material that can be shaped, often when heated
- **Forge** – a very hot fire used to heat metal
- **Anvil** – a heavy metal block used for shaping hot metal
- **Hammer** – a tool used to apply force
- **Metallurgy** – the science of working with metals
- **Heat** – energy that makes materials hotter and can change them
- **Change of state** – when a material changes form due to heating or cooling

Informational Story

In a small medieval village, the blacksmith's workshop was one of the busiest and noisiest places. Long before electricity or machines, people relied on human strength, fire, and simple tools to shape the materials God had placed in the earth.

The blacksmith began work early in the morning. He lit the forge and pumped air into the fire using bellows. As the fire grew hotter, pieces of iron were placed inside. Slowly, the iron changed colour – from dark grey to glowing red, and sometimes even orange. This colour change told the blacksmith that the metal was becoming soft enough to shape.

When the iron was hot, the blacksmith lifted it with tongs and placed it on the anvil. With strong, repeated hammer blows, he shaped the metal. Each strike applied a **force**, changing the metal's shape. If the metal cooled too much, it became hard again and could crack, so it had to be reheated.

This careful cycle of heating, shaping, and cooling showed an early understanding of **reversible and irreversible change**. Heating softened the metal (reversible), but mistakes could permanently damage it (irreversible). Blacksmiths learned through experience how long to heat metal, how hard to strike it, and when to cool it in water.

Medieval blacksmiths did not write scientific textbooks, but they practiced science every day. They observed patterns, tested methods, and shared knowledge through apprenticeship. Over time, their skills improved as techniques were passed from one generation to the next.

From a Christian perspective, blacksmithing reminds us that humans are not creators of matter – only **shapers of what God has already made**. Iron, fire, and strength all came from God's creation. The blacksmith's role was to use wisdom, care, and responsibility in working with those gifts.

Narration Prompt

Parent/Tutor Says:
"Now, close your eyes and picture the blacksmith at work. Imagine the heat of the fire, the sound of the hammer, and the glowing metal on the anvil. Tell me everything you remember about how the blacksmith used heat and force to shape metal."

Thinking Questions

Foundation – Year 2

- What tools did the blacksmith use?
- What happened to the metal when it was heated?
- Why do you think the blacksmith had to be careful?

Years 3–4

- How did heat change the metal?
- What forces were used in blacksmithing?
- What might happen if the metal cooled too quickly?

Years 5–6

- Which changes in blacksmithing were reversible, and which were irreversible?
- Why was blacksmithing important for medieval communities?
- How does this show people using science to solve problems?

Teaching Concepts

- Metals change when heated and cooled
- Heat energy can make materials softer or harder
- Force can change the shape of objects
- Early craftspeople used observation and testing
- Science develops through shared knowledge and experience

Practical Activities

Foundation – Year 2

- Sort classroom objects by material (metal / non-metal)
- Use modelling clay and tools to "shape" a pretend metal object

Years 3–4

- Heat investigation (safe): compare warm vs cool materials and describe changes
- Build a paper "tool" and test how shape affects strength

Years 5–6

- Model reversible vs irreversible changes using wax or chocolate (teacher-guided)
- Design a simple medieval tool and label materials and forces used

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Christian Wrap-up

Blacksmiths remind us that **science is about stewarding God's creation wisely**. Fire, metal, strength, and skill all come from God, and humans are called to use them carefully and responsibly. The patience and care required in blacksmithing reflect God's order and purpose in the world.

"The Lord God took the man and put him in the Garden of Eden to work it and take care of it." (Genesis 2:15)

Australian Curriculum v9 – Science Content Descriptions Addressed

Foundation

- AC9SFU03 – Objects are made of different materials and have observable properties
- AC9SFH01 – People use observation and questioning to learn about the world

Year 1

- AC9S1U03 – Pushes and pulls affect the motion and shape of objects
- AC9S1H01 – People use science in daily life

Year 2

- AC9S2U03 – Materials can be changed physically without changing composition
- AC9S2H01 – People use science to solve everyday problems

Year 3

- AC9S3U03 – Heat energy causes temperature change
- AC9S3H02 – Scientific explanations meet needs

Year 4

- AC9S4U04 – Properties of materials influence their use
- AC9S4H02 – Science helps solve problems

Year 5

- AC9S5U04 – Particle models explain properties of materials
- AC9S5H01 – Science builds on shared knowledge

Year 6

- AC9S6U04 – Reversible and irreversible changes
- AC9S6H01 – Science develops through collaboration

Lesson 1.2 – Early Clocks & Timekeeping

Introduction

In the medieval world, knowing the time was not about catching trains or checking phones. Instead, timekeeping helped people **pray, work, rest, and organise daily life**. Monasteries, towns, and villages depended on clocks to signal prayer times, meals, and important events.

In this lesson, students will explore how medieval people measured time using the **sun, water, sound, and moving parts**, and how these early technologies show careful observation of patterns in God's orderly world.

Science links: movement, sound, forces, patterns, energy transfer, science as a human endeavour.

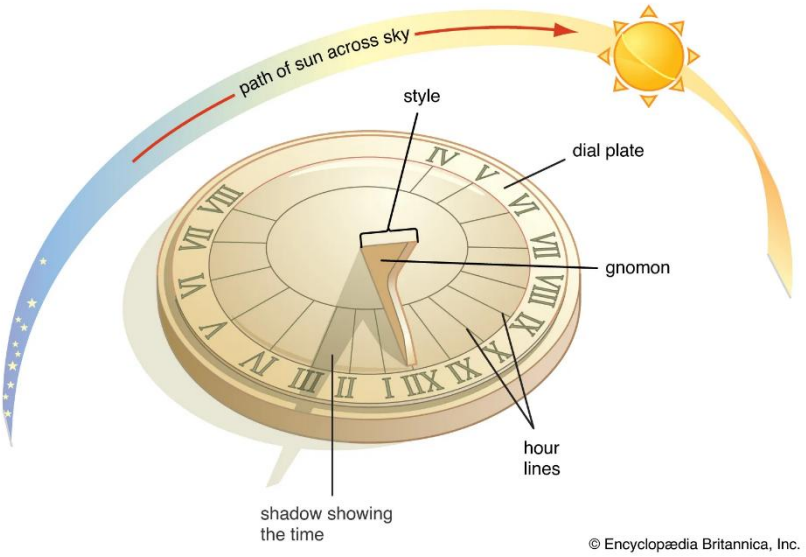
Science Terminology

- **Timekeeping** – measuring the passage of time
- **Sundial** – a device that uses shadows to tell time
- **Water clock (clepsydra)** – a clock that measures time using flowing water
- **Mechanical clock** – a clock that uses gears and moving parts
- **Escapement** – a mechanism that controls movement in a clock
- **Vibration** – repeated back-and-forth movement that creates sound
- **Pattern** – something that repeats in a regular way

Informational Story

Long before digital clocks and watches, medieval people learned to measure time by watching God's creation carefully. They noticed that the sun rose and set in regular patterns and that shadows moved in predictable ways. These observations led to one of the earliest timekeeping tools – the sundial.

A sundial worked by placing a stick or metal piece upright so that the sun cast a shadow. As the sun moved across the sky, the shadow moved too. Markings on the ground or stone showed the passing hours. Sundials worked well during the day but were useless at night or on cloudy days.



To solve this problem, medieval scientists and craftsmen developed **water clocks**. These clocks used water dripping at a steady rate from one container to another. By marking levels inside the container, people could measure how much time had passed.

This required careful observation, because changes in temperature could affect how fast the water flowed.

Churches played a major role in timekeeping. Bells were rung at regular times to signal prayer, work, meals, and rest. Sound became a way to share time with the whole community. The science of **sound vibrations** helped bells carry across towns and fields.

By the later Middle Ages, mechanical clocks appeared. These clocks used gears, weights, and escapements to control movement. Gravity pulled the weights downward, and the escapement released energy in small, steady steps. This allowed clocks to keep time more accurately than ever before.

From a Christian worldview, medieval timekeeping reflects a belief that time itself is part of God's orderly creation. Measuring time helped people live disciplined lives, honour God through prayer, and balance work and rest.

Narration Prompt

Parent/Tutor Says:
"Close your eyes and imagine a medieval town. Picture the sundial in the sunlight, the slow dripping of a water clock, and the sound of church bells. Tell me everything you remember about how medieval people measured time."

Thinking Questions

Foundation – Year 2

- How did the sundial tell time?
- What made the church bells useful?
- Which clock do you think was easiest to use?

Years 3–4

- Why didn't sundials work at night?
- How did water clocks show patterns?
- How did sound help people keep time together?

Years 5–6

- How did mechanical clocks improve accuracy?
- What forces helped mechanical clocks work?
- Why was timekeeping important for medieval communities?

Teaching Concepts

- Time follows patterns in nature
- Sound travels through vibration
- Forces such as gravity cause movement
- Measuring time requires observation and precision
- Technology develops to solve real-life problems

Practical Activities

Foundation – Year 2

- Make a simple shadow clock using a stick and sunlight
- Listen to different sounds and identify which are loud or soft

Years 3–4

- Create a simple water timer using cups and holes
- Investigate how different materials affect sound vibrations

Years 5–6

- Build a cardboard gear model to explore controlled movement
- Compare different time-measuring methods and record accuracy

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Christian Wrap-up

Medieval timekeeping reminds us that **time is a gift from God**. Learning to measure it helped people live ordered, disciplined lives that included work, worship, and rest.

“Teach us to number our days, that we may gain a heart of wisdom.” (Psalm 90:12)

Australian Curriculum v9 – Science Content Descriptions Addressed

Foundation

- AC9SFU02 – Objects move in different ways depending on size, shape, and material
- AC9SFH01 – People use observation and questioning to learn about the world

Year 1

- AC9S1U02 – Daily patterns affect everyday life
- AC9S1H01 – Science is used in daily life

Year 2

- AC9S2U02 – Sound is caused by vibration

- AC9S2H01 – People use patterns to make predictions

Year 3

- AC9S3U03 – Heat and energy affect materials and systems
- AC9S3H02 – Science meets community needs

Year 4

- AC9S4U03 – Forces affect motion
- AC9S4H02 – Scientific explanations solve problems

Year 5

- AC9S5H01 – Advances in science build on others' work

Year 6

- AC9S6H01 – Science develops through collaboration

TOPIC 2	KNIGHTS & HERALDRY

Lesson 2.1 – Armour & Weapons of the Knight (Materials, Force & Protection)

Introduction

Medieval knights needed strong protection to survive in battle. Armour and weapons were not just symbols of status – they were carefully designed technologies that used **materials, force, motion, and energy**. Over time, armourers improved designs to protect knights while still allowing them to move.

In this lesson, students explore how medieval armour and weapons worked, how different materials offered protection, and how science helped people reduce injury and survive dangerous conditions.

Science links: materials science, forces, motion, energy transfer, science as a human endeavour.

Science Terminology

- **Armour** – protective clothing made to stop or reduce injury
- **Chainmail** – armour made from linked metal rings
- **Plate armour** – solid metal plates shaped to fit the body
- **Force** – a push or pull that can change motion or shape
- **Impact** – force created when objects collide
- **Energy** – the ability to cause movement or change

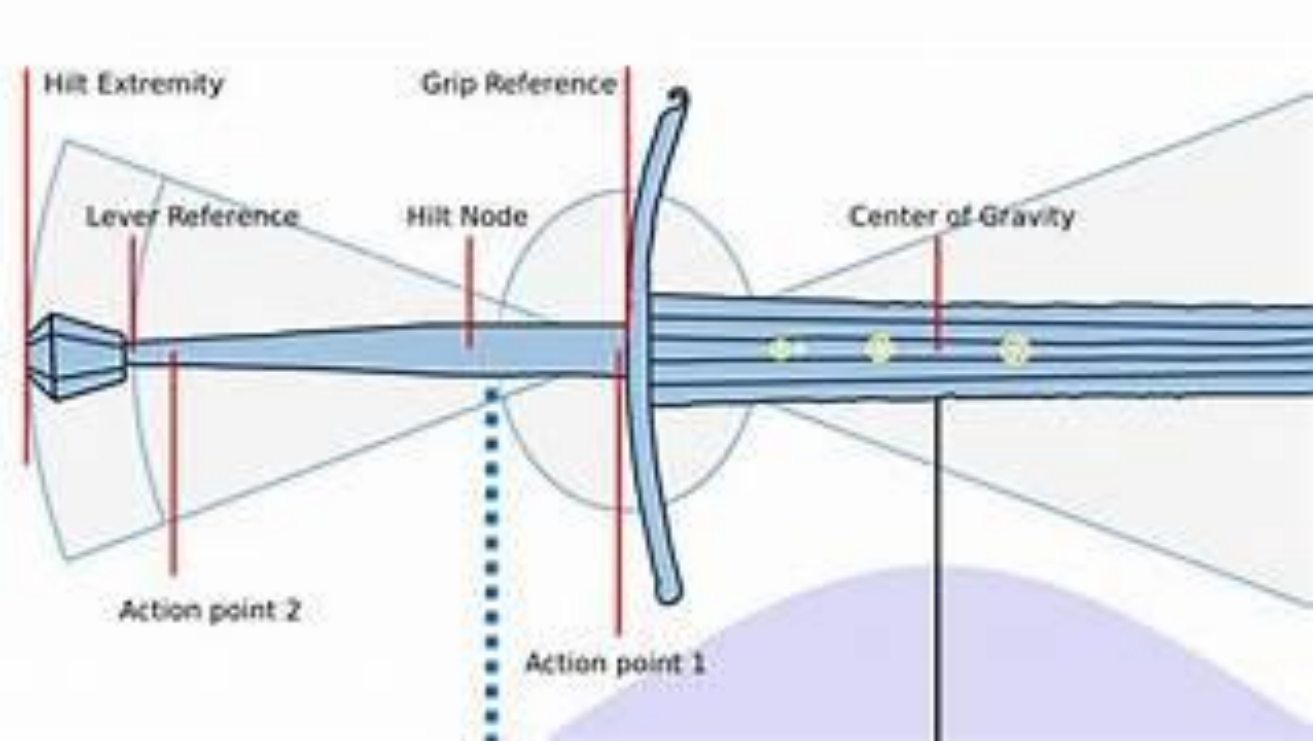
Informational Story

A medieval knight prepared for battle by putting on layers of carefully designed protection. Each piece of armour served a purpose and showed an early understanding of how **materials and forces interact**.

Chainmail was one of the earliest forms of armour. It was made by linking thousands of small metal rings together. When struck by a weapon, the force was spread across many rings instead of hitting one point. This reduced injury and prevented cutting weapons from slicing through easily.

Later, plate armour became more common. Armourers shaped large metal plates to cover the chest, arms, and legs. The curved shape of the plates helped deflect blows, causing weapons to slide away rather than hit directly. This shows an understanding of **angle, force direction, and impact**.

Weapons also reflected scientific thinking. Swords were balanced so knights could swing them effectively without losing control. Shields absorbed impact, reducing the force felt by the knight's arm. Lances used motion and speed to increase force during jousting, demonstrating how **movement increases energy**.



Armourers learned through observation and testing. Designs improved as battles revealed weaknesses. Knowledge was passed down through apprenticeships, showing how science and technology developed through experience and collaboration.

From a Christian perspective, armour reminds us that humans seek protection in a dangerous world. While physical armour protected knights, the Bible teaches about spiritual armour that protects the heart and mind.

Teaching Concepts

- Materials have properties that affect protection
- Force can be spread or redirected
- Motion increases energy
- Design improves through testing and experience
- Technology solves real-world problems

Narration Prompt

Parent/Tutor Says:
“Close your eyes and imagine a knight putting on armour piece by piece. Picture the weight of the metal, the sound of chainmail, and the clash of weapons. Tell me everything you remember about how armour protected knights.”

Thinking Questions

Foundation – Year 2

- What was armour made from?
- Why did knights wear armour?
- Which piece looks the strongest?

Years 3–4

- How did chainmail spread force?
- Why were plates curved instead of flat?
- How did shields protect knights?

Years 5–6

- How did armour design reduce injury?
- How did force and motion affect weapon use?
- Why did armour change over time?

Practical Activities

Foundation – Year 2

- Compare soft and hard materials for protection
- Design a paper "shield" and test gentle impacts

Years 3–4

- Test how curved and flat shapes respond to force
- Investigate how layering materials changes protection

Years 5–6

- Build a model helmet or shield and test force reduction
- Record results and suggest improvements based on evidence

Christian Wrap-up

Medieval armour protected the body, but Scripture reminds us that true strength comes from God. Just as knights prepared for battle, Christians are called to prepare their hearts and minds.

"Put on the whole armour of God, that you may be able to stand." (Ephesians 6:11)

Australian Curriculum v9 – Science Content Descriptions Addressed

Foundation

AC9SFU03 – Objects are made of different materials with observable properties

AC9SFH01 – People use observation and questioning to learn about the world

Year 1

AC9S1U03 – Pushes and pulls affect motion and shape

AC9S1H01 – Science is used in daily life

Year 2

AC9S2U03 – Physical changes to materials

AC9S2H01 – Science used to solve problems

Year 3

AC9S3U03 – Heat and energy transfer (impact energy)

AC9S3H02 – Scientific explanations meet needs

Year 4

AC9S4U03 – Forces affect motion

AC9S4U04 – Properties of materials influence use

Year 5

AC9S5H01 – Advances in science build on collaboration

Year 6

AC9S6H02 – Communities use scientific knowledge

Lesson 2.2 – Heraldry (Symbols, Colour, Materials & Communication)

Introduction

In medieval times, battlefields were noisy, crowded, and confusing. Knights wore armour that covered their faces, making it difficult to tell who was who. To solve this problem, medieval societies developed **heraldry** – a system of symbols, colours, and patterns used for **identification and communication**.

In this lesson, students explore how heraldry combined **materials science, colour visibility, pattern recognition, and symbolic communication** to solve a real-world problem.

Science links: materials, colour and light, patterns, communication systems, science as a human endeavour.

Science Terminology

- **Heraldry** – a system of symbols used for identification
- **Coat of arms** – a unique heraldic design representing a person or family
- **Symbol** – a picture or shape that stands for an idea
- **Pattern** – a design that repeats in an organised way
- **Pigment** – material used to create colour
- **Visibility** – how easily something can be seen

Informational Story

On a medieval battlefield, recognising friends and enemies quickly could mean the difference between safety and danger. Knights wore heavy armour that covered their faces, so people needed another way to identify them. Heraldry provided the solution.

Each knight or noble family had a **coat of arms** painted on shields, banners, and clothing. These designs used **bright colours**, bold shapes, and clear patterns so they could be recognised from a distance. This shows an understanding of **visibility and contrast**.

Medieval artists carefully selected pigments made from minerals, plants, and insects. Some colours were brighter or longer-lasting than others. Red pigments stood out strongly, while blue was rare and valuable. Gold and silver were used to reflect light, making symbols more visible.

Heraldry followed strict rules. Certain colours were not placed on top of similar colours because they would be hard to see. For example, dark colours were placed on light backgrounds. This shows an understanding of **contrast and pattern recognition**.

Over time, heraldry became more complex. Symbols represented qualities such as courage, loyalty, or faith. These designs were passed down through families, creating a reliable communication system that worked even when people could not read or write.

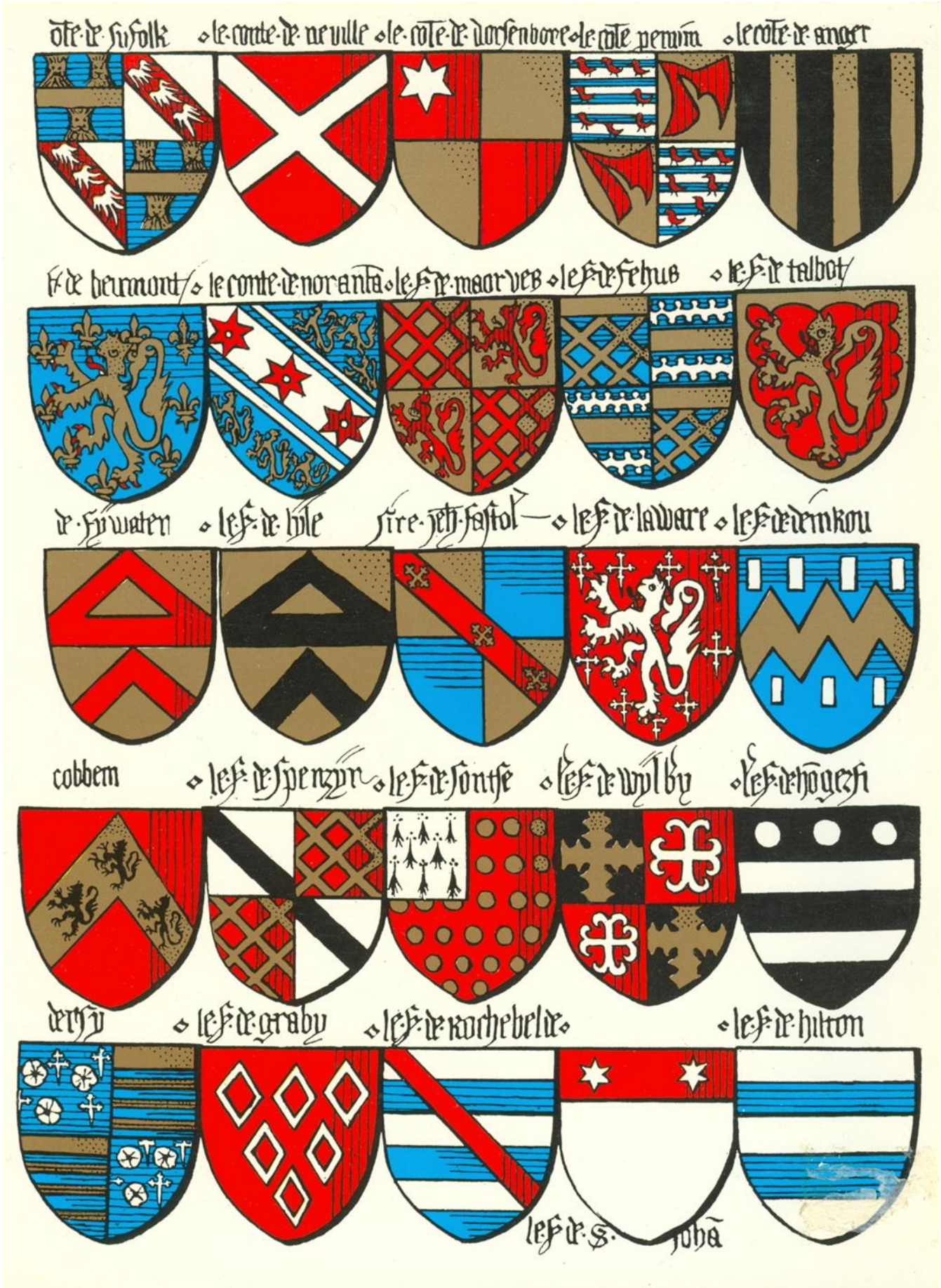
From a Christian worldview, heraldry reminds us that symbols matter. Just as knights were known by their shields, Christians are called to live in a way that reflects Christ clearly to others.

Teaching Concepts

- Colour and contrast affect visibility
- Patterns help recognition and memory
- Materials influence colour quality
- Symbols communicate information quickly
- Science and design solve communication problems

Narration Prompt

Parent/Tutor Says:
"Close your eyes and picture a battlefield filled with banners and shields. Imagine the colours and symbols standing out. Tell me everything you remember about how heraldry helped people identify one another."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Thinking Questions

Foundation – Year 2

- Why did knights need symbols?
- Which colours are easiest to see?
- Where did people paint coats of arms?

Years 3–4

- Why were bright colours important?
- How did patterns help people remember designs?
- Why were some colours rare?

Years 5–6

- How did heraldry act as a communication system?
- How did material choices affect visibility?
- Why were rules important in heraldic design?

Practical Activities

Foundation – Year 2

- Design a simple shield using bold shapes and colours
- Compare light and dark colours for visibility

Years 3–4

- Test which colour combinations are easiest to see at a distance
- Create repeating patterns using shapes and symbols

Years 5-6

- Design a coat of arms using rules of contrast and symbolism
- Explain material and colour choices using evidence

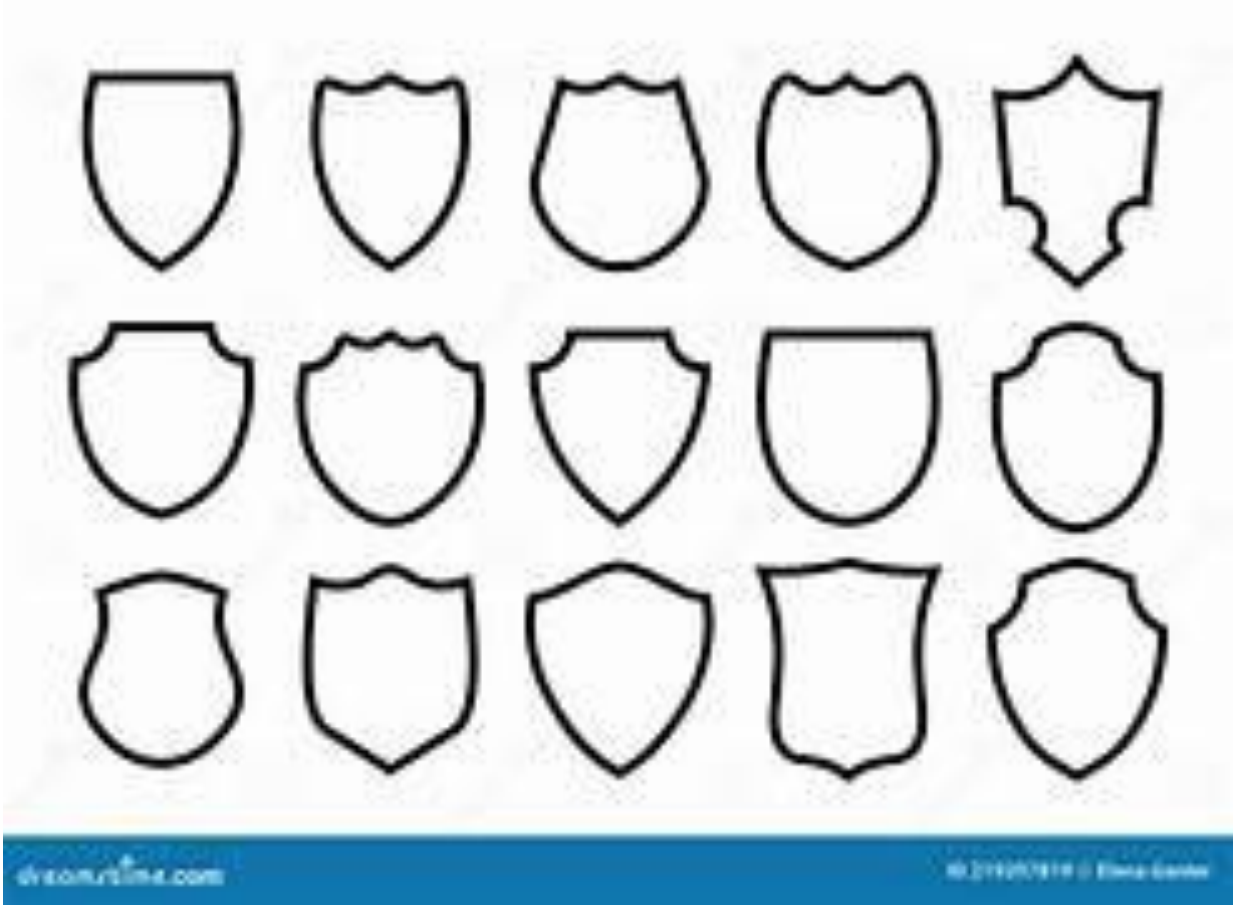
Extra Information for Any Ages:

Designs for coats of arms included four main things:

1. In the centre was a shield divided into sections. Each section had an image in it to represent the family the coat of arms was made for.
2. On either side of the shield, there might be objects or animals that look as if they're holding it up. These are called supporters.
3. Above the shield was a helmet and a crest. A crest is a special object worn on top of a helmet to help identify who's wearing it.
4. Below the shield was a phrase, often written in Latin, called a motto. This was designed to reflect the person's beliefs.

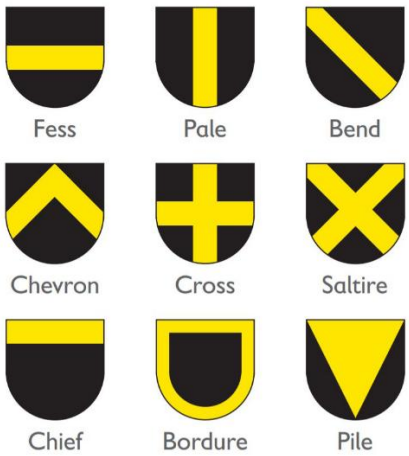
Shield Shapes

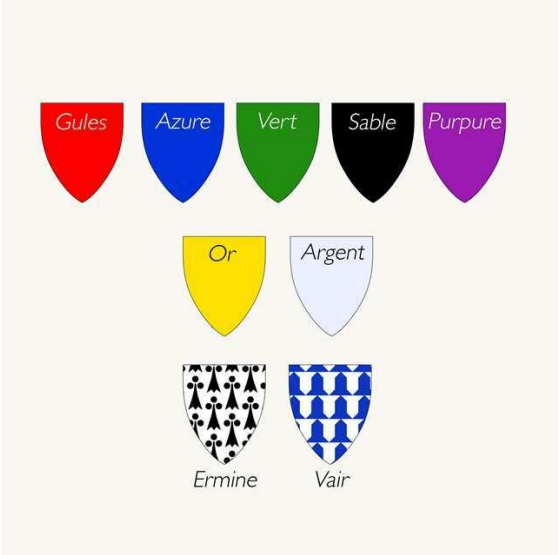
There are many different shapes of shields, but these are just some of them…



Patterns & Colours

In medieval times there were names and meanings for the different colours, shapes and animals used on coats of arms. When heraldry began to be used, knights and their families spoke Norman French, and the elements used in coats of arms had special names in this language.





You don't need to know this code for your own coat of arms, but you could use the colours, shapes and animals in your own design.

Heraldic Charges

Charges are emblems added to the shield, on the background, the 'ordinary', or both. There can be one big charge, or several smaller repeated ones. Here are some of the common charges you could use:

- Crosses - of many different types
- Stars
- Rings
- Balls
- Crescents
- Diamonds
- Flowers

They can be any colour, but remember **never put a dark colour on another dark colour or light on light**, for example a green star on blue, or a white flower on yellow, or silver on gold.

Many knights also used animals as charges.

Animal Charges

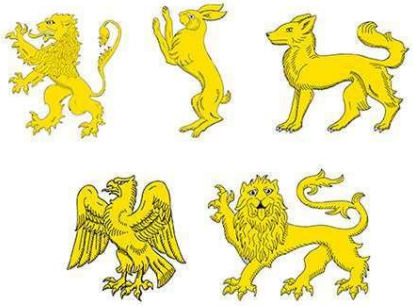
Any animal - either one big one or several smaller - can be used as a charge. They can be shown in many different ways, for instance:

- Rearing up (*rampant*) - like the lion and the hare in the pictures
- Standing (*statant*) - like the dog
- For birds, with wings outstretched (*displayed*) - like the eagle
- Walking along (*passant*) - like the other lion

If the animal is looking towards you, it is also *guardant* or 'on guard'. So the lion in the picture is *passant guardant*. The ancient royal arms of England are three golden lions, one above the other, walking along on a red shield: or in heraldic code *gules three lions passant guardant or*. (Just to make things more complicated, *lions passant guardant* are also called leopards - but they don't have spots!)

Choosing Your Animal

Animals symbolised different qualities. So for instance:



- Lions = bravery
- Dogs = faithfulness, reliability
- Stags = wisdom and long life
- Eagles = power and nobility
- Hares= speed
- Badgers = endurance or 'hanging on'

You could also design your own animal charge--for instance a cat, horse or other favourite pet.

Christian Wrap-up

Heraldry helped knights show who they belonged to. In the same way, Christians are called to live in a way that clearly shows who they belong to – not through symbols on shields, but through character and actions.

“Let your light shine before others.” (Matthew 5:16)

Australian Curriculum v9 – Science Content Descriptions Addressed

Foundation

- AC9SFU03 – Objects are made of different materials with observable properties
- AC9SFH01 – People use observation and questioning to learn about the world

Year 1

- AC9S1U02 – Daily patterns affect everyday life
- AC9S1H01 – Science is used in daily life

Year 2

- AC9S2U02 – Sound and light patterns (visibility and communication)
- AC9S2H01 – Science used to solve problems

Year 3

- AC9S3U04 – Observable properties of materials
- AC9S3H01 – People use data to develop explanations

Year 4

- AC9S4U04 – Properties of materials influence their use
- AC9S4H02 – Scientific explanations meet needs

Year 5

- AC9S5H02 – Scientific knowledge informs decisions

Year 6

- AC9S6H02 – Communities use scientific knowledge

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TOPIC 3	MEDIEVAL ENGINEERING & TECHNOLOGY

Lesson 3.1 – Castle Design (Engineering, Forces & Materials)

Introduction

During the Middle Ages, castles were not just homes for kings and nobles – they were carefully engineered **defensive structures**. Every part of a castle was designed to resist force, protect people, and control movement. Medieval builders may not have used modern scientific formulas, but they relied on **observation, testing, and experience** to design structures that could last for centuries.

In this lesson, students explore how medieval castle builders used **materials, forces, gravity, and structure** to solve problems of safety and defence.

Science links: forces, materials, structure, problem-solving, science as a human endeavour.

Science Terminology

- **Engineering** – designing and building structures to solve problems
- **Force** – a push or pull that can change motion or shape
- **Gravity** – a force that pulls objects toward the ground
- **Structure** – the way parts of something are arranged and supported
- **Masonry** – building with stone or brick
- **Load** – weight that a structure must support

Informational Story

A medieval castle was like a giant science experiment built out of stone. Castle builders had to think carefully about how walls would stand, how towers would support their weight, and how people could be protected from danger.

The first decision was location. Castles were often built on hills or rocky ground. Height gave defenders an advantage, and solid ground helped support the heavy stone walls. Builders understood that **gravity** would pull everything downward, so foundations had to be deep and strong.

Stone was the main building material. It was heavy, hard, and difficult to break. Thick stone walls could absorb the force of arrows, rocks, and early weapons. Builders noticed that thicker walls were stronger, so castle walls were often several metres wide at the base.

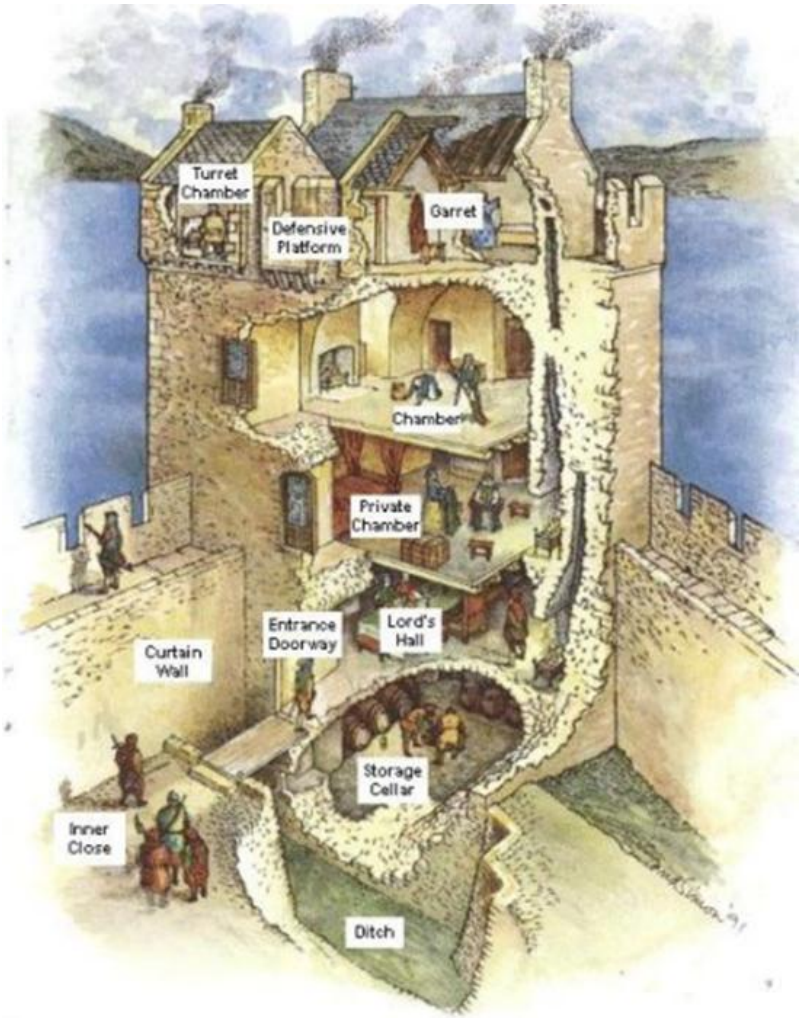
The keep – the central tower – was the strongest part of the castle. It acted like a final shelter if outer walls were breached. Narrow staircases were designed to slow attackers, and small windows reduced weak points. These features show how medieval engineers understood **force, movement, and control**, even without modern tools.

Castle builders learned through experience. When walls collapsed or cracked, builders adjusted their designs. Knowledge was passed from master builders to apprentices, improving castle design over generations. This is a clear example of **science developing through shared knowledge and observation**.

From a Christian perspective, castles show how humans use wisdom and creativity to protect life, while recognising that true security ultimately comes from God.

Teaching Concepts

- Structures must support weight and resist force
- Materials have properties that affect strength
- Gravity affects tall and heavy buildings
- Engineering solves real-world problems
- Science knowledge grows through experience and collaboration



Narration Prompt

Parent/Tutor Says:
"Close your eyes and imagine a medieval castle on a hill. Picture the thick stone walls, the tall towers, and the heavy gates. Tell me everything you remember about how castles were designed to resist force and protect people."

Thinking Questions

Foundation – Year 2

- What material were castles made from?
- Why were the walls thick?
- Why do you think castles were built on hills?

Years 3–4

- How did stone help protect castles?
- What forces acted on castle walls?
- Why was the keep important?

Years 5–6

- How did castle design control movement and force?
- What problems did medieval engineers solve?
- How did builders improve designs over time?

Practical Activities

Foundation – Year 2

- Build a small "castle wall" using blocks and test stability
- Compare light and heavy materials by touch and observation

Years 3–4

- Design a paper or cardboard wall and test how much weight it holds
- Investigate how shape and thickness affect strength

Years 5–6

- Build a model castle using recycled materials and test weak points
- Record results and suggest design improvements based on evidence

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Christian Wrap-up

Castles remind us that people have always used God-given wisdom to protect and care for others. Strong walls offered safety, but the Bible reminds us that true protection comes from trusting God.

“Unless the Lord guards the city, the watchman stays awake in vain.” (Psalm 127:1)

Australian Curriculum v9 – Science Content Descriptions Addressed

Foundation

- AC9SFU02 – Objects move in different ways depending on size, shape and material
- AC9SFH01 – People use observation and questioning to learn about the world

Year 1

- AC9S1U03 – Pushes and pulls affect the motion and shape of objects
- AC9S1H01 – Science is used in daily life

Year 2

- AC9S2U03 – Materials can be changed physically
- AC9S2H01 – Science is used to solve everyday problems

Year 3

- AC9S3U02 – Properties of rocks and minerals as Earth resources
- AC9S3H02 – Scientific explanations meet needs

Year 4

- AC9S4U03 – Forces affect motion
- AC9S4U04 – Properties of materials influence their use

Year 5

- AC9S5H01 – Advances in science build on collaboration

Year 6

- AC9S6H01 – Science develops through collaboration

Lesson 3.2 – Defensive Technology (Moats, Gates & Siege Defences)

Introduction

As weapons improved during the Middle Ages, castles had to change. Builders did not simply make walls thicker – they added **layers of defensive technology** designed to slow, redirect, and stop attackers. These features were carefully planned systems that used **forces, materials, movement, gravity, and water** to protect people inside the castle.

In this lesson, students explore how medieval defensive features worked together as a **system**, and how science and engineering were used to solve the problems of attack and defence.

Science links: forces, materials, gravity, water, systems thinking, science as a human endeavour.

Science Terminology

- **Defensive technology** – tools and structures designed to protect people
- **Moat** – a deep water-filled ditch around a castle
- **Drawbridge** – a bridge that can be raised or lowered
- **Portcullis** – a heavy sliding gate made of wood or metal
- **Battlements** – protective walls with gaps for defence
- **Siege** – an attempt to capture a castle by surrounding it
- **System** – parts working together to perform a function

Informational Story

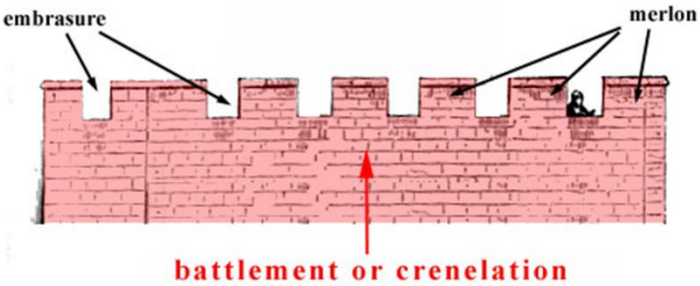
Medieval castles were designed like giant machines, with many parts working together to defend against attack. Castle builders understood that slowing an enemy was just as important as stopping them completely.

One of the first defences attackers faced was the **moat**. Moats were often filled with water, making it difficult to bring heavy weapons close to the walls. Water also softened the ground, causing attackers to sink or slip. This shows an understanding of how **water and ground conditions** affect movement.

The drawbridge controlled entry into the castle. When lowered, it allowed people to cross the moat. When raised, it created a steep barrier that was hard to climb. Drawbridges used **levers, pivots, and counterweights**, showing early mechanical engineering.

Behind the drawbridge stood the **portcullis**. This heavy gate could be dropped quickly using gravity. Its weight and metal construction made it extremely difficult to break. Medieval engineers understood that **gravity could be used as a force for protection**, not just a problem to overcome.

At the top of the walls were **battlements**. These stone structures allowed defenders to look out, shoot arrows, and retreat behind stone for safety. The repeating pattern of solid stone and open gaps shows careful planning and observation of what worked best in battle.



As siege weapons became more powerful, castles changed again. Walls became angled to deflect force, towers were strengthened, and defensive features multiplied. This constant improvement shows how medieval science and technology developed through **problem-solving, testing, and adaptation**.

From a Christian perspective, defensive technology reflects humanity's desire for safety in a fallen world. While people used wisdom to protect themselves, Scripture reminds us that peace and security ultimately come from God.

Teaching Concepts

- Water affects movement and stability
- Gravity can be used to control motion
- Forces can be redirected or absorbed
- Systems work best when parts support one another

Science develops through testing and improvement

Narration Prompt

Parent/Tutor Says:
"Picture a castle under attack. Imagine crossing the moat, raising the drawbridge, and hearing the portcullis crash down. Tell me everything you remember about how these defensive features worked together."

Thinking Questions

Foundation – Year 2

- What did the moat do?
- How did the drawbridge move?
- Why was the gate made heavy?

Years 3–4

- How did water slow attackers?
- How did gravity help the portcullis work?
- Why were there many layers of defence?

Years 5–6

- How did defensive features work as a system?
- How did siege weapons change castle design?
- What science ideas helped engineers improve defences?

Practical Activities

Foundation – Year 2

- Build a simple moat using a tray and water
- Use toy gates or cardboard flaps to explore open/close movement of portcullis and draw-bridges.

Years 3–4

- Design a paper drawbridge using string and pivots
- Test how water affects movement across different surfaces

Years 5–6

- Build a multi-layer castle defence model and test attack methods
- Record which defences worked best and explain why

Christian Wrap-up

Medieval defensive technology shows human creativity and problem-solving, but the Bible teaches that safety does not come from walls alone. God calls His people to trust Him while using wisdom and responsibility.

“The name of the Lord is a strong tower; the righteous run to it and are safe.” (Proverbs 18:10)

Australian Curriculum v9 – Science Content Descriptions Addressed

Foundation

- AC9SFU02 – Objects move in different ways depending on size, shape and material
- AC9SFH01 – People use observation and questioning to learn about the world

Year 1

- AC9S1U03 – Pushes and pulls affect motion and shape
- AC9S1H01 – Science in daily life

Year 2

- AC9S2U03 – Physical changes to materials
- AC9S2H01 – Science used to solve problems

Year 3

- AC9S3U03 – Heat and energy transfer (siege impacts, material response)
- AC9S3H02 – Science meets needs

Year 4

- AC9S4U03 – Forces affect motion
- AC9S4U02 – Water movement in environments

Year 5

- AC9S5H02 – Scientific knowledge informs community decisions

Year 6

- AC9S6H02 – Communities use scientific knowledge to solve problems

TOPIC 4	THE SCIENCE OF MUSIC

Lesson 4.1 – How Cathedral Organs Work (Sound, Air & Vibration)

Large pipe organs filled medieval cathedrals with powerful sound for worship.

Introduction

Music played an important role in medieval worship. Cathedrals were designed not only to be seen, but also to be heard. The **pipe organ** became one of the most important musical instruments of the Middle Ages because it could fill vast stone spaces with sound.

In this lesson, students explore how cathedral organs produced sound using **air, vibration, and energy**, and how medieval builders combined science, engineering, and art to support worship and community life.

Science links: sound, vibration, energy transfer, systems, science as a human endeavour.

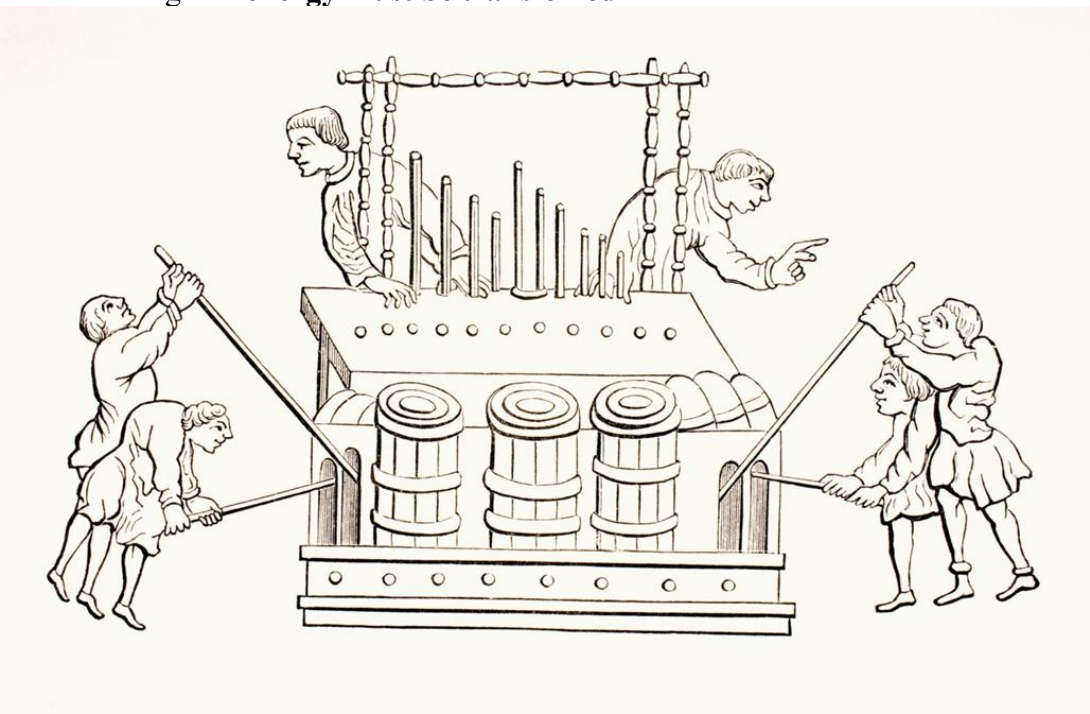
Science Terminology

- **Sound** – energy produced by vibrations
- **Vibration** – back-and-forth movement that creates sound
- **Pipe** – a tube that carries air to make sound
- **Bellows** – a device that pushes air
- **Pitch** – how high or low a sound is
- **System** – parts working together to perform a function

Informational Story

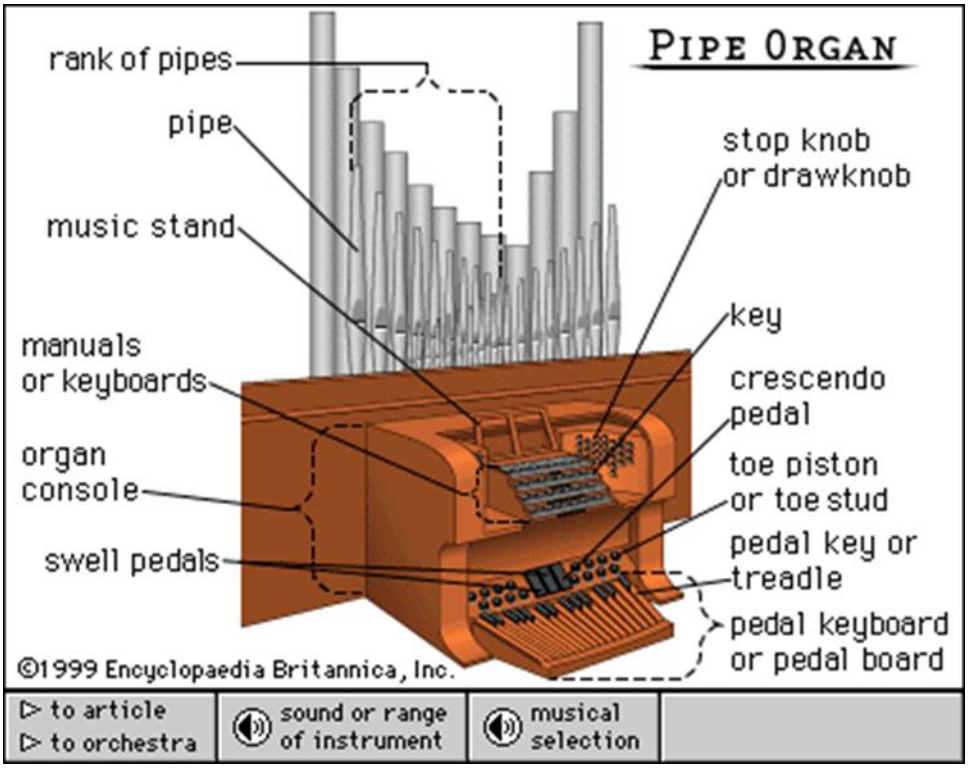
Walking into a medieval cathedral, people were often overwhelmed by the sound of the pipe organ. The deep notes echoed through stone walls and high ceilings, lifting voices and hearts during worship. This powerful sound was created by a carefully designed system of air and pipes.

At the heart of the organ were the **bellows**. These large leather devices were pumped by hand or foot to push air through the instrument. The moving air carried energy that caused sound to form. This shows an understanding that **energy must be transferred** to create sound.



When a key was pressed, a valve opened and allowed air to flow into a specific pipe. Inside the pipe, the moving air caused vibrations. These vibrations travelled through the air as sound waves. Longer pipes produced deeper sounds, while shorter pipes produced higher sounds. Medieval organ builders learned this by observation and testing.

Organ pipes were made from metal or wood. The material affected the quality of the sound. Builders experimented with different materials to create richer or softer tones. This shows materials science and careful craftsmanship.



The cathedral itself was part of the system. Stone walls and high ceilings reflected sound, making it louder and longer-lasting. Organ builders worked with architects to understand how sound moved through space.

From a Christian perspective, cathedral organs remind us that science and creativity can be used to glorify God. Sound, air, and vibration are part of God's creation, and humans can use them to bring beauty and meaning to worship.

Teaching Concepts

- Sound is caused by vibration
- Air carries sound energy
- Pitch depends on size and length
- Systems work when parts cooperate
- Science can support art and worship

Narration Prompt

Parent/Tutor Says:
"Close your eyes and imagine standing in a cathedral as the organ begins to play. Picture the bellows moving, air flowing through pipes, and sound filling the space. Tell me everything you remember about how an organ makes sound."

Thinking Questions

Foundation – Year 2

- What made the sound in the organ?
- What happened when air moved through the pipes?
- Which pipes made low sounds?

Years 3–4

- How did vibration create sound?
- Why did pipe size matter?
- How did the building affect the sound?

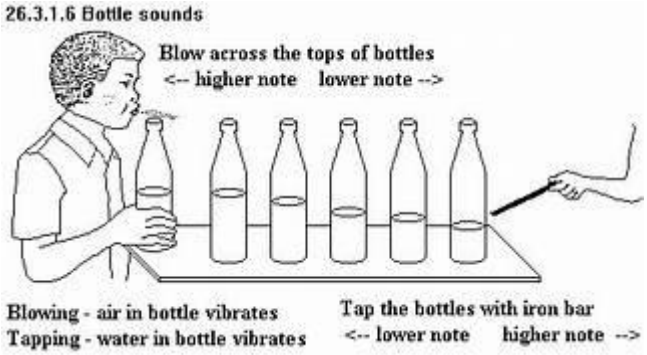
Years 5–6

- How did energy move through the organ system?
- Why did organ builders test different materials?
- How does this show science used in worship?

Practical Activities

Foundation – Year 2

- Blow across bottles to hear different sounds
- Tap objects and listen to vibrations



Years 3–4

- Make simple pan pipes using straws of different lengths
- Investigate how air speed changes sound

Years 5–6

- Build a small air-powered instrument (glass bottles, pan-pipes or flute or trumpet or thongaphone organ) and test pitch changes
- Record observations and explain results using science vocabulary

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Christian Wrap-up

Medieval cathedral organs remind us that sound and music are gifts from God. When used with care and skill, science and technology can help people worship and rejoice together.

“Praise Him with the sounding of the trumpet.” (Psalm 150:3)

Australian Curriculum v9 – Science Content Descriptions

Foundation

- AC9SFU02 – Objects move in different ways depending on size, shape and material
- AC9SFH01 – People use observation and questioning to learn about the world

Year 1

- AC9S1U03 – Pushes and pulls affect motion (air movement)
- AC9S1H01 – Science is used in daily life

Year 2

- AC9S2U02 – Sound energy causes objects to vibrate
- AC9S2H01 – Science used to solve problems

Year 3

- AC9S3U03 – Heat and energy transfer (air energy)
- AC9S3H02 – Scientific explanations meet needs

Year 4

- AC9S4U03 – Forces affect motion (air pressure)

Year 5

- AC9S5H01 – Advances in science build on collaboration

Year 6

- AC9S6H02 – Communities use scientific knowledge

Lesson 4.2 – How Medieval Stringed Instruments Work (Vibration & Tension)

Introduction

Music in the Middle Ages was not only heard in great cathedrals. In castles, homes, and village gatherings, musicians played **stringed instruments** such as lutes, harps, and fiddles. These instruments worked through simple but powerful scientific ideas involving **vibration, tension, length, and energy transfer**.

In this lesson, students explore how medieval stringed instruments produced sound and how careful observation helped musicians and instrument makers create different notes and tones.

Science links: sound, vibration, forces, energy transfer, systems, science as a human endeavour.

Science Terminology

- **String** – a thin stretched material that can vibrate
- **Vibration** – repeated back-and-forth movement that produces sound
- **Tension** – how tight or loose a string is
- **Pitch** – how high or low a sound is
- **Energy** – the ability to cause movement or change
- **Resonance** – when vibrations are amplified in a body or space

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Informational Story

A medieval musician tuning a lute listened carefully to the sound of each string. By tightening or loosening the strings, the musician could change the pitch. This simple action shows an understanding of how **tension affects vibration**.

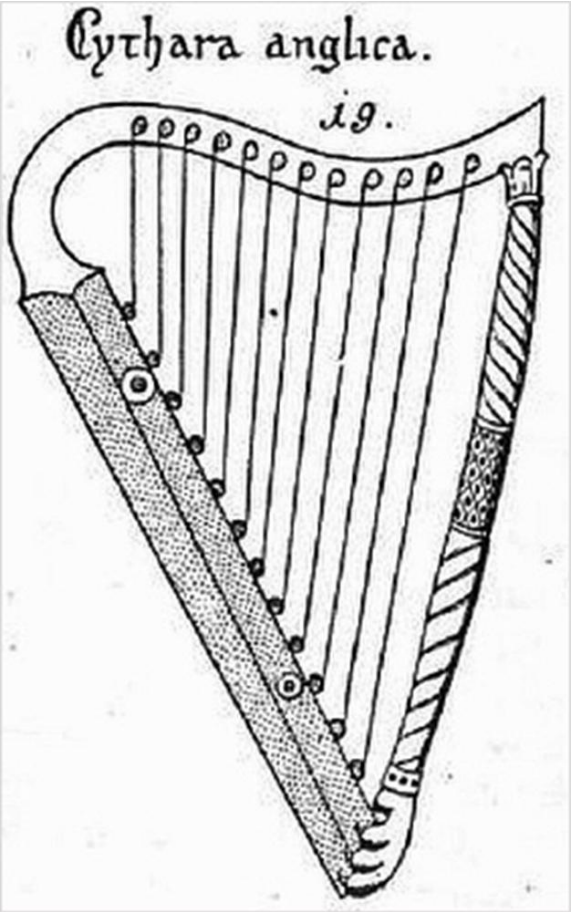
When a string is plucked or bowed, it begins to vibrate. These vibrations move through the air as sound waves. Shorter strings vibrate faster and create higher sounds, while longer strings vibrate more slowly and produce lower sounds. Medieval instrument makers learned this through observation and repeated testing.

The body of the instrument played an important role. Wooden soundboards amplified vibrations, making the sound louder. Different woods produced different tones. This shows early experimentation with **materials and resonance**.

Bowed instruments like the **vielle** allowed musicians to control sound for longer periods. The bow kept the string vibrating, demonstrating how continuous energy input creates sustained sound.

Medieval musicians did not study sound using modern equations, but they understood patterns. Their knowledge was shared through teaching and practice, allowing music to develop across generations.

From a Christian perspective, stringed instruments remind us that harmony and order are woven into God's creation. Sound follows rules that reflect design and purpose.



Harps produced sound as strings vibrated at different lengths and tensions.

Teaching Concepts

- Sound is created by vibrating strings
- Tension affects vibration speed
- Length influences pitch
- Energy transfer sustains sound
- Materials affect resonance and tone

Narration Prompt

Parent/Tutor Says:
"Close your eyes and imagine a medieval musician tuning a harp or lute. Picture the strings being tightened, plucked, and bowed. Tell me everything you remember about how strings make sound."

Thinking Questions

Foundation – Year 2

- What happens when a string is plucked?
- Which strings make higher sounds?
- What part of the instrument makes the sound louder?

Years 3–4

- How does tightening a string change the sound?
- Why do longer strings make lower sounds?
- What role does the wooden body play?

Years 5–6

- How does vibration travel from string to air?
- How did musicians control sound using tension and length?
- Why was observation important in making instruments?

Practical Activities

Foundation – Year 2

- Stretch rubber bands over a box and pluck them
- Compare sounds made by tight and loose bands

Years 3–4

- Build a simple string instrument and test pitch changes
- Record which string lengths make higher or lower sounds

Years 5–6

- Investigate how tension and thickness affect vibration
- Create a chart showing relationships between string length, tension, and pitch

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Christian Wrap-up

Stringed instruments show that sound follows clear patterns and rules set by God. When people understand and respect those patterns, they can create beauty that brings joy and praise.

“Sing to Him a new song; play skilfully.” (Psalm 33:3)

Australian Curriculum v9 – Science Content Descriptions Addressed

Foundation

- AC9SFU02 – Objects move in different ways depending on size, shape and material
- AC9SFH01 – People use observation and questioning to learn about the world

Year 1

- AC9S1U03 – Pushes and pulls affect motion
- AC9S1H01 – Science is used in daily life

Year 2

- AC9S2U02 – Sound energy causes objects to vibrate
- AC9S2H01 – Science used to solve problems

Year 3

- AC9S3U03 – Heat and energy transfer (vibration energy)
- AC9S3H02 – Scientific explanations meet needs

Year 4

- AC9S4U03 – Forces affect motion

Year 5

- AC9S5H01 – Advances in science build on collaboration

Year 6

- AC9S6H02 – Communities use scientific knowledge

TOPIC 5	MEDIEVAL MEDICINE & HEALTH

Lesson 5.1 – Medieval Hospitals & Care for the Sick (Health, Observation & Compassion)

Introduction

During the Middle Ages, sickness and injury were common, and medical knowledge was limited. Even so, people developed ways to **care for the sick** through observation, routine, cleanliness, and compassion. Many medieval hospitals were run by churches and monasteries, where caring for the ill was seen as an act of Christian service.

In this lesson, students explore how medieval hospitals worked, how people observed symptoms and changes in health, and how early healthcare practices helped communities survive.

Science links: human health, observation, patterns, hygiene, science as a human endeavour.

Science Terminology

- **Hospital** – a place where sick or injured people receive care
- **Infirmary** – a small hospital, often in a monastery
- **Hygiene** – practices that help keep people healthy
- **Symptoms** – signs that someone is sick
- **Observation** – carefully watching and noticing changes
- **Care** – actions taken to help someone heal or feel better

Informational Story

A medieval hospital did not look like a modern one filled with machines and medicines. Instead, it was often a large hall with beds along the walls. Patients rested, were fed warm meals, and received comfort from carers who believed that caring for the sick was a duty before God.

Monasteries played a major role in healthcare. Monks and nuns kept infirmaries where sick travellers, villagers, and the poor could receive help. They observed patients carefully, noting changes in temperature, skin colour, appetite, and strength. This careful watching shows early use of **pattern recognition** in health.

Cleanliness was important, even if people did not understand germs. Fresh air, clean bedding, and regular washing were encouraged because carers noticed patients recovered better in cleaner environments. This is an example of science developing through **experience and observation**.

Some diseases were contagious. To protect others, special hospitals were built outside towns. While this practice was imperfect, it shows an early understanding that illness could spread and that separating patients could reduce harm.

From a Christian worldview, medieval hospitals reflect compassion in action. While scientific knowledge was limited, love, care, and responsibility guided health practices.

Teaching Concepts

- Observation helps identify changes in health
- Clean environments support recovery
- Health practices develop through experience
- Communities work together to care for the sick
- Science and compassion often work side by side

Narration Prompt

Parent/Tutor Says:
"Close your eyes and imagine a medieval hospital. Picture the beds, the carers, and the quiet routines of care. Tell me everything you remember about how people cared for the sick."

Thinking Questions

Foundation – Year 2

- Where did sick people go for care?

- Who looked after them?
- What helped people feel better?

Years 3–4

- Why was cleanliness important?
- How did carers observe sickness?
- Why were some hospitals built outside towns?

Years 5–6

- How did observation help medieval healthcare?
- What health practices were helpful, even without modern science?
- How did Christian beliefs influence care?

Practical Activities

Foundation – Year 2

- Identify healthy habits (washing hands, resting, eating well)
- Sort pictures of healthy and unhealthy actions

Years 3–4

- Observe how quickly dirt spreads using coloured powder (safe simulation)
- Create a simple daily care routine chart

Years 5–6

- Investigate how hygiene affects health outcomes (case studies)
- Design a “medieval hospital” with rules for cleanliness and care

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Christian Wrap-up

Medieval hospitals remind us that caring for the sick is both a scientific and a spiritual responsibility. Even when knowledge was limited, compassion made a real difference.

“Whatever you did for one of the least of these brothers and sisters of mine, you did for me.” (Matthew 25:40)

Australian Curriculum v9 – Science Content Descriptions Addressed

Foundation

- AC9SFH01 – People use observation and questioning to learn about the world

Year 1

- AC9S1U01 – Living things have basic needs
- AC9S1H01 – Science used in daily life

Year 2

- AC9S2H01 – Science helps people make decisions in daily life

Year 3

- AC9S3H01 – People use data to develop explanations

Year 4

- AC9S4H02 – Scientific explanations meet needs

Year 5

- AC9S5H02 – Scientific knowledge informs community decisions

Year 6

- AC9S6H02 – Communities use scientific knowledge

Lesson 5.2 – Herbal Medicine & Plant Classification (Observation, Biology & Care)

Introduction

Before modern medicines existed, medieval people relied heavily on **plants** to treat illness and injury. Herbal medicine required careful **observation, identification, and classification** of plants. Healers needed to recognise which plants were helpful, which were harmful, and how they should be prepared.

In this lesson, students explore how medieval people studied plants for healing, how they grouped plants by features and uses, and how early biological science developed through observation and record-keeping.

Science links: biology, plant features, classification, observation, science as a human endeavour.

Science Terminology

- **Herbal medicine** – using plants to help treat illness
- **Herb** – a plant used for food or healing
- **Apothecary** – a person who prepared medicines
- **Classification** – grouping things based on features
- **Remedy** – a treatment intended to heal
- **Observation** – careful watching and recording

Informational Story

In medieval towns and monasteries, herb gardens were places of careful study. Healers walked among the plants, touching leaves, smelling flowers, and observing shapes and colours. Each detail mattered, because confusing one plant for another could be dangerous.

Monks and healers created **herbals** – books that described plants, their features, and their uses. These books included drawings to help identify plants correctly. While these drawings were not always perfectly accurate, they showed an effort to classify plants based on observable characteristics.

Plants were grouped by shape, smell, taste, and effect on the body. Some herbs were known to calm pain, others to reduce

fever, and some to help digestion. Over time, healers noticed patterns: certain plants worked better for certain symptoms. This is an early example of **biological science based on evidence**.

Preparation mattered as much as identification. Leaves might be dried, roots boiled, or flowers crushed. Heat, water, and time affected how strong a remedy became. This shows early understanding of **physical and chemical changes**.

From a Christian worldview, herbal medicine reflects gratitude for God's provision. Plants were seen as gifts placed in creation for nourishment and healing, to be used wisely and carefully.

Teaching Concepts

- Plants have observable features
- Classification helps avoid mistakes
- Observation leads to pattern recognition
- Preparation methods affect results
- Science develops through record-keeping and shared knowledge

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Narration Prompt

Parent/Tutor Says:
"Close your eyes and imagine walking through a monastery herb garden. Picture the shapes, colours, and smells of the plants. Tell me everything you remember about how medieval healers used plants for medicine."

Thinking Questions

Foundation – Year 2

- What did healers use plants for?
- How could they tell plants apart?
- Where did they grow herbs?

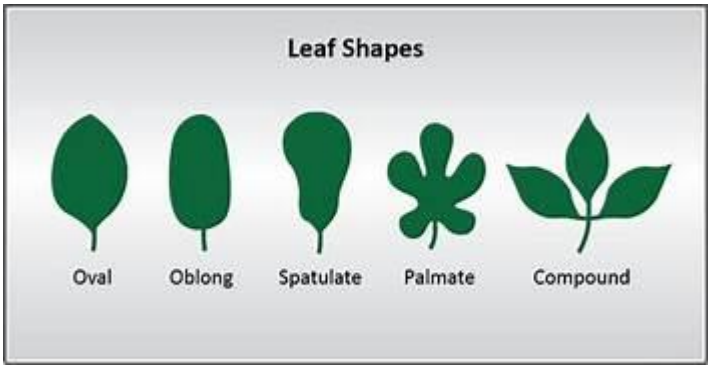
Years 3–4

- Why was plant classification important?
- How did drawings help identification?
- Why did preparation change how a remedy worked?

Years 5–6

- How did observation help healers improve remedies?
- What risks came with using plants incorrectly?
- How does this compare to modern medicine?

Practical Activities



Foundation – Year 2

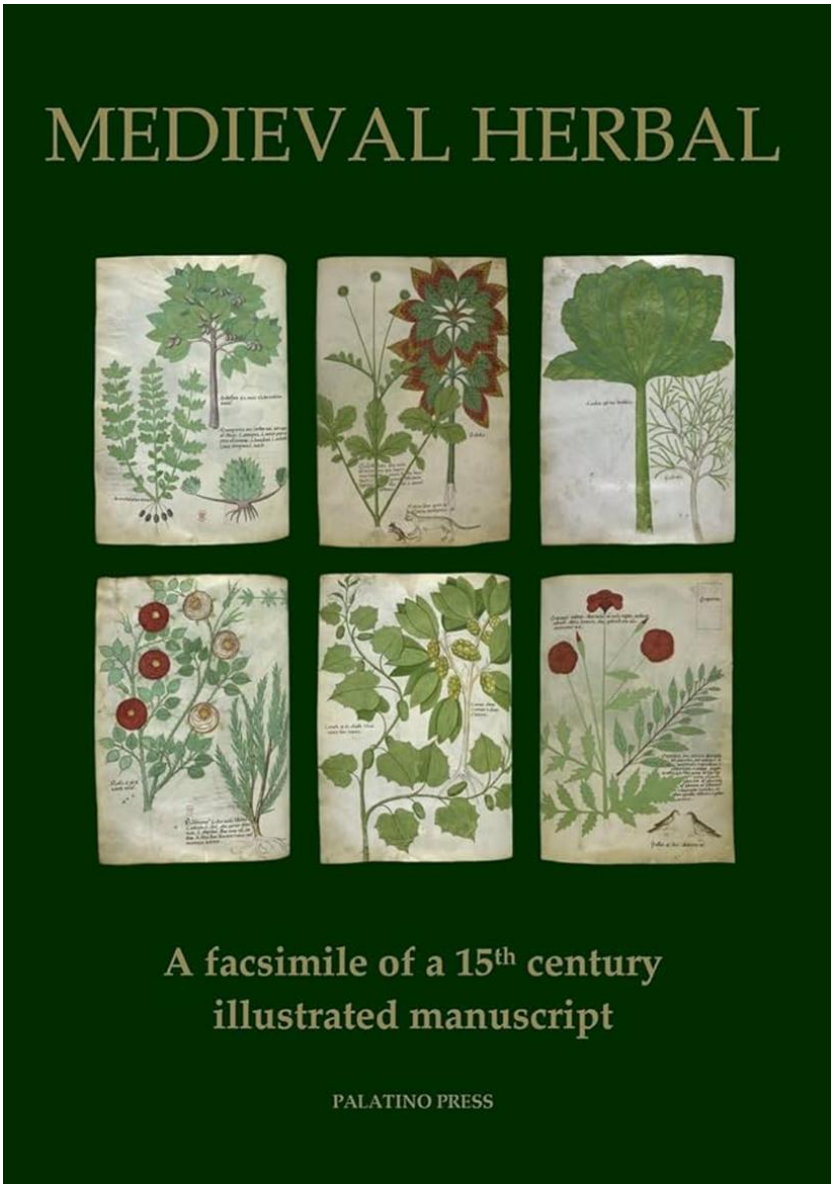
- Sort leaves or pictures of plants by shape and size. The picture shows common shapes. Can you find any shapes that are different from these?
- Smell safe herbs and describe differences

Years 3–4

- Create a simple plant classification chart
- Observe how drying leaves changes texture and smell

Years 5–6

- Design a "herbal guide" using observable plant features
- Investigate how heat or soaking changes plant materials (safe simulation)



Christian Wrap-up

Herbal medicine reminds us that God placed variety and usefulness into creation. Wisdom is required to observe carefully and use these gifts responsibly.

“The Lord God made all kinds of trees grow out of the ground… and the leaves of the tree are for healing.” (Genesis 2:9; Revelation 22:2)

Australian Curriculum v9 – Science Content Descriptions Addressed

Foundation

- AC9SFU01 – Observe external features of plants and group them
- AC9SFH01 – People use observation to learn about the world

Year 1

- AC9S1U01 – Living things have basic needs
- AC9S1H01 – Science is used in daily life

Year 2

- AC9S2H01 – Science helps people make decisions

Year 3

- AC9S3U01 – Compare characteristics of living and non-living things
- AC9S3H01 – People use data to develop explanations

Year 4

- AC9S4U01 – Roles of organisms in environments (plants as resources)
- AC9S4H02 – Science meets needs

Year 5

- AC9S5U01 – Structural features support survival
- AC9S5H02 – Scientific knowledge informs decisions

Year 6

- AC9S6U01 – Physical conditions affect living things
- AC9S6H02 – Communities use scientific knowledge

TOPIC 6	MEDIEVAL PHYSICS

Lesson 6.1 – Bridges, Cranes, Pulleys & Gears (Simple Machines & Forces)

Introduction

Medieval builders faced enormous challenges. They needed to lift heavy stones, move large loads, and build strong bridges – all without electricity or engines. To solve these problems, they used **simple machines** such as **levers, pulleys, wheels, and gears**. These machines allowed people to use force more effectively.

In this lesson, students explore how medieval engineers used simple machines to multiply force, control movement, and solve practical problems in building and transport.

Science links: forces, motion, simple machines, energy transfer, science as a human endeavour.

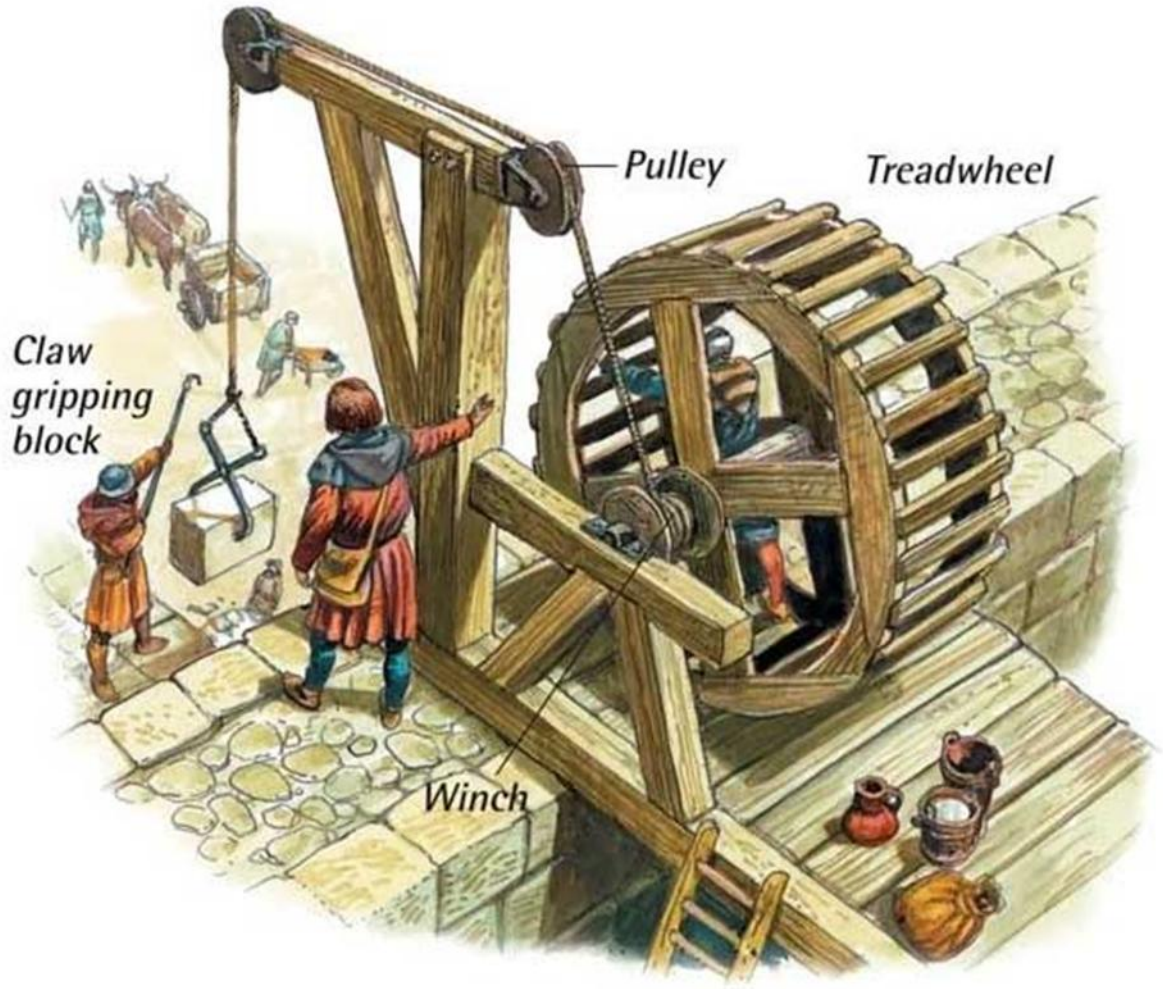
Science Terminology

- **Simple machine** – a device that helps change the size or direction of a force
- **Force** – a push or pull
- **Pulley** – a wheel with a rope used to lift loads
- **Gear** – a wheel with teeth that transfers motion
- **Lever** – a rigid bar that moves around a pivot
- **Load** – the object being lifted or moved

Informational Story

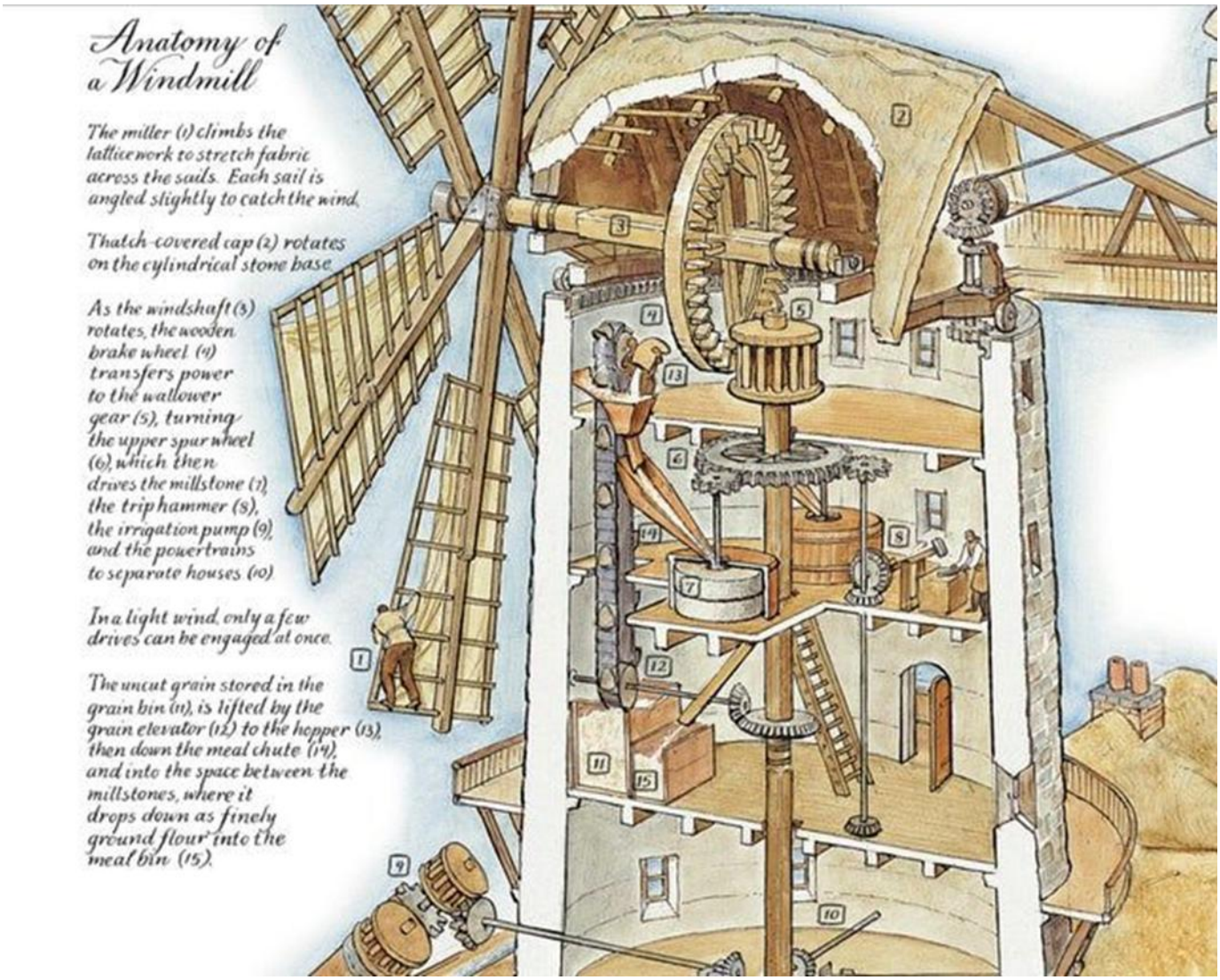
Building a medieval cathedral or castle required lifting stones that weighed hundreds of kilograms. Without modern machinery, builders relied on clever systems that used **force and movement wisely**.

Cranes were one of the most important machines. Large wooden cranes used wheels, ropes, and pulleys to lift stones high into the air. By pulling down on a rope, workers could lift heavy loads upward. The pulley changed the direction of the force, making work safer and more efficient.



Bridges also showed deep understanding of forces. Stone arches spread weight evenly across their structure. Instead of pushing straight down, the force travelled along the curve of the arch into the ground. This allowed bridges to hold great weight without collapsing.

Gears helped control motion. When one gear turned another, it could change speed or direction. Medieval clocks, mills, and cranes all used gears to control movement carefully. Builders learned which gear sizes worked best through trial and observation.



These machines were not invented all at once. Knowledge was passed from master builders to apprentices, improving designs over generations. This shows how science develops through **collaboration and shared experience**.

From a Christian worldview, simple machines remind us that God designed the world with laws and patterns. When people understand those patterns, they can work wisely and productively.

Teaching Concepts

- Simple machines change how forces work
- Forces can be redirected or multiplied
- Structures distribute weight
- Motion can be controlled using gears
- Science knowledge grows through experience

Narration Prompt

Parent/Tutor Says:
"Close your eyes and imagine builders lifting heavy stones with cranes and ropes. Picture the turning gears and arching bridges. Tell me everything you remember about how simple machines helped medieval people do hard work."

Thinking Questions

Foundation – Year 2

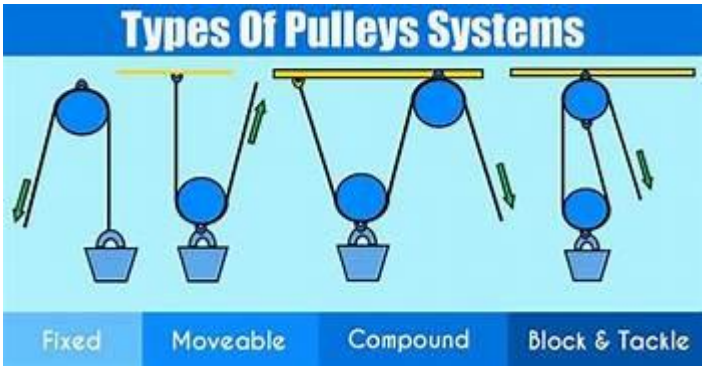
- What machines helped lift heavy things?
- How did ropes and wheels help?
- Why were bridges important?

Years 3–4

- How did pulleys change force direction?
- Why were arches strong?
- How did gears help control movement?

Years 5–6

- How did simple machines make work easier?
- Why was sharing knowledge important?
- How do these machines compare to modern tools?



Practical Activities

Foundation – Year 2

- Use toy pulleys or string over a bar to lift small objects
- Build an arch using blocks

Years 3–4

- Design a paper crane using string and wheels
- Test how arches hold weight compared to flat beams

Years 5–6

- Build a working pulley or gear system
- Measure force needed with and without a simple machine

Christian Wrap-up

Simple machines show that God created a world governed by order and laws. When people understand these laws, they can work efficiently and help others.

“Commit your work to the Lord, and your plans will be established.” (Proverbs 16:3)

Australian Curriculum v9 – Science Content Descriptions Addressed

Foundation

- AC9SFU02 – Objects move in different ways depending on size, shape and material
- AC9SFH01 – People use observation and questioning

Year 1

- AC9S1U03 – Pushes and pulls affect motion and shape
- AC9S1H01 – Science is used in daily life

Year 2

- AC9S2U03 – Materials can be changed physically
- AC9S2H01 – Science used to solve problems

Year 3

- AC9S3U03 – Heat and energy transfer
- AC9S3H02 – Scientific explanations meet needs

Year 4

- AC9S4U03 – Forces affect motion

Year 5

- AC9S5H01 – Advances in science build on collaboration

Year 6

- AC9S6H01 – Science develops through collaboration

Lesson 6.2 – Famous Christian Scientists: Understanding God's World

Introduction

During the Middle Ages, science was often studied by **Christian scholars** who believed that the natural world reflected God's wisdom and order. They did not separate faith from learning. Instead, they believed that **studying creation was a way to honour the Creator**.

In this lesson, students explore how medieval Christian thinkers observed nature, recorded evidence, and developed early scientific ideas while holding a strong biblical worldview.

Science links: observation, evidence, classification, science as a human endeavour.

Science Terminology

- **Observation** – carefully watching and recording what happens
- **Evidence** – information used to support an explanation
- **Scholar** – a person who studies and teaches
- **Experiment** – a test carried out to answer a question
- **Classification** – grouping things based on features
- **Worldview** – a way of understanding the world

Informational Story

Many medieval Christians believed that the world was created with purpose and order. Because of this, they thought it was important to study nature carefully rather than rely only on ancient books or traditions.

One such thinker was **Roger Bacon**, a Franciscan monk. He believed that observation and experimentation were essential for understanding how the world worked. Bacon encouraged scholars to test ideas rather than simply repeat what others had said. This approach helped shape later scientific methods.

Another important figure was **Albertus Magnus**, a Dominican friar who studied plants, animals, and minerals. He carefully described the physical features of living things and grouped them by similarities. His work shows early biological classification based on direct observation.

Hildegard of Bingen, an abbess and healer, recorded detailed observations of plants, health, and the human body. She combined practical care with careful study, creating medical and natural history texts that were used for centuries.

These scholars worked in monasteries and universities where learning was shared. Knowledge was written down, copied, and taught to others. This shows that science developed through **collaboration and record-keeping**, not isolated genius.

From a Christian worldview, medieval science reminds us that faith and reason are not enemies. Studying the world helps us better understand the God who made it.

Teaching Concepts

- Observation leads to understanding
- Evidence strengthens explanations
- Science develops over time
- Learning is shared through teaching and writing
- Worldview influences scientific questions

Narration Prompt

Parent/Tutor Says:
"Close your eyes and imagine medieval scholars studying plants, stars, and stones by candlelight. Picture them writing notes and teaching students. Tell me everything you remember about how Christian scholars studied God's world."

Thinking Questions

Foundation – Year 2

- Who studied nature in medieval times?
- What did they look at?
- Why did they study the world?

Years 3–4

- How did observation help scholars learn?
- Why was writing important?
- How did faith influence learning?

Years 5–6

- How did medieval scholars use evidence?
- Why was collaboration important?
- How did their worldview shape science?

Practical Activities

Foundation – Year 2

- Observe and draw a natural object
- Describe what you see using senses

Years 3–4

- Create a simple observation journal
- Group objects by shared features

Years 5–6

- Research one medieval Christian scholar and summarise findings
- Compare observation-based learning with guessing

Christian Wrap-up

Medieval Christian scientists believed that studying nature honoured God. Their careful observation reminds us to approach learning with humility and gratitude.

“Great are the works of the Lord, studied by all who delight in them.” (Psalm 111:2)

Australian Curriculum v9 – Science Content Descriptions Addressed

Foundation

- AC9SFH01 – People use observation and questioning to learn about the world

Year 1

- AC9S1H01 – Science is used in daily life

Year 2

- AC9S2H01 – Science helps people make decisions

Year 3

- AC9S3H01 – People use data to develop explanations

Year 4

- AC9S4H01 – Data supports scientific explanations

Year 5

- AC9S5H01 – Advances in science build on collaboration

Year 6

- AC9S6H01 – Science develops through collaboration

TOPIC 7	CHINESE SCIENCE

Lesson 7.1 – Papermaking (Materials, Processes & Innovation)

Introduction

Paper is so common today that it is easy to forget how important its invention was. Before paper, people wrote on stone, clay, bamboo, or expensive silk. In medieval China, new ways of making paper transformed communication, learning, and record-keeping.

In this lesson, students explore how Chinese papermakers used **materials, water, and careful processes** to create paper, and how scientific thinking helped solve real-world problems.

Science links: materials, physical change, processes, observation, science as a human endeavour.

Science Terminology

- **Paper** – a thin material made from plant fibres
- **Fibre** – thin strands from plants or cloth
- **Pulp** – a wet mixture of fibres and water
- **Screen** – a mesh used to shape paper
- **Process** – a series of steps to make something
- **Innovation** – a new or improved way of doing something

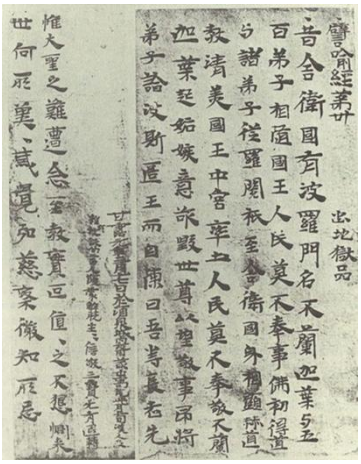
Informational Story

In ancient and medieval China, keeping records was essential for government, trade, and education. Early writing materials such as bamboo strips were heavy and awkward, while silk was costly. People needed a better solution.

Chinese papermakers discovered that fibres from plants such as mulberry bark, hemp, and old cloth could be broken down and mixed with water. This mixture, called **pulp**, could be spread thinly and dried into a flexible sheet. This was a **physical change**, not a chemical one – the fibres stayed the same material but were rearranged.

The process required careful observation. If the pulp was too thick, the paper became heavy. If it was too thin, it tore easily. Papermakers tested different fibre mixtures and drying times to improve quality. Over time, the process became more reliable and efficient.

Paper was lighter than bamboo and cheaper than silk. This made books, letters, and official documents more accessible. Knowledge could be copied, stored, and shared more easily, helping learning to grow.



rom a Christian worldview, papermaking reminds us that creativity and problem-solving are gifts God has given to people everywhere. Innovations like paper helped preserve knowledge that would later travel across cultures and centuries.

Teaching Concepts

- Materials can be changed physically
- Processes involve ordered steps
- Observation improves results
- Innovation meets community needs

Knowledge spreads through better materials

Narration Prompt

Parent/Tutor Says:
“Close your eyes and imagine Chinese papermakers stirring pulp, lifting screens, and laying paper out to dry. Tell me everything you remember about how paper was made.”

Thinking Questions

Foundation – Year 2

- What was paper made from?
- Why was paper useful?
- What did papermakers do with water?

Years 3–4

- Why did fibre choice matter?
- How did the screen help shape paper?
- What problems did paper solve?

Years 5–6

- Why was papermaking an important innovation?
- How did testing improve the process?
- How did paper change learning and communication?

Practical Activities

Foundation – Year 2

- Tear paper into pieces and feel fibre texture
- Sort materials by thick or thin

Years 3–4

- Make simple paper pulp using recycled paper
- Observe drying time and paper strength

Years 5–6

- Experiment with different pulp thicknesses
- Record results and explain which paper worked best

Christian Wrap-up

Papermaking shows how God has given people creativity to develop useful tools. When knowledge is preserved and shared, communities grow in wisdom.

“Write the vision and make it plain.” (Habakkuk 2:2)

Australian Curriculum v9 – Science Content Descriptions Addressed

Foundation

- AC9SFU03 – Objects are made of different materials and have observable properties
- AC9SFH01 – People use observation and questioning

Year 1

- AC9S1H01 – Science is used in daily life

Year 2

- AC9S2U03 – Materials can be changed physically
- AC9S2H01 – Science helps people make decisions

Year 3

- AC9S3U04 – Properties of solids and liquids
- AC9S3H02 – Scientific explanations meet needs

Year 4

- AC9S4U04 – Properties of materials influence their use

Year 5

- AC9S5H02 – Scientific knowledge informs decisions

Year 6

- AC9S6H02 – Communities use scientific knowledge

Lesson 7.2 – Printing (Patterns, Processes & Communication)

Introduction

Once paper existed, people needed better ways to copy information. In medieval China, printers developed techniques that allowed **many identical pages** to be produced efficiently. Printing transformed education, government records, and religious texts by making written information more accessible.

In this lesson, students explore how Chinese printing relied on **patterns, repetition, materials, and step-by-step processes**, and how scientific thinking helped ideas travel further than ever before.

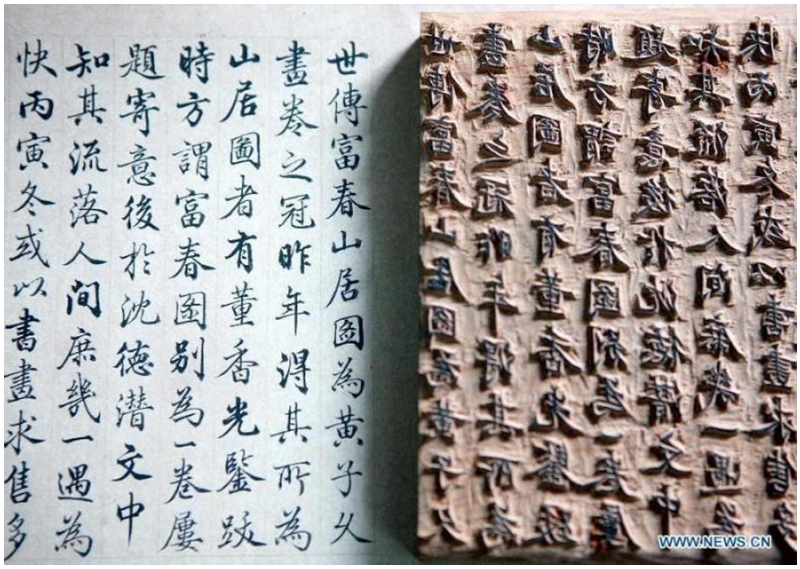
Science links: materials, patterns, processes, forces (pressure), science as a human endeavour.

Science Terminology

- **Printing** – transferring inked text or images onto paper
- **Woodblock** – a carved wooden block used to make prints
- **Movable type** – individual characters that can be rearranged
- **Ink** – coloured liquid used for printing
- **Pressure** – force applied to transfer ink
- **Pattern** – a repeated design or arrangement

Informational Story

Before printing, books were copied by hand. This was slow and often led to mistakes. In medieval China, printers found a better way by carving entire pages of text into wooden blocks. When ink was spread on the block and paper pressed on top, a clear copy appeared. The same block could be used again and again.



This method depended on **patterns and repetition**. Every copy was nearly identical, showing careful planning and precision. Printers had to observe how much ink to apply and how much pressure was needed. Too much ink caused smudging; too little made text faint.

Later, printers developed **movable type**, using small pieces with individual characters. These could be rearranged to create new pages. While complex because of many characters, this idea showed deep understanding of **systems and efficiency**.

Printing spread information more quickly than ever before. Educational texts, instructions, and religious writings could reach more people. This demonstrates how scientific processes and materials can change how societies learn and communicate.

From a Christian worldview, printing reminds us of the importance of sharing truth clearly and accurately. Tools that preserve and spread knowledge can be used for great good.

Teaching Concepts

- Repetition creates consistent results
- Pressure transfers materials
- Processes require careful steps
- Systems improve efficiency
- Technology spreads knowledge

Narration Prompt

Parent/Tutor Says:
"Close your eyes and imagine a printing workshop. Picture ink being spread, paper pressed down, and pages drying in rows. Tell me everything you remember about how printing worked."

Thinking Questions

Foundation – Year 2

- What did printers use to make words appear on paper?
- Why was printing helpful?
- What happened when paper was pressed?

Years 3–4

- Why were patterns important in printing?
- How did pressure affect the print?
- Why was printing faster than copying by hand?

Years 5–6

- How did movable type improve efficiency?
- What science ideas helped printing work well?
- How did printing change learning and communication?

Practical Activities

Foundation – Year 2

- Make simple prints using foam shapes and paint
- Identify repeating patterns in prints

Years 3–4

- Create a stamped message and test ink thickness
- Observe how pressure changes print quality

Years 5–6

- Design a simple movable-type system with letter tiles
- Compare speed and accuracy with handwriting

Christian Wrap-up

Printing shows how careful design and process can help share ideas widely. God calls His people to value truth and communicate it clearly and responsibly.

“How beautiful are the feet of those who bring good news.” (Romans 10:15)

Australian Curriculum v9 – Science Content Descriptions Addressed

Foundation

- AC9SFU03 – Objects are made of different materials with observable properties
- AC9SFH01 – People use observation and questioning

Year 1

- AC9S1H01 – Science is used in daily life

Year 2

- AC9S2U03 – Materials can be changed physically
- AC9S2H01 – Science helps people make decisions

Year 3

- AC9S3H02 – Scientific explanations meet needs

Year 4

- AC9S4U04 – Properties of materials influence their use

Year 5

- AC9S5H02 – Scientific knowledge informs decisions

Year 6

- AC9S6H02 – Communities use scientific knowledge

TOPIC 8	CHINESE SCIENCE

Lesson 8.1 – Gunpowder (Chemical Change, Energy & Impact)

Introduction

One of the most influential discoveries of medieval Chinese science was **gunpowder**. It was first developed through experiments with different materials and mixtures. Although early uses were often for celebration or signalling, gunpowder later transformed warfare and technology.

In this lesson, students explore how gunpowder involved **chemical change**, **energy release**, and **cause-and-effect**, and how scientific discoveries can have both positive and dangerous consequences.

Science links: chemical change, energy, forces, safety, science as a human endeavour.

Science Terminology

- **Gunpowder** – a mixture that releases energy when ignited
- **Chemical change** – a change that produces new substances
- **Energy** – the ability to cause movement or change
- **Reaction** – what happens when substances interact
- **Gas** – matter that spreads out and takes up space
- **Safety** – actions taken to prevent harm

Informational Story

Gunpowder was discovered accidentally while Chinese alchemists searched for substances that could extend life. By mixing ingredients such as charcoal, sulphur, and saltpetre, they noticed that some combinations burned quickly and released large amounts of energy.

When gunpowder burned, it produced **heat, light, sound, and expanding gas**. This gas pushed outward with force. Early experimenters learned that even small amounts could be dangerous, so careful handling became essential. This shows early understanding of **cause and effect** in chemical reactions.

At first, gunpowder was used in fireworks for celebrations and religious ceremonies. Fireworks demonstrated controlled reactions, where energy was released in planned ways. Over time, people learned to harness this force to move objects, such as in early rockets.

Chinese soldier launches fire-arrow

Eventually, gunpowder was used in weapons. This changed the nature of warfare and required new defensive technologies. This reminds us that scientific discoveries are powerful and must be used wisely.

From a Christian worldview, gunpowder illustrates that human creativity can be used for both good and harm. Wisdom and responsibility are essential when handling powerful knowledge.

Teaching Concepts

- Chemical changes create new substances
- Energy can be released quickly
- Gases expand and create force

- Observation helps improve safety
- Science knowledge carries responsibility

Narration Prompt

Parent/Tutor Says:
"Close your eyes and imagine a medieval experimenter watching sparks fly from a mixture. Picture fireworks lighting the sky and rockets moving forward. Tell me everything you remember about how gunpowder worked."

Thinking Questions

Foundation – Year 2

- What happened when gunpowder burned?
- What kinds of energy could you see or hear?
- Why was safety important?

Years 3–4

- How was gunpowder a chemical change?
- What made rockets move?
- Why did people experiment carefully?

Years 5–6

- How did expanding gases create force?
- Why can scientific discoveries be dangerous?
- How should powerful knowledge be used responsibly?

Practical Activities

Foundation – Year 2

- Observe safe chemical reactions (e.g., vinegar and bicarbonate)
- Identify energy you can see, hear, or feel

Years 3–4

- Balloon rocket experiment to show gas expansion
- Record cause-and-effect observations

Years 5–6

- Compare physical vs chemical changes using safe materials
- Analyse historical uses of energy release

Christian Wrap-up

Gunpowder reminds us that knowledge is powerful. God calls people to use wisdom, self-control, and care when working with the forces of creation.

“The wise see danger and take refuge.” (Proverbs 22:3)

Australian Curriculum v9 – Science Content Descriptions Addressed

Foundation

- AC9SFU03 – Objects are made of different materials with observable properties
- AC9SFH01 – People use observation and questioning

Year 1

- AC9S1H01 – Science is used in daily life

Year 2

- AC9S2U03 – Materials can be changed physically
- AC9S2H01 – Science helps people make decisions

Year 3

- AC9S3U04 – Properties of solids and liquids and change of state
- AC9S3H02 – Scientific explanations meet needs

Year 4

- AC9S4H02 – Scientific explanations meet needs

Year 5

- AC9S5H02 – Scientific knowledge informs decisions

Year 6

- AC9S6U04 – Reversible and irreversible changes
- AC9S6H02 – Communities use scientific knowledge

Lesson 8.2 – Porcelain (Materials, Heat & Transformation)

Introduction

Porcelain was one of the most admired materials produced in medieval China. It was strong yet delicate, waterproof, and beautifully finished. People across Asia, the Middle East, and later Europe valued Chinese porcelain so highly that it was often called **"white gold."**

In this lesson, students explore how porcelain was made using **special materials, very high heat, and careful processes**, and how heating caused **permanent changes** to clay.

Science links: materials science, heat, irreversible change, transformation, science as a human endeavour.

Science Terminology

- **Porcelain** – a hard, smooth ceramic made by firing special clay at high temperatures
- **Clay** – natural material made from fine particles of rock
- **Kaolin** – a white clay used to make porcelain
- **Kiln** – a high-temperature oven used for firing ceramics
- **Heat** – energy that raises temperature
- **Irreversible change** – a change that cannot be undone

Informational Story

Chinese potters spent generations perfecting the art and science of porcelain. They discovered that not all clays behaved the same when heated. Ordinary clay could crack or remain porous, but **kaolin clay** transformed into something entirely new when fired at very high temperatures.

The porcelain-making process began with careful preparation of the clay. It was cleaned, shaped, and dried slowly to prevent cracking. Then it was placed in a kiln. Inside the kiln, temperatures rose much higher than those used for ordinary pottery.

As the heat increased, the clay underwent an **irreversible change**. Water trapped inside evaporated, and minerals fused together. The clay became hard, dense, and waterproof. This was not just drying – it was a permanent transformation.

Minerals were also used to create decoration. Cobalt oxide produced the famous blue designs seen on many Chinese porcelain pieces. These colours were painted onto the clay before firing and became permanent during heating.

Porcelain required careful control of temperature and timing. If the kiln was too hot or too cool, the piece could warp or break. Through observation, testing, and shared knowledge, Chinese potters mastered this process.

From a Christian worldview, porcelain reflects how God placed remarkable properties within creation. When humans understand and respect those properties, they can transform raw materials into objects of beauty and usefulness.

Teaching Concepts

- Different materials react differently to heat
- High temperatures can cause permanent change
- Preparation affects final results
- Observation improves manufacturing processes
- Scientific knowledge increases material usefulness

Narration Prompt

Parent/Tutor Says:
"Close your eyes and imagine potters shaping clay, loading a kiln, and watching porcelain emerge after intense heat. Tell me everything you remember about how porcelain was made."

Thinking Questions

Foundation – Year 2

- What was porcelain made from?
- What did heat do to the clay?
- Why was porcelain special?

Years 3–4

- Why did porcelain need higher heat than pottery?
- What happened to the clay in the kiln?
- Why couldn't porcelain turn back into clay?

Years 5–6

- How did heat cause an irreversible change?
- Why was temperature control important?
- How did porcelain become valuable to other cultures?

Practical Activities

Foundation – Year 2

- Use air-dried clay to create a bowl or cup.
- Compare air-dried clay and baked clay
- Observe changes in texture and hardness

Years 3–4

- Model clay objects and discuss drying vs firing
- Sort materials by reversible or irreversible change

Years 5–6

- Investigate changes caused by heating (safe materials)
- Create a flowchart showing porcelain production steps

Christian Wrap-up

Porcelain reminds us that transformation often requires patience and care. God's creation holds deep potential, and wisdom is needed to shape it responsibly.

"He has made everything beautiful in its time." (Ecclesiastes 3:11)

Australian Curriculum v9 – Science Content Descriptions Addressed

Foundation

- AC9SFU03 – Objects are made of different materials with observable properties
- AC9SFH01 – People use observation and questioning

Year 1

- AC9S1H01 – Science is used in daily life

Year 2

- AC9S2U03 – Materials can be changed physically
- AC9S2H01 – Science helps people make decisions

Year 3

- AC9S3U04 – Properties of solids and liquids and change of state

Year 4

- AC9S4U04 – Properties of materials influence their use

Year 5

- AC9S5U04 – Particle models explain material properties

Year 6

- AC9S6U04 – Reversible and irreversible changes

TOPIC 9	ASSESSMENT

Medieval Science & Technology – Assessment & Rubrics (AC v9 Aligned)

FOUNDATION – YEAR 2

Assessment Task: Medieval Science Explorer

Purpose (aligned to Achievement Standard)
To assess whether students can:

- identify **observable properties of materials**
- identify **movement or effects of forces**
- recognise that **people use observation to learn about the world**
- **share ideas** about science experiences

Student Evidence

- Drawing of medieval object(s)
- Oral explanation (teacher-recorded)
- Simple sorting activity (material / movement)

Foundation–Year 2 Rubric (Achievement Standards Embedded)

Achievement Standard Criteria	Exceeding	Meeting	Developing	Beginning
Identifies observable properties of materials	Accurately describes multiple properties using clear language	Describes at least one correct property	Identifies properties with prompting	Shows limited recognition of properties
Identifies factors influencing movement of objects	Clearly explains how size, shape, or material affects movement	Identifies a correct influence on movement	Partial or unclear identification	Does not identify movement factors
Recognises people use observation to learn about the world	Explains observation using own example	Identifies observation as a way to learn	Recognises observation with support	Does not recognise observation
Shares ideas about science experiences	Communicates ideas clearly and confidently	Shares ideas understandably	Shares limited ideas	Unable to share ideas

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YEARS 3–4

Assessment Task: Medieval Science Problem Solver

Purpose (aligned to Achievement Standard)
To assess whether students can:

- describe **properties of materials and forces**
- explain how science **meets a need or solves a problem**
- identify **patterns from observations**
- **communicate findings** using scientific vocabulary

Student Evidence

- Written explanation
- Diagram or model
- Short reflection

Years 3–4 Rubric (Achievement Standards Embedded)

Achievement Standard Criteria	Exceeding	Meeting	Developing	Beginning
Describes properties of materials and effects of forces	Accurate, detailed descriptions with examples	Correct description of properties or forces	Partial or general description	Limited or incorrect description
Explains how science is used to solve problems	Clearly explains problem, solution, and outcome	Explains how science met a need	Identifies problem or solution only	Does not explain use of science
Identifies patterns from observations	Clearly identifies and explains patterns	Identifies a pattern	Limited recognition of pattern	No pattern identified
Communicates ideas using scientific vocabulary	Uses vocabulary accurately and consistently	Uses some correct scientific terms	Limited vocabulary use	Does not use scientific vocabulary

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YEARS 5–6

Assessment Task: Medieval Innovation Investigation

Purpose (aligned to Achievement Standard)
To assess whether students can:

- explain how **material properties relate to use**
- distinguish **reversible and irreversible changes**
- explain how science develops through **collaboration**
- **plan and communicate investigations** clearly

Student Evidence

- Short written report
- Investigation or model
- Explanation of process and impact

Years 5–6 Rubric (Achievement Standards Embedded)

Achievement Standard Criteria	Exceeding	Meeting	Developing	Beginning
Explains how properties of materials relate to use	Detailed, accurate explanation with evidence	Correct explanation of material properties	Partial explanation	Limited or incorrect explanation
Distinguishes reversible and irreversible changes	Accurately classifies and explains changes	Correctly identifies type of change	Some confusion evident	Unable to distinguish changes
Explains science as collaborative and cumulative	Clearly explains shared knowledge over time	Identifies collaboration in science	Limited recognition	Does not recognise collaboration
Plans and communicates an investigation	Clear planning and precise communication	Investigation described clearly	Limited planning or explanation	Investigation unclear or missing