KS3 Castles STEM Resource

LEARN

Cadw

Llywodraeth Cymru
Welsh Government

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Introduction

The aim of this pack is to help teachers approach a self-led visit to a castle in a creative, confident and imaginative way. The activity suggestions are flexible and can be carried out in a number of ways. We encourage teachers to select and adapt the material to ensure it meets topic and year group needs.

Booking a visit

Did you know that self-led visits to Cadw sites are free to education groups attending education establishments in the European Union?

The following guidelines are for staffed castles only. If you are visiting a castle that is not staffed you do not need to book. To book your free visit, please follow these simple steps:

Please book your visit at least five working days in advance. Telephone the site to check the availability for the date you'd like to visit. Once you have agreed a date and time with the site, complete the online booking form.

We also offer interactive, curriculum-linked education activities at selected sites. Booking guidelines and other resources can be found on the Cadw learning pages www.cadw.wales.gov.uk/learning

Health and safety

Teachers and group leaders are responsible for carrying out risk assessments prior to the visit, in accordance with guidance issued by local education authorities. We offer free teacher familiarisation visits to enable teachers to write the risk assessments and plan activities before bringing a group to the site. The learning pages on the Cadw website offer advice for planning your visit and site specific information.

Castles and the curriculum

We have included a curriculum map to support teachers' planning. The map highlights how the activity suggestions in this pack are relevant to learning in Key Stage 3 and how they link to the National Curriculum for Wales. The activity suggestions also support the delivery of Cwricwlwm Cymreig. They provide pupils with opportunities to develop and apply their knowledge and understanding of the cultural, economic, environmental and historical characteristics of Wales.

Castles and STEM in Key Stage 3

Study of Welsh castles enriches work in STEM subjects and provides students with an environment in which to explore real life scientific, mathematical, technological and engineering opportunities and challenges. Visiting a castle can provide students with a context in which to learn and extend their understanding. The suggested activities in this pack provide a snapshot of ideas for meeting skills in STEM subjects whilst visiting a castle and in the classroom prior to and following a visit.

Before your visit

Activity Suggestions

Route planner

Before you go investigate the geographical location of the castle you intend to visit. Locate your school and the castle on local maps and plan your route.
Think about:

- How will you get there?
- How far away is it?
- How long will it take you to get there?
- How much will it cost?
- What will the impact of your journey on traffic and the environment be?

Locate the castle on a digital map.
Think about:

- What does the area look like on the satellite image?
- What do you notice about the landscape?
- Can you find important landmarks? Can you locate physical and human features?
- Does the castle make use of natural features?
- What impact does the castle have on the local area?

Report your findings back to the class in a number of ways; you could present your ideas in a PowerPoint presentation or create a 'mini study manual'.
Make the most of your journey to the castle and look for landmarks along the route. Add what you have spotted to your report.

Take a risk

Before you go make a list of the possible hazards you may encounter on your visit and think about the actions you could take to reduce the risk of injury. E.g. you will find uneven floor surfaces around the castle and to reduce the risk of tripping and hurting yourself you could wear sensible walking boots.

Create a 'Risk Assessment Table' with potential 'hazards', 'injuries' and 'actions'. Write a list of things you may need to take with you to keep you safe on your visit. E.g. sensible shoes.

Next you could research the hazards you would have faced in the past when the castle was in use. Think about the actions you would need to take then to reduce the risk of injury. E.g. the castle may have been surrounded by a moat. To reduce the risk of falling into the deep and murky moat and drowning you would need to make sure you carefully crossed it when the drawbridge was down.

Again create a 'Risk Assessment Table' with potential 'hazards', 'injuries' and 'actions'. Write a new list of the things you would need to take with you to keep you safe on your visit. E.g. A shield. Compare the two tables and lists.

K-W-L. Know - Want to know - Learn

Launch your castle topic and steer thinking and questioning with a K-W-L chart. Before your visit to a castle brainstorm: What do I know about castles? What would I like to find out about castles? Complete the chart and list everything you know and would like to find out. Following your visit or at the end of your topic, complete the final column asking: What I have learned about castles?

Comparing castles

There are many different castle styles including: motte and bailey, square keep and concentric castles. Research three castle designs and create a PowerPoint presentation to explain and describe each example. Include a title slide, an open layout with bullet points, labeled diagrams and photographs. You could also include transitions, animations, hyperlinks and sounds.

Built to last

The following activities give students an opportunity to explore the reasons why people built castles. They encourage students to think about castles as places built to defend and protect as well as places for people to broadcast immense power and control over others.

Maths: Skills: Solve mathematical problems. Communicate mathematically.
Range: Measure and Money, Shape, position and movement
Design and Technology: Skills: Designing. Making. System and control

Other curriculum links:
English: Oracy
ICT: Skills: Find and analyse information
History: Skills: Historical knowledge and understanding. Historical Enquiry
Geography: Skills: Locating places, environments and patterns. Range: Study the town and country, tomorrow's citizens.

Turbulent times

Key Questions:
Why did people build castles? How did people defend castles? How did people attack them?

Engage:

Many castles were built during a time of conflict. They were built to keep hold of land that was captured and then kept to rule the defeated enemy. Castles were ferociously defended and attacked.

Develop:

Split the class into two groups - 'Attackers' and 'Defenders'. In pairs and with a plan of the castle, explore it through the eyes of an attacker or a defender.
Attackers: Find the weak spots in the castle. **Think about:** How would you storm the castle? Defenders: Find the weak spots in the castle. **Think about:** How would you defend the castle?
There are many ways in which to use the 'Turbulent times' cards, found at the back of this resource. We have included two activities you may wish to use.

1. Find the evidence
Choose an attack card and search the castle for the area that it relates to. Observe the area carefully and talk about how this area could be attacked. Decide on the most effective way to defend it.
2. Turbulent Times Tactics
In small groups create two teams - 'Attackers' and 'Defenders'. The aim of this game is to outwit the opposing team using the 'Turbulent Times' cards and win the battle with the best defence or attack methods. Each team read their cards carefully. Discuss together the most effective attack/defence methods. Choose three cards that you all agree are the most effective, (you also need to think about what your opponent might choose). Both teams reveal your cards. Debate together which methods chosen would win the battle. E.g. if the 'defenders' have chosen to use the portcullis and the 'attackers' the battering ram, decide which team would come out on top.

Reflect:

Where is the weakest area of the castle? How do you know? What can you do to strengthen it?

In class: Explore the Cadw learning pages to find out more about why castles were built. Create a 'Trick list' for attackers or a 'Trick list' for defenders with ideas for attacking or defending a castle.

Defence inspector

Key Questions:
Does the castle have good defences? How can I find out?

?

Engage:

Use your maths skills to investigate whether the castle is strong enough to withstand an attack. Become a 'Defence Inspector'. With clipboard in hand conduct a castle survey to test the castle defences. Can it withstand an attack and pass your inspection? You will need a plan of the castle and measuring equipment including a stopwatch to find out.

Develop:

- Estimate then measure the thickness of the walls. Where is the thickest wall found? Why?
- Estimate the height of the walls. Where is the tallest wall found? Why?
- Estimate then measure the size of the doors and windows. How far are the windows from the ground?
- Measure the position, size and number of arrow slits. Are there enough?
- Estimate then measure the distance from the keep to various rooms or areas around the castle e.g. from the keep to the kitchen, the keep to the chapel, the keep to the bedchambers etc.
- How long will it take an attacker to move around the castle? Measure the time it takes for them to reach each room or area of the castle. Remember they would creep slowly, carefully and quietly once within the castle walls to stay undetected.
- Calculate the speed an attacker will need to travel to reach certain areas of the castle in a specified time, e.g. an attacker has only 10 minutes to reach the keep from the curtain wall. How fast will they need to move? Remember they can only move with caution so they will not move at speed. Can it be done?
- Estimate then measure the perimeter of the castle walls. How far will an attacker have to travel around the castle? How long will it take?

Reflect:

Will the castle survive an attack? Has the castle passed your inspection? Explain your reasons.

In class: Create a database with the information you gathered during the inspection. Create a map of the castle with grid references pinpointing the castle weak spots.

How high?
Is the tower or wall too high to measure? How can you find out the height of the tallest wall or tower? Bend over and look through your legs!

Walk far enough from the tower or wall to a place where you are just able to see the top of it from your upside down position. The distance from where you are standing to the bottom of the tower is about its height.

The angle that is formed as you look between your legs is about 45 degrees. The angle between the tower or wall and the ground is about 90 degrees. Remember what you know about the angles and sides of a triangle? Now you can work out the height of the tower. The height of the tower and the distance from the tower to where you are standing is about equal. Find the tallest tower. Find the tallest wall.

Explosive stuff!

Key Question:
How does a catapult work?

Engage:

Engineers played an important role in building, defending and attacking castles. They also designed and constructed the siege engines and weapons. To do this they used ingenuity, precision and a great imagination. Can you step into the shoes of a castle engineer? Do you have what it takes?

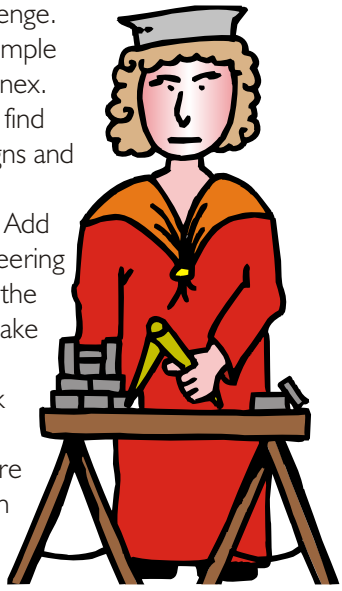
Develop:

Take the Catapult Challenge. You are the castle engineers and your mission is to design, make and test a mechanical catapult to help attack the castle. You need to test your catapult in a 'Castle Siege' and describe the key engineering concepts involved.

Choose a catapult challenge

1. Make the most accurate catapult to hit a specific target.
2. Build the fastest catapult to destroy a castle wall in the quickest time.
3. Construct a catapult that launches objects the furthest.
4. Design the most unusual catapult with features never before seen.

Designing your catapult - Tips
Remember your chosen challenge.
Make a prototype - create a simple lever catapult using Lego or K-nex.
Research Use the Internet to find ideas. Search for catapult designs and images.
Plan Draw your design ideas. Add labels illustrating the key engineering concepts involved and a list of the equipment you will need to make your catapult.
Test Does it work? Refer back to your chosen challenge.
Evaluate How does it compare to your initial specification? Can you improve it?



Mission impossible?

Engage:

Before a siege, we attackers plan our tactics very carefully. The castle is always well guarded by day and night. However, within the castle walls a network of spies and messengers pass on important information to help us plan our attack.

Take the **'Castle Spy Challenge'**. You are a spy and your mission is to make a map of the castle to aide our attack. With a plan of the outer walls make a record of all the internal features and obstacles. Include the position of rooms, the stairs, doors, windows, passageways, fireplaces etc. Make a note of where guards will be positioned and whom we are likely to find in the castle rooms. Label your map carefully and accurately to help us succeed when we storm the castle. Are there any secret passageways or tunnels? Remember to move around the castle with care and secrecy. Shhhhhhh!

Discussion point - What would happen if a spy got caught?

In class: Reasearch the castle's story and the characters that payed a key role in its history. Create a timeline of events or retell the story on a storyboard. You could also research crime and punishment during the castle's history and find out what would have happened to a captured spy.

Tools of the trade

The following activities give students an opportunity to explore how castles were built. They will consider common features, materials used, construction methods and why castles changed over time.

Maths: Skills: Solve mathematical problems. Communicate mathematically. Range: Measure and Money. Shape, position and movement. Handling data
Design and Technology: Skills: Designing. Making. Rigid and flexible materials
Science: Skills: Communication. Enquiry. Developing. Range: The sustainable Earth. How things work.

Other curriculum links:
English: Oracy.
History: Skills: Historical knowledge and understanding. Historical enquiry

Grand design

Key Questions: How were castles built? What will my castle look like?

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Engage:

I am a castle master mason and it is I who was responsible for building the castle you see today. My castle designs are masterpieces, works of beauty and I am the best castle builder the world had ever seen.
I am calling upon all budding architects to search my castle from different angles and heights and take inspiration and ideas to influence your own castle designs. Look carefully at the architecture, structure, shape, line, angle and elevation.

Develop:

Use a plan of my castle as you explore. Sketch in detail or take photographs of the features you would like to use in your design. Sketch the structural parts of the castle inside and outside including how windows, floors and ceilings were styled and constructed. Add detail to your designs and label the materials you would like to use. Decide whether you will design a castle with features to show off to others or to defend against attack, or both.

Reflect:

Add a modern feature to your design. Describe its purpose and how it will either defend or show off depending on the function of your castle. Think about how you could use sustainable building strategies and resources to create an energy efficient castle. Share your ideas with the group.

In class: Research how castle design has developed over the years and use those ideas to tweak your design. Draw a detailed, scaled plan of your castle. You may wish to use an ICT package to generate a 3D image of your castle design. Decide on the materials you will use and construct it. Explore the Cadw learning pages to find out more about castle designs.

Materials I spy

Key Questions: *What are castles made from? What materials will I find at the castle?*

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Engage:

At first castles were made from mounds of earth and wood. But as weapons developed so did the materials used to build castles and stone was the material of choice.

Develop:

Work in groups to identify different materials found throughout the castle. E.g. stone, metal, wood, glass, plaster. When you have identified a material e.g. soft stone, carry out careful observations of the material. Describe its properties e.g. easy to carve. Describe the way it is used around the castle, e.g. decoration.

Think about:

- Is it original or not?
- How can you tell?
- Why was this particular material used here?
- Is there evidence of different materials that are no longer visible?
- Why?

Carefully record your findings on the Materials I spy grid.

Reflect:

Discussion point: Is there a material that you have not found in the castle? Why do you think that is?

In class: Investigate where the materials you have found at the castle came from and how they were transported to the site. **Think about:** Did castle building use sustainable approaches? i.e. Local materials, local people and renewable resources.

Missing

Key Questions: *Where and how was wood used in the castle? Why has much of the wood used in castles not survived?*

Engage:

You may have discovered that much of the wood that was used in and around the castle when it was built is missing. To find out why involves detective work. Detectives examine and collect evidence; they hunt for clues to find answers to tricky questions. Work in small teams of detectives and explore the castle to find evidence of where and how wood was used.

Develop:

Teams should make a list of the evidence and decide where wood was used. Think about: fuel, buildings, furniture and weapons. Don't forget that everyday objects may have been made out of wood too, e.g. buckets, bowls, utensils and tools etc. Which team has the longest list?

The 'hole' truth

Holes can give us useful clues about where wood was used in the castle.

- Wooden beams were inserted into round putlog holes in the stonework to support scaffolding when the castle was being built. You may find them on the outside of the castle.
- Holes were made in stonework for wooden drawbars to enter to act as a door bolt. You may find them near doorways especially the main door.
- Joist holes were cut into stonework and wooden beams were inserted to support floors.
- Post holes may be found in the ground. They were dug and beams were inserted. They may show you where a wooden building once stood.
- You may find pivot holes near the entrance where a wooden drawbridge was lowered and raised.

Reflect:

Share the lists you have collected and discuss why the wood has disappeared. Has it rotted away, was it vandalised or destroyed by fire or has it been replaced with a different material? Where do you think the wood used in the castle came from?

In class: Conduct a series of controlled experiments to see how wood deteriorates in different conditions, e.g. immersed in water, frozen, heated, buried, dropped. Compare it with other materials such as stone.
Investigate: where the wood in your classroom has come from. **Research:** What is a sustainable forest? Why is it important to use wood from sustainable sources?

Investigate arches

Key Questions: *Why do castles have arches? How strong are they? Why are they that shape?*

Engage:

The arch shape is very strong and has been used for thousands of years. A force from above pushes down on the keystone at the top of the arch. The force then pushes outwards onto the wedge shaped stones and is channeled down the sides of the arch to the pillars on either side, then to the footers at the bottom. The abutments stop the pillars from spreading.

Develop:

In pairs, stand opposite each other and form an arch by placing your palms together at shoulder height and leaning towards each other. Carefully slide your feet back as far as you can. Can you feel pushing (compression)? Where? The force you are feeling is the same force created in an arch, an outward and downward force along the sides and the base.

In pairs, search for arches around the castle. How many can you find? Where are they used? When you have found a good example use it to explain to your partner how it works.

Reflect:

Choose an arch you have found and carefully draw it in detail. Label: keystone, footers, abutments and load. Record what your arch is supporting.

In class: Work in teams and build an arch using the observational drawings you made during your visit to the castle to help you. Test the strength of your arch, describe the forces involved and write instructions so others can build it. What is your arch made from?

Use the force

Key Questions: *What is a force and what can it do?*

Engage:

As you explore the castle invisible forces will surround you. You cannot see them so you will have to use your powers of deduction to spot where they are or where they were in the past.
Remember: A force is needed to get things moving, to change their direction, to change their speed and to stop them.

Develop:

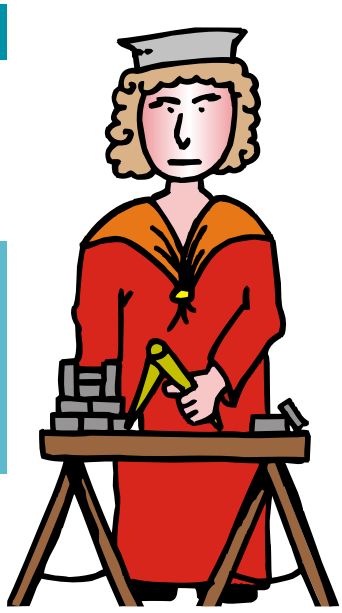
Explore the castle and make a list of the invisible forces that surround you.

Think about:
Moving objects
Pulleys or windlasses - they would have been used to move heavy stone, raise and lower the castle drawbridge or draw water from a deep well
Winches - they were used to raise and lower the portcullis or lift other heavy objects
Levers - they were used in siege engines to fire heavy objects at speed during an attack
Stable objects
Structures - bridges, walls, pillars, columns, towers, arches, buttresses and the arrangement of stones

Reflect:

Discussion point: How does the castle stay up and why does it not fall over? What are the forces you found around the castle and what role do they play?

In class:
Design and make a feature from the castle, e.g. a working drawbridge and demonstrate the force acting on it and the relationship to work done and power.



Build budget

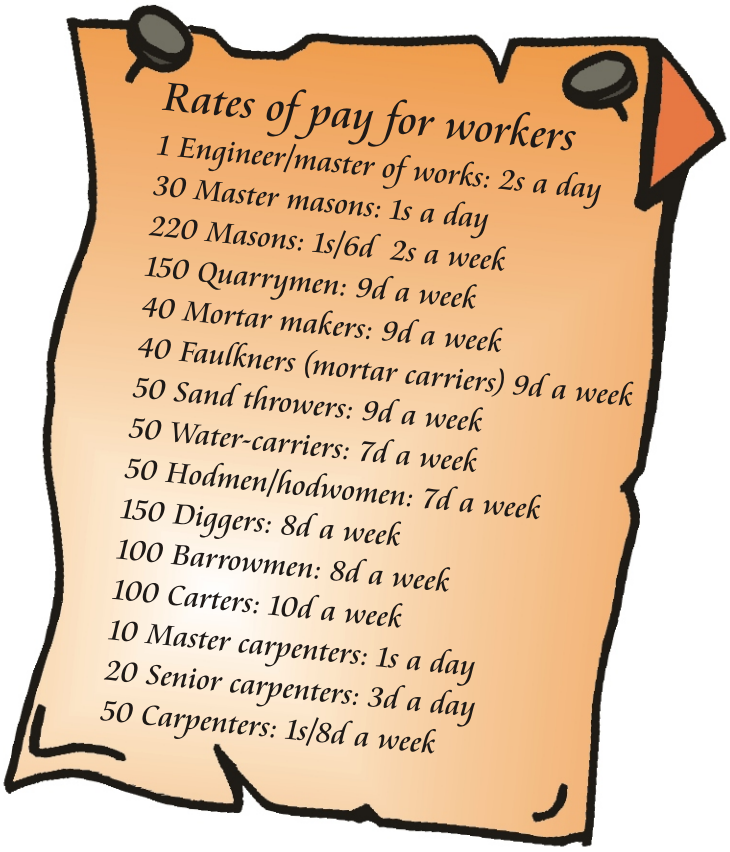
Key Question: *What was the cost of building castles?*

Engage:

Castles cost a great deal of money to build and took many years to complete. The main build season was between May and November and as many as 2000 workers worked every day of the week to finish them. Keeping to a budget when building a castle was difficult. Can you help the master mason balance the budget?

Develop:

Solve the master mason's financial problems.
How much will it cost to pay all the workers in one week?
If the main build season was between May and November, how much did it cost to pay the workers if the castle took 10 years to build?
What is the average yearly wage?



d = penny
s = shilling
1s = 12 pennies

Reflect:

How much do you think it would cost to build a castle now?
If 1d = £3.27 and 1s = £39.30. How much would it cost to build the castle now? Use the conversion rate to work out the workers' average yearly wage.
Think about: What impact will inflation have on the figures?

In class: The master mason has a £25,000 castle budget. Investigate savings and investments and analyse the best value for money deals to help his £25,000 grow.

Just the job

The following activities encourage pupils to think about the people who worked within the castle. They will explore the hustle and bustle of castle life through the people who worked there.

Maths: Skills: Solve mathematical problems. Communicate mathematically.
Range: Number, Measure and Money, Shape, position and movement, Handling data

Other curriculum links:
English: Oracy.
History: Skills: Historical knowledge and understanding.

Geography: Skills: Locating places, environments and patterns. Investigating. Range: Study living in Wales: their local area.
ICT: Skills: Find and analyse information
Art and Design: Skills: Understanding, Investigating. Range: Understanding, Investigating, Making

All in a day's work

Key Question: How easy is it to get around the castle?

Engage:

You have just started a new job as the castle errand boy/girl. In your role you are expected to know your way around every part of the castle. You are expected to know all the best routes to get your job done quickly.

Develop:

In pairs use compass points and directional language to write instructions on how to reach different parts of the castle. Then test it out. Give your instructions to another pair. Did they get the job done or did they get lost? Measure and record the time it takes.

Reflect:

How easy it is to get around the castle?

In class: Draw a map of the castle and use coordinates or grid references to show where features are located.

Castle careers top trumps

Key Questions: Who had the best job? Who had the worst job?

Engage:

Think about: Who worked in the castle and what tasks did they have to undertake? Who do you think had the best job? Rate the castle jobs and create a deck of 'top trump' cards.
A template for this is included at the back of this resource.

Develop:

Choose your categories: Skill - Job satisfaction - Salary - Stamina - Grossness. Rate each job by giving each category a score. The best job will have the highest score.

Reflect:

Discussion point: Who has the best and worst job?

In class: Research more castle jobs and add these to your deck of top trump cards. You could create your own categories and a design for the back of each card. Play your top trumps cards.

Party planner

Key Question: *What were castle feasts like?*

Engage:

Can you find the great hall? Magnificent feasts would take place in the castle's great hall. Important guests were invited, quality linen would adorn the tables and an array of fine food was served. For the people working in the castle it was a very hectic time.

Develop:

The king is due to visit the castle and a feast is planned in his honour. It is your job to plan it! Look around the great hall and use your imagination to picture the sights, smells and sounds during one of the feasts. **Think about:** a guest list, the invitations, a seating plan, the menu, entertainment, decorations, staff required to serve the king and the other guests. Jot down your ideas and make a plan of the feast.

Reflect:

Discussion point: how much you think the feast would cost.

In class: Create a feast budget and make a detailed record of how much a modern day castle feast will cost. Research the cost of the food, printing the invitations, hiring a band or a disco, employing waiters and buying the decorations. Set A budget; compare prices and choose deals that are the best value for money.

Heraldry

Key Question: *What is heraldry?*

Engage:

When a knight was in the heat of battle it was important to be able to identify a friend from an enemy. To be recognised knights decorated their shield and tunic with a coat of arms. A Herald designed the coat of arms making sure that no two were the same. Their designs were filled with symbolism.

Develop:

As you explore the castle, collect symbols and shapes that interest you or mean something to you. Use the castle as inspiration to create your own personal coat of arms. It could represent your characteristics, personality and values, your hobbies, your favourite things and important events. Use the shield template found at the end of this resource, to sketch your thoughts and ideas.

Reflect:

Can you design a coat of arms with two lines of symmetry or with rotational symmetry?

In class: Refine the sketches you made during your visit and create your shield in your chosen medium. Look at each other's coat of arms and guess who they represent. Where do you find coats of arms today? Research and compare coats of arms from different time periods.

Home sweet home

Castles were much more than powerful strongholds. Within the solid walls they were also a home to many people. The following activities allow students to investigate the castle as a place to live.

Maths: Skills: Solve mathematical problems. Communicate mathematically. Range: Measure and Money, Shape, position and movement, Handling data
Design and Technology: Skills: Designing.
Science: Skills: Communication. Enquiry. Range: Interdependence of organisms.

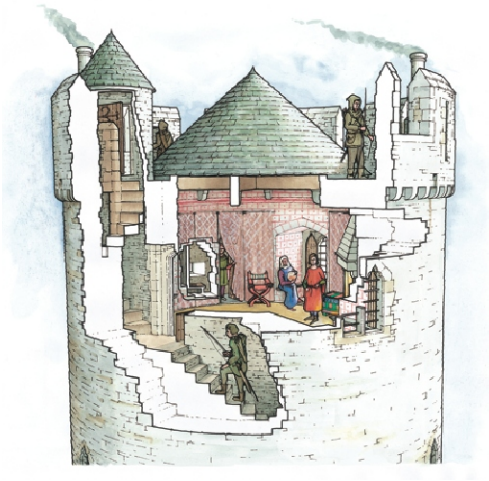
Other curriculum links:
English: Oracy, writing
History: Skills: Historical knowledge and understanding. Historical enquiry
Geography: Skills: Locating places, environments and patterns. Investigating. Range: The town and country, tomorrow's citizen

Go go gadget go

Key Questions: How did people heat and light castles?

Engage:

The castle can be a very dark, draughty, damp and cold place to live. We use heavy blankets, feather mattresses, fur covers and tapestries on the walls to give us some comfort and warmth, but in the winter my chambers can freeze. Some days I find it quite impossible to see my embroidery, even sat in the window seats.



Develop:

I commission you to invent a new machine or gadget that will supply the castle with warmth and light. Your invention must be 'attack proof' too and should be designed with medieval materials in mind. As you explore the castle make notes and jot down your ideas. Can you find any clues in the walls to suggest how the castle was lit and heated?

Reflect:

Come together and share your ideas. **Think about:** How can you improve your invention?

In class: Draw a detailed diagram of your new invention. Label it before writing an instruction manual with diagrams and labels explaining how it works.

Construct a prototype of your invention, give it a name and write a business plan highlighting how You will market it. You could pitch your idea to the 'medieval dragons den'.

Castle for sale

Key Question: *What are the castle's dimensions?*

Engage:

The Lord wishes to move and sell his castle. He has instructed you, a medieval estate agent, to list the castle for sale.

Develop:

Make notes about the castle for a 'For Sale' brochure. Measure the width and length of each room and then calculate the area and perimeter. Provide the room dimensions in metres and centimetres and convert these to feet and inches. Draw scaled floor plans and label each room. Measure the land around the castle and record the size in square metres and convert this size into acres.

Reflect:

How many square metres of floor space does the entire castle have?

In class: Create a brochure with floor plans and photographs of the castle. In your brochure provide a map with the castle accurately located on it and record its distance from the nearest amenities e.g. schools, bus and train stations and shops etc. Research the average house prices in the area and decide a list price for the castle. You could create a computer-aided 3-D plan of the castle or a virtual tour.

Estate agents charge 2% commission for selling a home. Calculate your fee. Don't forget you will need to add VAT.

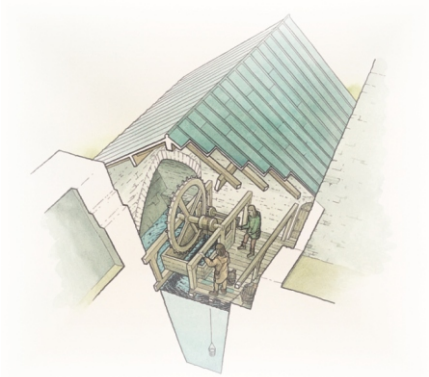
You could also investigate stamp duty charges, mortgage deals and the cost of moving.

Water watch

Key Questions: *How did the castle get its water? How was water used in the castle? How was water moved around the castle?*

Engage:

Castles needed a water supply and they were often built on land with a spring or well. Waste-water was sometimes dumped into a moat or cesspit and the stench would help to defend the castle from attack. The water supply was often sabotaged during an attack and a siege could be lost if the water supply was cut off.



Develop:

Investigate: How did people bring water into this castle? Where was it used and what was it used for? How was waste-water disposed of?

Follow the route of water as it was brought into the castle. Move around the castle and into the rooms where water was used. Can you find evidence of: a well, a spring, cistern, basin, pipes, valves, garderobe, latrine, moat, river etc?

Follow the water as it left the castle. Where was the waste-water disposed of? Make a list of the technology involved in supplying water to the castle, e.g. winding mechanisms, levers and pulleys.

Reflect:

Discussion point: What did the people who lived and worked in the castle drink? Why did they not drink water?

In class: Investigate the role technology plays in managing our water supply and research how engineers make our water safe. Investigate different ways of filtering dirty water by designing and building a water filtration system for the castle.

Research the problems developing countries have with water supply. Consider hygiene, sanitation and drought. List the pros and cons of the technology used to manage their water supply and offer suggestions for improvement.

K W L

Know	Want to Know	Learned

Turbulent times
Resource cards

Attack: Siege - Surround the castle so no-one can enter or leave

Attack: Siege engines - Fire stones and rocks over the walls and into the castle

Attack: Water - Block the water supply to the castle.

Attack: Battering ram - Break down the castle door or the thick stone walls

Attack: Archers - Fire arrows at the soldiers in the castle

Attack: Siege Tower - Get men over the castle walls and protect your soldiers as they climb the ladder

Attack: Fire - Set fire to the wooden door, the food store or any wooden part of the castle

Attack: Ladders - Climb the high walls or cross the moat

Attack: Surprise - Attack at night and look for places to hide

Attack: Tunneling - Dig under the castle foundations to weaken the walls so they collapse

Turbulent times
Resource cards

Defend: Sally Port - A small entranceway that is closely guarded. Soldiers can pass through quickly to mount a sudden attack.

Defend: Castle location - Build on high ground to give you great field of vision of the surrounding area and make tunneling and access difficult.

Defend: Main door - Bolt shut the door and lower the bar behind it.

Defend: Portcullis - Create an extra barrier and lower the portcullis.

Defend: Murder holes - With attackers at the gate pour scalding hot sand or rocks through the holes.

Defend: Supplies - Stock up on the essentials so you can't be starved out.

Defend: High, thick curtain walls - Build your walls high with a walkway along the top for shooting.

Defend: Battlements - Protect soldiers on the curtain wall walkway.

Defend: Allow archers to shoot through the gaps while remaining safe behind the stone.

Defend: Ditches - Make access to walls and doors difficult by digging ditches.

Defend: Surround the castle with a moat filled with water and waste.

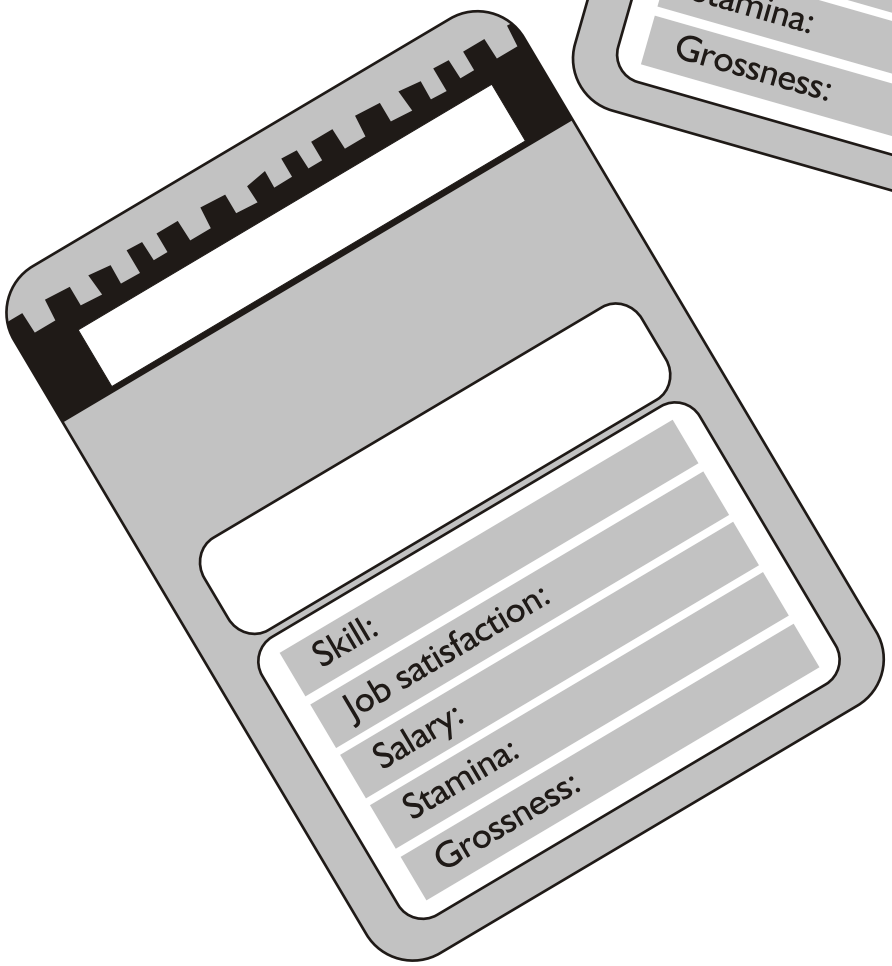
Defend: Archers - Shoot the enemy through the arrow loopholes.

Defend: Drawbridge - pull up the drawbridge to protect the main door.

Materials I spy

Object	Material	Properties	Uses	Original

Top trumps
Example



Heraldry
Shield template