|  |  |  |  |
| --- | --- | --- | --- |
|  | **WHAT MAKES THE BEST BUILDING STONE?** | | |
| This section could take between 1 and 4 lessons depending on how much you choose to exploit the cross-curricular links. The basis of the section is on materials and their properties, with pupils conducting experiments to decide on the best building material to use for building a house out of three Jurassic Coast rock types. If pupils have already done some work on properties of everyday materials then that is useful prior knowledge. If not, the work fits in well with this section. English and Geography can also be built on using this section as a starting point. | | | |
| **Key Stage 2** | **Timing: 2 Lessons** | **Science, Geography, History** | |
| **ACTIVITY** | | **LEARNING OUTCOMES** | **RESOURCES** |
| **Can you build it? Yes You Can!**  Provide pupils with a set of materials (eg. Pipe cleaners, newspaper, bubble wrap, cotton wool, matchsticks, card etc) and give them 10 minutes to build a model house no bigger than 20cm3. No lead a whole class discussion about why they chose the materials they picked out for building their house.  **Observations and reflections**  You may choose to follow on from this to some work on classifying materials based on their properties (harness, strength, flexibility, magnetism) by giving pupils a set of everyday materials and asking them to complete a table (Worksheet 1) describing their observations in relation to the different properties. If pupils have already done some work on properties of materials, this section could be left out.  **‘The Three little pigs on the Jurassic Coast’**. Remind the pupils of the three little pigs’ story. Explain that they are going to ‘update’ the story…the three little pigs have now all decided that they need to use stone to build their houses so that the wolf can’t blow it down. But they can’t decide which stone to use: Triassic sandstone from Sidmouth, Jurassic Clay from Charmouth, or Portland Stone from Portland. Use the stimulus pictures as you read through the story. The pupils will need to do some experiments to decide which type of rock to recommend the pigs use to build their houses. Provide each group of pupils with the 3 rock types and Worksheet 2 to work through. | | * Recognise and identify * Express simple views and opinions * Compare and contrast * Reason * Use basic scientific skills with some judgement * Make simple explanations for observations * Lead an enquiry using scientific skills and reasoning * Demonstrate understanding through explanation * Make links and identify relationships between observations and outcomes * Demonstrate decision making in leading a scientific enquiry | Materials to choose from to build a model house, plus scissors, glue etc.  Everyday objects such as bar magnets    Worksheet 1: Which of these materials would you group together?  Worksheet 2: Three Little Pigs on the Jurassic Coast |
| **ACTIVITY** | | **LEARNING OUTCOMES** | **RESOURCES** |
| Depending on time, possible link to **English** and writing stories based on stimulus material. Ask the pupils to write a cartoon strip for the 3 Little Pigs Jurassic Coast story. They will need to be imaginative in showing how the waves attack and erode their houses, and they should incorporate as much of the science they have done in the experiments as possible.  A further extension of the work in Geography could look at how homes are built in other countries and what weather conditions can affect them. A case study could focus on Bangladesh and the effect of flooding on houses made out of the local mud and clay. | |  |  |

**Worksheet 1: Which of these materials would you group together?**

Putting things into groups makes it easier to understand what might happen when we use them. Scientists use the **properties** of things to decide how to put them into groups. They **observe** the objects very carefully to decide what their properties are. We are going to look at some different materials, investigate how they look and behave (their properties) and then put them into groups.

You will need to test each material for the different properties using the tests below, and write your notes in the table.

**Hardness:** To see how hard something is, try scratching it with your finger nail. If you can see a scratch, it is a soft material. If you can’t scratch it, it is a hard material.

**Flexibility:** Try bending the material. Will it bend? If you bend it, does it break? Or can you not move it at all?

**Appearance:** Describe the colour of the material. Is it all one colour? Is it shiny or dull? Put down as much detail as you can.

**Magnetism:** To see if the material is magnetic or not, try putting a magnet next to it. Does it stick to the material? Can you feel a force trying to pull it to the material when the magnet gets close?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Material | Hardness | Flexibility | Appearance | Magnetism |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

**Grouping your materials**

Now you have lots of observations, you need to decide if you think any of the materials are similar. If you think they are, put them into groups and give your groups a name to describe them.

Group 1

Group 2

Group 3

When Scientists have done this, they have come up with groups like metals and non-metals.

**Worksheet 2: The Three Little Pigs on the Jurassic Coast**

Once upon a time, there were three little pigs, named Peter, Patty and Penny, who left their mummy and daddy to see the Jurassic Coast.

All summer long, they roamed along the Jurassic Coast, collecting fossils and having fun **(PICTURE 1)**. They spent time looking at all the different rocks that the Jurassic Coast was made out of. In East Devon the rocks were made out of a soft red crumbly sandstone. In West Dorset the rocks were grey in colour and made out of a soft, slippery clay with lots of fossils. When they travelled to Purbeck they saw that the rocks were hard, square blocks of white Portland Stone. None were happier than the three little pigs, and they easily made friends with everyone they met.

Wherever they went, they were given a warm welcome and never had to worry about where they would sleep. But as summer drew to a close, they realized that people were starting to prepare their homes for winter. The three little pigs decided that they too needed a home of their own to keep them safe and warm through the winter.

The three little pigs decided to build their houses out of the rocks they found on the Jurassic Coast. Peter, the first little pig, was the oldest of the three. He decided to build his house out of the red sandstone rocks he found in East Devon **(PICTURE 2)**. "It won’t take me very long and it will be a lovely colour! Then I'll go have fun and look for fossils," he sang enthusiastically.

The others disagreed. "It's too crumbly and weak, look at the rockfalls on the beach" they said disapprovingly, but Peter refused to listen (after all, he WAS the oldest).

Patty Pig was the second little pig (born after Peter and before Penny). She decided that a house of sandstone would be too crumbly during the winter storms so she went off in search of some grey clay that she had seen in West Dorset to build her house **(PICTURE 3)**. It took her two days to collect the lumps of clay and she then used lots of water to make the clay soft to build her house. As the clay dried out it hardened to form walls and a roof. Patty finished, looked at her house and thought, "well..., it's a little uneven and maybe it isn't my VERY best job... but it's supposed to be warm this winter so it should do."

Penny quietly voiced her opinion that the house didn't look sturdy enough to stand up to the big waves that came crashing onto the Jurassic Coast in the Winter. In fact sometimes the clay cliffs slumped onto the beach in muddy landslides! Peter teased that Patty had wasted a whole day collecting the clay when she could have been having fun fossil collecting with him. Patty turned and sang out, "It only took an extra day. Now I can go have fun and look for fossils."

Penny Pig was the youngest of the three and being the youngest loved to collect fossils at least as much as Peter and Patty did. But she remembered what her mummy and daddy had taught her growing up.

Her daddy always told her, "we don't expect you to be perfect Penny."

And her mummy always added, "we'll always be proud of you as long as you've done your very best job."

So Penny Pig sighed and thought, "It will take time, patience and hard work to build a safe, warm, comfortable house. I've never done it before and I'm a little nervous, but I'm going to do my very best job!"

Penny went to the library and took out some books about building houses. She spent two whole days reading the books before she decided that a house built of Portland Stone would be the best choice. Penny found out that St. Paul’s Cathedral in London was built out of Portland Stone over 200 years ago and it was still standing in London today! That must be a good sign! **(PICTURE 4)**

Penny spent another whole day collecting supplies from local quarries **(PICTURE 5)**. It took 4 days to carve the Portland Stone into blocks so she could make her house **(PICTURE 6)**. It took another week to make the foundations and put the blocks of Portland stone together to make the house. Then another 4 days to put on the roof and paint the walls. Just to make sure that she'd tried her best, she decided to take a few more days to build some cosy wooden furniture to put in her house of Portland Stone. By the time she had done her house, two weeks had passed and the leaves outside had taken on their autumn colours.

Penny looked at her little house with pride. Sure, the chimney was a little crooked and the paint had dripped a bit here and there, but Penny knew that she'd done her very best job and was quite proud of what she'd accomplished.

Peter, Patty and Penny spent the next day playing and going fossil collecting. The two older pigs teased Penny that she'd wasted the whole autumn building her house (and Peter couldn't resist pointing out that even after all that work, Penny hadn't even managed to get the chimney on straight!) But Penny was happy with the choices she'd made as she sat in front of her cosy fireplace that night.

Peter wasn't nearly as comfortable in his house of sandstone. The cold night air crept in quickly through the cracks where the stone had crumbled. Peter hadn't taken the time to build a bed so he huddled in the corner on a pile of crumbly soft sand. As the sun rose the next morning, Peter was starting to wish that he'd spent a bit more time on his house. As he pondered what he was going to use to cook breakfast with, Peter heard a knock on the door.

"Who's there?" Peter asked... it was awfully early for visitors.

Peter hadn't been the only one wondering about breakfast. A big, bad, hungry wolf had wandered through the forest. He hadn't eaten for a while and a nice young piggy was just the kind of breakfast he was craving!

"Come out!" ordered the wolf, his mouth watering. "I want to speak to you!"

Peter may have been a bit lazy, but he certainly wasn't dumb. "I'd rather stay where I am," he replied.

"Come out now!" yelled the wolf fiercely.

"Not by the hair on my chin-y chin chin," teased Peter (after all, what could the wolf do about it).

"Then I'll wait for the next big storm to come by and wash your house away!" threatened the wolf, who knew in winter that big waves crashed against the red sandstone cliffs causing them to collapse. That night as Peter huddled in his house, an almighty storm approached the Jurassic Coast, and the waves battered his poor weak sandstone house and broke it apart **(PICTURE 7)**. Peter dashed as fast as he could to his sister Patty's house. Patty had heard the commotion. She ran to the door and pulled it open for her brother. The wolf ran after Peter and shouted "Come out and play with me!" just as the door slammed in his face. "Not by the hair on our chin-y chin chins," replied Patty

"Then I'll wait for the waves to wash your house away too!" yelled the wolf who was soaking wet in the rain as it battered against Patty’s clay and mud house. As the waves and rain washed over Patty’s clay house, something strange started to happen. The clay, which was dry and hard during the summer, suddenly started to get wetter and softer. Peter and Patty trembled inside their grey clay house and watched with amazement as the walls of the house started to slip and slide away in the rain. They both dashed out and were halfway to Penny's house as the last of the clay house slumped to the ground. Penny urged them into her Portland Stone house, took one last look at the crooked chimney, crossed her fingers and slammed the door.

"Come out here now! I want my dinner," growled the wolf, not bothering to pretend anymore or care about the storm that was blowing around him.

"Not by the hair on our chin-y chin chins," replied Peter, Patty and Penny (her fingers still crossed tightly).

"Then I'll wait until your house crumbles and slumps like the other two in this storm!" yelled the wolf who stood his ground as the waves crashed against him and the house made of Portland Stone.

As he waited nothing happened as the waves crashed against the walls of the house. The wolf waited and then he saw a wave coming across the sea, the biggest, strongest wave he had ever seen! He smiled to himself as he knew this would be the wave that would destroy the house made of Portland Stone. Peter and Patty looked outside of the window and saw the approaching wave and shivered in terror. “This is it!” they both cried, “your house will be washed away, and the wolf will eat us!”. Penny gulped; she knew that some of the strongest buildings on the Jurassic Coast were built of Portland Stone. She thought of the Lighthouse on Portland which had lasted through some of the biggest storms. “Don’t worry” she said to the other two pigs, “we’ll be OK, you’ll see!”. Now as the wave approached they held their breath. The wolf waited and watched, dripping with rain and shivering in the cold. As the wave approached the Jurassic Coast, it crashed against the cliffs causing some bits of it to crumble. But as the waves crashed against the house made of Portland Stone nothing happened – the house stood still! The wolf watching this cried out in horror and surprise as he was expecting it to be broken into tiny pieces. As he decided to jump on the roof and go down the chimney, the big storm wave caught him and washed him away down the coast! Further and further he went and he found himself washed onto a beach in France, far away from the Jurassic Coast and from the three little pigs.

Later that day after the storm had gone away, Penny took Peter and Patty to the library and showed them the books she had read about on Portland Stone, and about how so many buildings across the world were made from this rock. Penny did her best to give them some instruction and Peter showed his sisters how to put on paint without it getting drippy (after all, he WAS the oldest).

The wolf did return once to roam in the neighbourhood, but when he caught sight of THREE crooked chimneys, he remembered how cold and wet he felt on the night of the storm and the feeling of being washed away on the waves all the way to France. He never returned to bother them again.

Now safe and happy, Penny sang out to her brother and sister, "No more working for today... Come on let's go out and look for fossils!”



**PICTURE 1: Fossil collecting on the Jurassic Coast**



**PICTURE 2: Red sandstone cliffs in East Devon with a small cliff fall**



**PICTURE 3: Grey clay cliffs in West Dorset with a landslide**



**PICTURE 4: St Paul’s Cathedral in London, built in 1708 out of Portland Stone**



**PICTURE 5: Portland Stone blocks in a Quarry**



**PICTURE 6: Block of Portland Stone which is made out of limestone**

**PICTURE 7: Massive storm waves hit the Jurassic Coast at Charmouth**

**PICTURE 7: Massive storm waves hit the Jurassic Coast at Charmouth**

