CWK CWK

Metamorphic Rocks

- Explain how metamorphic rocks are made from sedimentary and igneous that have had their structure changed by heat and pressure.
- Explain why we rarely find fossils in metamorphic rocks
- Use particle diagrams to explain physical changes in metamorphic rocks.

Lesson 11

TASK: You are company of expert geologists.

The school is going to have a few improvements made over the summer but the builders are not sure what is the best materials to use for each job.

1. The school roof needs to be repaired and a tiled roof will be installed. The rock needs to be easily split into thin layers so that it is not too heavy. Also the rock should have a nice even colour.

2. The school wants to put a statue of the best teachers in the school on the roundabout in the car park. This will be made of stone and must be soft enough to carve.

Your Challenge! Write a report for the builders letting them know what they should use for each task.

You need to include:

Company Name.
What type of rock they should use.
Why this rock is suitable for them.
What problems might they have with other rocks.
How much you are going to charge them for your advice.

You have been given some information but can use your books, textbooks and your own knowledge to help.

ROCK ADVISORY REPORT
QIS Building Project 2016

Example Report

Thank you for selecting our company to help you with your rock problems. We are delighted to help your granites and marbles.

School Roof Tiles

We have looked at the evidence and we think the best rock you should use for the school roof is…….. This is because this rock can…….. You should not use an igneous rock because these do not ……..

School Statue

We have looked at the evidence and we think you should use…….. for a statue. …….. has been used for statues for thousands of years and is a very strong material. However you may have some problems with ……..

We hope you follow our advice and your building work is a success. We have used our expert knowledge in making this report and will charge £……. plus expenses.

Sincerely
B. Bam
Pebbles Consulting Company

Limestone is a sedimentary rock composed largely of calcium carbonate ($CaCO_3$).

Many limestones are composed from skeletal fragments of marine organisms such as coral.

The solubility of limestone in water and weak acid solutions leads to landscapes in which water erodes the limestone over thousands to millions of years.

Limestone makes up about 10% of the total volume of all sedimentary rocks.

Limestone has numerous uses: as a building material, as aggregate for the base of roads, as white pigment or filler in products such as toothpaste or paints.

Limestone is readily available and relatively easy to cut into blocks or more elaborate carving. It is also long-lasting and stands up well to exposure. However, it is a very heavy material, making it impractical for tall buildings, and relatively expensive as a building material.

Limestone is reactive to acid solutions, making acid rain a significant problem to the preservation of artifacts made from this stone. Many limestone statues and building surfaces have suffered severe damage due to acid rain.

Marble is a metamorphic rock Geologists use the term "marble" to refer to metamorphosed limestone; however. Marble is commonly used for sculpture and as a building material.

Marble is a rock resulting from metamorphism of sedimentary carbonate rocks, most commonly limestone.

Marble rock is typically composed of an interlocking mosaic of carbonate crystals.

White marble has been valued for its use in sculptures since ancient times. This preference has to do with its softness.

Pakistan is one of the largest marble exporters of the world [10] with exports totaling to around a 100,000 tonnes per year.

Sandstone (sometimes known as arenite) is a clastic sedimentary rock composed mainly of sand-sized minerals or rock grains.

Like sand, sandstone may be any colour, but the most common colours are tan, brown, yellow, red, gray, pink, white and black.

Sandstone is mined by quarrying. It is sometimes found where there used to be small seas. It is usually formed in deserts or dry places like the Sahara Desert in Africa, the Arabian desert in the Middle East and the Australian desert.

Sandstone was a popular building material from ancient times. It is relatively soft, making it easy to carve. It has been widely used around the world in constructing temples, cathedrals, homes, and other buildings. It has also been used for artistic purposes to create ornamental fountains and statues.

Some sandstones are resistant to weathering but most wear away quite quickly if expose to rain or cold temperatures.

Slate is a fine-grained metamorphic rock derived from an original shale-type sedimentary rock composed of clay or volcanic ash.

It is caused by strong compression causing fine grained clay flakes to regrow

When expertly "cut" by hitting with a hammer and chisel in the quarry, many slates will form smooth flat sheets of stone.

Slate is frequently grey in color.

The word "slate" is also used for certain types of object made from slate rock. It may mean a single roofing tile made of slate, or a writing slate.

This was traditionally a small smooth piece of the rock, often framed in wood, used with chalk as a notepad or noticeboard, and especially for recording charges in pubs and inns. The phrases "clean slate" and "blank slate" come from this usage.

Slate is particularly suitable as a roofing material as it has an extremely porosity which makes it resistant to freeze thaw damage.

Because slate was formed in low heat and pressure, compared to a number of other metamorphic rocks, some fossils can be found in slate.

Granite is a granular igneous rock.

Granite is nearly always hard and tough, and therefore it has gained widespread use as a construction stone.

The word "granite" comes from the Latin *granum*, a grain, in reference to the coarse-grained structure of such a crystalline rock.

Granite is a natural source of radiation, like most natural stones. However, some granites have been reported to have higher radioactivity thereby raising some concerns about their safety.

There is some concern that materials sold as granite countertops or as building material may be hazardous to health.

The world's first temple full of granite was built by the Tamil civilization Emperor Rajaraja Chola I for Lord Shiva during 1009 AD in Tanjore, India and the time period for construction was just 5 years(1004 AD - 1009 AD).

Homework
Complete this metamorphic rocks worksheet

Metamorphic rocks

Complete the gaps in these sentences using words from the box below. You may need some words more than once.

All rocks are made up of different _____ . When these minerals are _____ and squashed, they can change into _____ ones. Metamorphic rocks have been _____ within the Earth.

All _____ rocks were originally other types of rock. As more layers of Rocks build up, the older rocks get pushed _____ into the Earth. Earth _____can squeeze the rocks and raise their _____.

Gradually, over a very _____ period of time, the rocks get changed into _____ rocks. One example is the _____ rock limestone, which changes into _____ when it is heated and squashed.

changed **different minerals** **down movements** **heated** **long** **marble** **metamorphic** **sedimentary** **temperature**

This table shows the names of sedimentary rocks, and the names of the metamorphic rocks they turn into. Use words from the box below to complete the table.

Name of original rock	Name of metamorphic rock
	marble

limestone **quartzite** **sandstone** **shale** **slate**

Which words have you learned so far? SPLAT

crystalisation	**sedimentation**	**weathering**	**crystalisation**	**sedimentation**	**weathering**
temperature and pressure	**sedimentary**	**metamorphic**	**temperature and pressure**	**sedimentary**	**metamorphic**
basalt	**granite**	**igneous**	**basalt**	**granite**	**igneous**
mudstone	**slate**	**limestone**	**mudstone**	**slate**	**limestone**
marble	**dolerite**	**pumice**	**marble**	**dolerite**	**pumice**