



Answers

Rocks

Year 8 Science

Chapter 8

p171	<ol style="list-style-type: none">1 Rocks are made up of minerals such as quartz, feldspars, micas, and calcite. Different rocks are made up of different combinations of minerals.2 Igneous, sedimentary, metamorphic.3 Magma is molten rock.4 Cooling slowly produces the largest crystals in igneous rocks.5 Granite, basalt, rhyolite, diorite, and gabbro are igneous rocks.6 Shale, sandstone, limestone, conglomerate, and breccia are sedimentary rocks.7 Slate, marble, schist, gneiss, and quartzite are metamorphic rocks.8 Metamorphic means a change in form.9 Sedimentary rock can change into metamorphic rock through heat and pressure.10 Sediment is material that settles to the bottom of a liquid.11 The sediment could be seen at the bottom of the bottle of wine.12 Igneous rock can change into sedimentary rock through weathering and then cementing and pressure.13 The rock cycle describes the process by which one type of rock, over millions of years, can change to another type of rock.14 Geologists generally decide the age of rocks by knowing the age of the formation of rocks that the rock came from. Some rocks have radioactive isotopes such as uranium and thorium. These isotopes decay at a constant rate. By measuring the amount of isotope in a rock, it is possible to calculate the age of the rock.
p173	<ol style="list-style-type: none">1 Igneous rocks are formed when (magma) molten rock cools.2 Three types of igneous rocks are extrusive, intrusive, and plutonic.3 Granite has large grains of feldspar, quartz, and mica. Granite is a plutonic igneous rock.4 Rhyolite has small grains of feldspar, quartz, and mica. Rhyolite is an extrusive igneous rock.5 Gabbro has large grains of pyroxene, plagioclase, and sometimes olivine. Gabbro is a plutonic igneous rock.6 An igneous rock has a dark colour and fine grains. The key suggests that it is basalt.

<p>p175</p>	<ol style="list-style-type: none"> 1 The constant weathering of the Earth's surface breaks rock down to clay, sand, gravel, and pebbles. These sediments may eventually form sedimentary rock. 2 As sediments are deposited on top of other sediments the weight of the layers compresses and compacts the sediment into sedimentary rock. Sediments may be cemented into sedimentary rock by the cementing property of some minerals such as clay. 3 <ol style="list-style-type: none"> a) Grey colour, with small grains that glint when held at certain angles = Limestone b) Variety of grain sizes from small to large. The larger pebbles tend to be rounded = Conglomerate
<p>p177</p>	<ol style="list-style-type: none"> 1 Metamorphic rocks are rocks that have been 'morphed' into another kind of rock. 2 Sedimentary and igneous rocks that have been subjected to pressure and/or heat and have changed form. 3 A foliated rock shows banding or layers. 4 <ol style="list-style-type: none"> a) Glassy and with small grains = Anthracite b) Consists of thin flat sheets. Fine grains = Slate c) Light grey, not foliated, fizzes when a drop of vinegar is added = Marble
<p>p179</p>	<ol style="list-style-type: none"> 1 Eons covers a larger timescale than eras. 2 The Port Campbell Limestone is estimated to be about 15-20 million years old. This limestone belongs to the cenozoic era. 3 According to the above map, the oldest rocks in Australia are found in southern Western Australia, in South Australia, and a smaller amount in the Northern Australia. 4 According to the above map, Phanerozoic rocks are found in eastern Australia. 5 The map supports the theory that Australia was developed from the west to the east because newer rocks are found progressively from west to east. 6 According to the time scale, the dinosaurs become extinct roughly 65 million years ago.
<p>p181</p>	<ol style="list-style-type: none"> a) Rocks in age from oldest to youngest are D, C, B, A. As surrounding hills and mountains have been weathered, the sediments of different mixes of sand, clay, mud, pebbles, etc., have been compressed into layers of different types of sedimentary rock, the oldest layers are on the bottom. The youngest layers are on the top. b) Rocks in age from oldest to youngest are A&G, B&F, C&E, D. As surrounding hills and mountains have been weathered, the sediments of different mixes of sand, clay, mud, pebbles, etc., have been compressed into layers of different types of sedimentary rock, the oldest layers are on the bottom. The youngest layers are on the top. Before the formation of layer D, the rock has slipped. c) Rocks in age from oldest to youngest are D, C, B, A, E. Sediments from the weathering of surrounding hills and mountains have been deposited. Magma, E, has pushed through and then cooled. D is probably metamorphic due to the heat and pressure. d) Rocks in age from oldest to youngest are A, C, D, E, B. Sediments from the weathering of surrounding hills and mountains have been deposited. Magma, B, has pushed through and then cooled. A is probably metamorphic due to the heat and pressure. e) Rocks in age from oldest to youngest are G, F, E, D, C, A, B Sediments from the weathering of surrounding hills and mountains have been deposited. Magma, A, has pushed through and then cooled. G is probably metamorphic due to the heat and pressure. The rocks have been tilted and then a new layer B has been formed.

p181	f) Sediments from the weathering of surrounding hills and mountains have been deposited. A road has then been cut through the layer.
p184	<ol style="list-style-type: none"> 1 Rocks are made up of minerals such as quartz, feldspars, micas, and calcite. Different rocks are made up of different combinations of minerals. 2 The rock cycle describes the process by which one type of rock, over millions of years, can change to another type of rock. 3 Geologists generally decide the age of rocks by knowing the age of the formation of rocks that the rock came from. Some rocks have radioactive isotopes such as uranium and thorium. These isotopes decay at a constant rate. By measuring the amount of isotope in a rock, it is possible to calculate the age of the rock. 4 Igneous, sedimentary, metamorphic. 5 Magma is molten rock. 6 Igneous rocks are formed when (magma) molten rock cools. 7 Cooling slowly produces the largest crystals in igneous rocks. 8 Three types of igneous rocks are extrusive, intrusive, and plutonic. 9 Examples of igneous rocks are: Basalt, rhyolite, diorite, dolerite, granite, gabbro. 10 Igneous rock (derived from the Latin word ignis meaning fire) is one of the three main rock types, the others being sedimentary and metamorphic. Igneous rock is formed through the cooling and solidification of magma or lava. 11 Granite has large grains of feldspar, quartz, and mica. Granite is a plutonic igneous rock. 12 Rhyolite has small grains of feldspar, quartz, and mica. Rhyolite is an extrusive igneous rock. 13 Gabbro has large grains of pyroxene, plagioclase, and sometimes olivine. Gabbro is a plutonic igneous rock. 14 An igneous rock has a dark colour and fine grains. The key suggests that it is basalt. 15 Granite will tend to weather into a poorer soil when compared to basalt. This is due to the differences in mineralogy. Basalt will have more minerals, that when weathered produce black and red soils that contain more trace elements that plants require. Granite contains minerals such as quartz which weathers into sand and feldspar which weather into clays. Both these granitic weathering products don't generally have many available nutrients to plants, especially sand.
p185	<ol style="list-style-type: none"> 1 The constant weathering of the Earth's surface breaks rock down to clay, sand, gravel, and pebbles. These sediments may eventually form sedimentary rock. 2 As sediments are deposited on top of other sediments the weight of the layers compresses and compacts the sediment into sedimentary rock. Sediments may be cemented into sedimentary rock by the cementing property of some minerals such as clay. 3 Sediment is material that settles to the bottom of a liquid. 4 The sediment could be seen at the bottom of the bottle of wine. 5 Examples of sedimentary rocks are breccia, conglomerate, limestone, sandstone, shale, mudstone. 6 Sandstone consists of grains of sand cemented together. 7 <ol style="list-style-type: none"> a) Fine grains, reasonably soft, easily breaks into thin sheets = shale b) Grey colour, with small grains that glint when held at certain angles = limestone c) Variety of grain sizes from small to large. The larger pebbles tend to be rounded = conglomerate

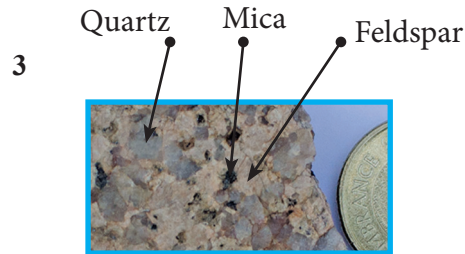
<p>p186</p>	<ol style="list-style-type: none"> 1 Metamorphic rocks are rocks that have been ‘morphed’ into another kind of rock. 2 Sedimentary and igneous rocks that have been subjected to pressure and/or heat and have changed form. 3 A foliated rock shows banding or layers. 4 Metamorphic means a change in form. 5 Sedimentary rock can change into metamorphic rock through heat and pressure. 6 Examples of metamorphic rock are marble, quartzite, anthracite, hornfels, serpentinite, schist, gneiss, phyllite, slate. 7 <ol style="list-style-type: none"> a) Large grains with mixed dark layers and light layers = gneiss b) Glassy and with small grains = Anthracite c) Consists of thin flat sheets. Fine grains = Slate d) Light grey, not foliated, fizzes when a drop of vinegar is added = Marble e) No layers with large light grains = quartzite
<p>p187</p>	<ol style="list-style-type: none"> 1 Let m = mass of container, let w = full mass of water $m + w = 620$ $m + 0.5w = 340$ <p>Subtracting the two equations gives: $0.5w = 280$</p> $w = 280 \div 0.5$ $w = 560$ <p>The full mass of water is 560 kg</p> <p>The mass of the container = $620 - 560 = 60$ kg</p> 2 The two dotted lines are at 90° to each other. 3 Top faces = 4, bottom faces = 1 Front faces = 2, back faces = 2 Left faces = 4, right faces = 3 Total number of faces = 16
<p>p188</p>	<ol style="list-style-type: none"> 1 Eons covers a larger timescale than eras. 2 The Port Campbell Limestone is estimated to be about 15-20 million years old. This limestone belongs to the cenozoic era. 3 Western Australia. 4 Central Australia. 5 The map supports the theory that Australia was developed from the west to the east because newer rocks are found progressively from west to east. 6 <ol style="list-style-type: none"> a) Rocks in age from oldest to youngest are A, B, C. b) Rocks in age from oldest to youngest are A, C, D, E, B. 7 <ol style="list-style-type: none"> a) As surrounding hills and mountains have been weathered, the sediments of different mixes of sand, clay, mud, pebbles, etc., have been compressed into layers of different types of sedimentary rock, the oldest layers are on the bottom. The youngest layers are on the top. b) Sediments from the weathering of surrounding hills and mountains have been deposited. Magma, B, has pushed through and then cooled. A is probably metamorphic due to the heat and pressure.

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1 c) 2 a) 3 a) igneous b) sedimentary

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- 1 a) Sedimentary rock can become igneous rock through melting and then cooling.
 b) Metamorphic rock can become sedimentary rock through weathering and erosion and then formed through weight and cementing.
- 2 a) Marble is expected to be found in areas of foliated limestone because it suggests that pressure has caused the foliation and that nearby further pressure will have produced marble.
 b) Marble harder than limestone because marble has sustained considerable pressure to compress the marble.



- 4 a) The youngest rock is in E.
 b) The oldest rock is in layer A
 c) The layers D, C, and B are each different types of sedimentary rock because they have been deposited by weathering of nearby hills and mountains.

5 a)

Mass of carbon-14	Years
1	0
0.5	5,700
0.25	11,400
0.125	17,100
0.0625	22,800
0.03125	28,500
0.015625	34,200

- b) If 10 grams of carbon-14 starts to decay, approximately how many years will it take to decay to 0.5 grams?

Mass of carbon-14	Years
10	0
5	5,700
2.5	11,400
1.25	17,100
0.625	22,800
0.3125	28,500
0.015625	34,200

It will take roughly 25,000 years for 10 grams of carbon-14 to decay to 0.5 grams.

- c) Make a similar table for Potassium-40 which has a half-life of 1.3 billion years (1,300,000 years).

Mass of potassium-40	Years
1	0
0.5	1,300,000,000
0.25	2,600,000,000
0.125	3,900,000,000
0.0625	5,200,000,000
0.03125	6,500,000,000
0.015625	7,800,000,000