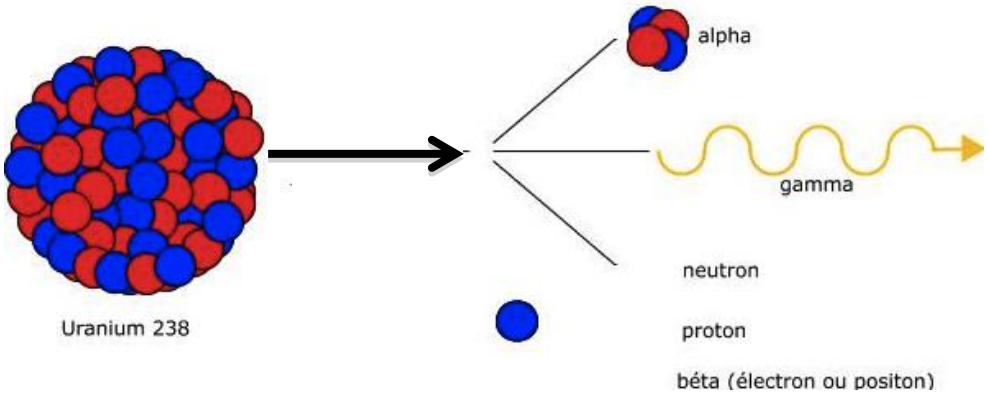
Rock Age Data - Teacher Notes

Evidence for seafloor spreading

Part of the magnetic history of Earth is recorded in the basalts on either side of mid-ocean ridges. We can observe basalt flowing out from trenches at the centre of mid-ocean ridges. We can also estimate the ages of rocks using data from natural radioactive decay.



Earths crust is made of a silica rich continental crust layer that overlies denser iron and magnesium rich oceanic crust. Samples of deep ocean floor rocks show it becomes young towards mid-oceanic ridges. Oceanic floor is generally younger than continental crust. Continental crust can be up to 3.8 billion years old whilst the older sampled oceanic crust is only 350 million years old

Materials per student

- Sharp pencil (not HB) and eraser
- Ruler
- Calculator should not be necessary

When a rock solidifies its radioactive minerals start to decay. Radioactive minerals lose their radioactivity at a known rate. The time it takes to lose half their radioactivity is called their half-life. The mineral in this example is purely imaginary.
Plot the decay curve for radioactive mineral X on the graph paper provided below. Mineral X has a half-life of 100 years. Every 100 years its remaining radioactivity will be halved.
If its initial radioactivity is 80 units what will its radioactivity be in 600 years?

Calculations of radioactivity remaining

Time (years)	**Remaining radioactivity** (units)
0	80
100	40
200	20
300	10
400	5
500	2.5
600	1.25

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Plot this radioactive data on your graph paper Graph paper provided on student worksheet.

HINT A graph needs: A title Change in radioactivity over time

1. The correct style of graph chosen. (Line or bar graph?) Line graph because it demonstrates how one piece of data (radioactivity) changes over another (time).
2. Its X and Y axes labeled including the correct units. X (horizontal) axis should be time in hundreds of years and the Y (vertical) axis radioactivity in units
3. Data points plotted in pencil Not HB
4. Data points joined to draw the graph Curved line
5. The graph should almost fill your sheet of paper

If the basalt has 15 units of radioactivity, how long ago was it erupted? 250 years ago

How many units of radiation would a basalt erupted 350 years ago have? 7.5 units

Can we estimate how much radiation a basalt erupted 1,000 years ago might have using this data? Explain your answer No we cannot extrapolate from the given data.

Can we use this method to age sedimentary rock formed under the ocean? No because sedimentary rock is formed from clasts (broken bits) of other rocks that have been weathered, eroded and deposited on the ocean floor. Any date given from individual clasts will represent the age of the original rock it broke away from.

How could the age of basalts flowing from mid oceanic ridges be used to demonstrate ocean floor spreading? If the floor of the ocean is spreading on either side of the ridge, the newest rocks will be close to the ridge and rocks will become progressively older the further away you get on either side of the ridge.

The present is the key to the past (James Hutton)

Pillow lava from Lake Ballard north of Menzies WA

This pillow basalt was erupted from the seafloor of what is now the Eucla Basin. We know it was erupted under water because of its classic shape. Volcanic material erupted under sea at present takes on a hard chilled margin as it comes in contact with cold water. Pressure inside builds up as more molten material is added and it bulges and rolls outward to take on the classic pillow shape.