

Inside the Earth

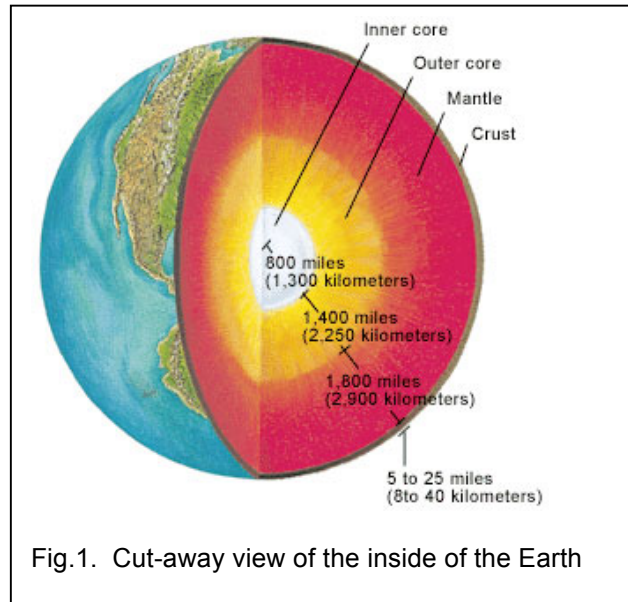
Name: _____

Scientists infer that the Earth formed about 5 billion years ago, and that it is still cooling down. It is a bit like a hot, baked potato: the outside cooled first, but the inside is still very hot.

Scientists have never traveled to the centre of the Earth. They have observed molten rock from volcanoes. They have drilled holes to get rock samples from inside the Earth. So far the deepest they have drilled is about 10 kilometres. They have also observed what happens when earthquake waves travel through the Earth. From these observations they have made *inferences* about what is inside the Earth.

The evidence suggests that the Earth is not the same all the way through, and that there are layers, a bit like the inside of an egg. Scientists think that there are four layers – the inner and outer core, the mantle, and the crust. Study the table below, and Fig. 1.

The deeper you go into the Earth, the hotter it becomes. That is why the outer core is molten. You would also expect the inner core to be molten. However, scientists think that the inner core is solid, because of the enormous pressure from the rocks above it.



Layers of the Earth	Thickness (km)	Density (g/cm ³)	Temperature (°C)	Description
Crust	8 – 40	2.9	20 – 500	Thickness varies (thickest under the continents)
Mantle	2900	3.6	500 – 2000	Partly solid, partly liquid, like a thick paste – very hot and always moving
Outer core	2250	6.0	3000	Molten iron and nickel
Inner core	1300 (radius)	9.5	4000	Solid iron and nickel

1. Which of the following are true, and which are false?
 - (a) Scientists have observed the Earth's core.
 - (b) Every layer of the Earth is the same thickness.
 - (c) The crust has the least dense rocks.
 - (d) The mantle contains soil.
 - (e) We live on the crust.
 - (f) Pressure is greatest in the inner core.
 - (g) The crust is the hottest layer of the Earth.

2. Why would it be impossible to send someone to explore the Earth's mantle and core?

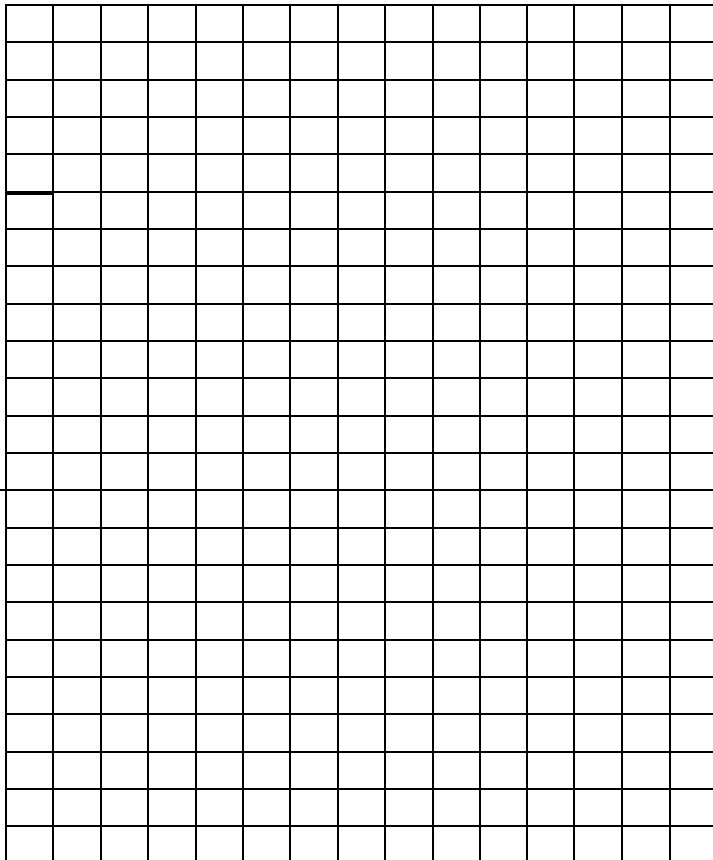
3. The inner core is hotter than the outer core, yet it is solid, and the outer core is molten. Why is this?

4. The table below shows the temperature at different depths in a drill hole. Plot the data from the graph on the table below, and draw a line of best fit for the data.

(a) Use your graph to work out how many degrees the temperature rises for each kilometre below the earth's surface (this is the slope of your line).

(b) Predict the temperature at the following depths:

- (i) 1.5 km
- (ii) 5.8 km
- (iii) 8 km
- (iv) 14 km



Depth (km)	Temperature (°C)
0	20
1	51
2	82
3	112
4	142
5	171
6	201
7	230