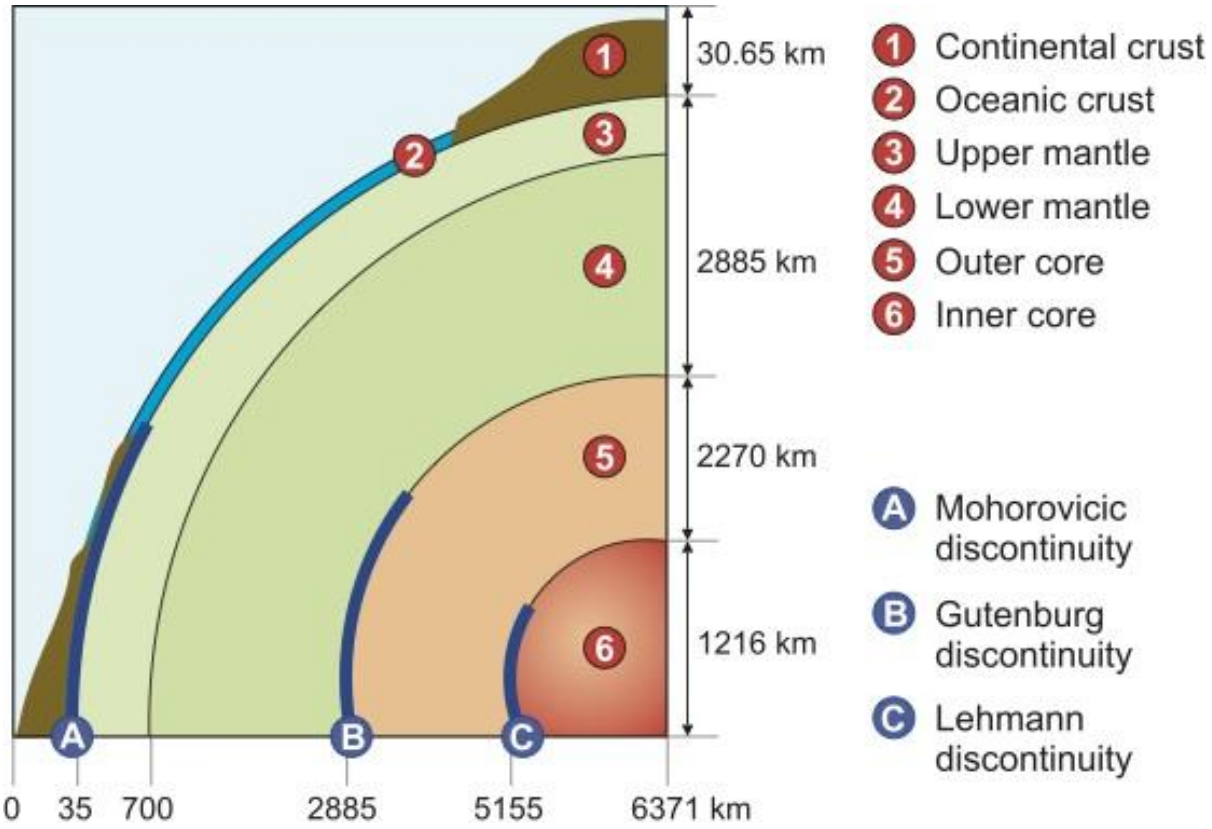
GIC & Rock Density - Student Activities

After the first three billion years, it is thought that Earth had differentiated into a nickel-iron core, a mantle and a silicate rich crust by density sorting, whilst it was mostly molten. The process is called planetary differentiation or "The Great Iron Catastrophe".



Schematic view of the Earth's interior (Tompkins, 2010)

The crust itself consists of two layers

1. Continental crust that has a low density and is mostly made of sedimentary rocks such as sandstone and silica rich (felsic) igneous rocks such as granite.
2. Oceanic crust which is denser and made of silica poor mafic igneous rocks such as basalt.

Continental crust forms continents and their surrounding continental shelves. Continents "float" on underlying oceanic crust in the same way a block of wood floats on water. We can easily gain access to primary data on continental crust because it lies under our feet however we have to depend on volcanoes to bring up pieces of denser, darker oceanic crust.

Rock density - Secondary data sheet

Location	Density (g/cm^3)
Average for Earth	5.45
Continental crust	2.7 – 3.0
Oceanic crust	3.0 – 3.3
Upper mantle	3.3 – 5.7 increasing with depth
Outer core	9.9 – 12.2
Inner core	12.6 – 13.0

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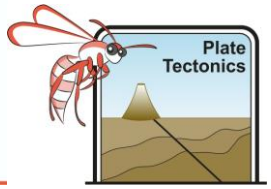

Your teacher will provide you with several rocks.

AIM **To measure and compare the density of rocks from oceanic crust and continental crust**

Method

1. Order the equipment necessary to estimate the mass, volume and therefore density of each rock. An order sheet is attached.
   (Ensure that this equipment will give readings to two decimal places)
2. Measure the mass and volume of each rock
3. Enter the figures in the data sheet provided.
4. Calculate the density of each rock ***(Mass ÷ Volume = Density)***
5. Remember to enter the correct units for mass, volume and density

Rock	Mass ( )	Volume ( )	Density
1			
2			
3			
4			
5			
6			

Is this primary data or secondary data? _____

Using this data and the secondary data sheet provided assign a reasonable location for the origin of each rock within the planet Earth.

Western Australian rock information

Rock Name	Possible source in Western Australia	Density g/cm^3	Origin in planet
Basalt	Bunbury beach	2.90	
Coal	Collie Mingenew	1.25	
Diorite	Mt Bruce	2.95	
Dolomitic limestone	Hamersley Gorge	2.80	
Gabbro	Windimurra	3.15	
Gold	Kalgoorlie	19.32	
Lead ore (galena)	Northampton	6.23	
Gneiss	Dunsborough	2.82	
Granite	Yilgarn	2.75	
Limestone	Coastal WA	2.32	
Marble		2.50	

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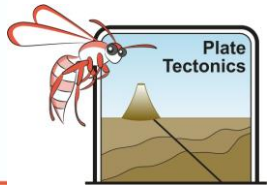

Mica schist	Bindoon	2.90	
Nickel sulphides	Kambalda	8.13	
Peridotite	Argyle	3.40	
Quartzite	Jigalong	2.75	
Rhyolite	Newman	2.55	
Sandstone	Broome	2.55	
Shale	Canning basin	2.45	
Slate	Whim Creek	2.70	

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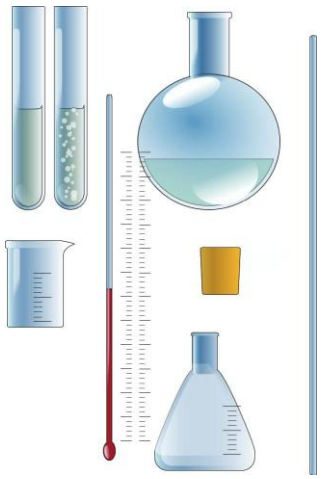
Laboratory equipment Order sheet

Group names _____

_____

_____

_____



Room Number _____

Teacher _____

Date required _____

Materials requested

Please give name of equipment and size

Date requested _____