# Title Information

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# Data and Observations / Calculations

## Time Periods with Calculations

|  |  |  |  |
| --- | --- | --- | --- |
| Question | Scenario | Calculation | Answer |
| A | If Era (1) occurred 4.6 billion years ago from today, how long ago did Era (9) end? | Era 1 to Today = 4.6 billion years  Era 1 to End of Era 9 = 3+10+50+51+80+90+100+200 = 584 million  4.6 billion – 584 million = 4.016 billion | 4.016 billion years ago, Era 9 ended. |
| B | If Era (1) occurred 4.6 billion years ago from today, how long ago did Era (8) end? | Era 1 to Today = 4.6 billion years  Era 1 to End of Era 8 = 3+10+50+51+80+90+100 = 384 million years  4.6 billion – 384 million = 4.216 billion | 4.216 billion years ago, Era 10 ended. |
| C | About how many years ago did some of the earliest life on Earth form? | Era 1 to Today = 4.6 billion years  Era 1 to end of Earliest Life (Era 10) = 584 + 1500 = 2084 million  4.6 billion – 2084 million = 2.516 billion | 2.516 billion years ago, the earliest life of Earth formed. |
| D | About how many years did it take after Era (8) for there to be oceans on Earth? | Era 8 ended  Oceans Occur in Era 9 which has duration = 200 million years | 200 million years between Era 8 and Oceans on Earth. |
| E | How many years were there between the beginning of Era (5) and the end of Era (8)? | Era 5 + Era 6 + Era 7 +Era 8 = 51+80+90+100 = 321 million years | 321 million years were between the beginning of Era 5 and the end of Era 8. |
| F | If 81 objects around the size of our Moon collided in order to form Earth during the time period in (Era 9), roughly how many years went by between these impact events (if they were evenly spaced out). | Era 9 duration = 200 million years  200 million / 81 = 2469135.9 (approx. 2.4 million) | 2469134 years (rounded up) roughly went by between these impact events (if they were evenly spaced out). |

**\*\*\* These are new calculations based on the update that the time column represented the duration of the Era. In the first lab submit, I assumed the time column represented the year the Era ended. \*\*\*\***

## Forming the Planets

### Data Table

| Rock Sample Name | Mass [g] (from a digital scale) | Volume [cm3] | Density [g/cm3] | Layer came from | Order from Differentiation |
| --- | --- | --- | --- | --- | --- |
| Halite | 16.4 | 5.0 | 3.28 | Crust | 2 |
| Pyrite | 6.2 | 2.0 | 3.1 | Crust | 1 |
| Hematite | 16.3 | 4.0 | 4.075 | Mantle | 4 |
| Corundum | 28.4 | 8.0 | 3.55 | Mantle | 3 |

Note Densities from Figure 1 Physical Science Department:

Crust: 2.7 – 3.3, Mantle: 3.3 – 5.7, Outer Liquid Core: 9.9 – 12.2, Inner Solid Core: 12.6 – 13.0

### Density Calculations

Units: g / cm3

**Halite:**

3.28

**Pyrite:**

**Hematite:**

**Corundum:**

# Lab Questions

## Part 2B: Volume Calculation Response

If I was out in the field or in a laboratory, I would go about measuring the volume of each rock with a few steps. First, I would estimate the density of the rock based on which layer of Earth it comes from or given the type of rock it was. Then, I would measure its mass using a scale. I would manipulate the density formula to get: volume = mass / density. I would use the derived number to calculate volume. Another method to calculate the volume of a rock is to submerge it in a finite bucket of water to see the displacement it creates. This displacement of water in mL can be easily converted into cm3 where 1 mL of water = 1 cm3 (*UCSB Science Lane).*

## Part 2E

Differentiation is the separation of martials according to density (Differentiation, 2017). Materials with lower densities rise while materials with higher densities sink (Differentiation, 2017). Based on my data, I believe that the materials of my rocks rose as the Earth was forming – given their smaller densities. They differentiated based on their relative densities in the data table – 1 being the topmost layer. On the Earth, you will find heavier material deeper in the ground on the surface level. Based on the composition of Earth, heavier material is found in the solid core and liquid outer core (Differentiation, 2017) Material that is lighter would be found in outer layers of the Earth such as the mantle and crust (Differentiation, 2017).

# Conclusions

2F – Article Summary

I chose to research how scientists are using technology to improve our knowledge about the layers of a comet. Beginning the mission in 2014, the spacecraft Rosetta became the first to orbit a comet. What makes Rosetta so special is that from it was launched the Philae lander that was successfully able to “transmit data about the comet’s composition” (Philae, 2019). Prior to this landing, scientist has some preconceived notions on the composition of comets. It was believed that comets could be “soft as a result of low gravity” (Philae, 2019). But it was after this landing – well, more so bumpy landing – that comets were far more solid and that this particular comet “held a large amount of water and granular material in a layer 24 cm deep” (Philae, 2019). Over time, this lander has helped make some fascination hypothesizes as to how Earth was created. For example, the components found on the comment such as simple amino acids, water, and carbon dioxide “suggest that comets could have helped bring about life on Earth by seeding our planet with the necessary materials” (Philae, 2019).

Word Count: 184

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