name_____ per_____

The Chemical Composition of the Earth

Read the following page and follow the instructions

As Earth cooled in its early history, heavier elements settled toward the core and the lighter elements rose toward the surface. The mass of the Earth is approximately 5.98×10^{24} kg. It is composed mostly of iron (32.1%), oxygen (30.1%), silicon (15.1%), magnesium (13.9%), sulfur (2.9%), nickel (1.8%), calcium (1.5%), and aluminium (1.4%); with the remaining 1.2% consisting of trace amounts of other elements. The core region is believed to be primarily composed of iron (88.8%), with smaller amounts of nickel (5.8%), sulfur (4.5%), and less than 1% other elements.

Activity 1 *- Find the underlined elements on the periodic table. Highlight or draw a dark line around all of these elements. Write the percentage of each in the element box.*

Crust

Earth's crust is made up of several elements: 47% oxygen; 28% silicon; 8% aluminum; 5% iron; 3.6% calcium; 2.8% sodium; 2% magnesium.

The crust is divided into huge plates that float on the mantle, the next layer. The plates are constantly in motion; they move at about the same rate as fingernails grow. Earthquakes occur when these plates grind against each other. Mountains form when the plates collide and deep trenches form when one plate slides under another plate. Plate tectonics is the theory explaining the motion of these plates.

Mantle

silicate = silicon + oxygen

The mantle under the crust is about 1,800 miles deep (2,890 km). It is composed mostly of silicate rocks rich in magnesium and iron. Intense heat causes the rocks to rise. They then cool and sink back down to the core. This convection — like a lava lamp — is believed to be what causes the tectonic plates to move. When the mantle pushes through the crust, volcanoes erupt.

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Core

alloy = mixture of at least one metal with something else. The resulting alloy usually has different properties than the base ingredients. Some examples are bronze and steel.

At the center of the Earth is the core, which has two parts. The solid, inner core of iron has a radius of about 760 miles (about 1,220 km). It is surrounded by a liquid, outer core composed of a nickel-iron alloy. It is about 1,355 miles (2,180 km) thick. The inner core spins at a different speed than the rest of the planet. This is thought to cause Earth's magnetic field. When charged particles from the solar wind collide with air molecules above Earth's magnetic poles, it causes the air molecules to glow, causing the auroras — the northern and southern lights.

Questions to think about

1. Describe two things you already know about the periodic table or something on the periodic table.

2. What information from the table do you think you would use to determine which of the elements are heavier or lighter (density)?

3. Which elements in the layers are the heavier ones? Which are the lighter ones?

4. Are the heavier elements in the core or in the crust? Why do you think this is the case?

5. The oceanic plates are more iron-rich, while the continental plates are more silicate-rich. How would this make the two types of plates different?