8th Grade Science Packet

4th Quarter

Dear Student,

Here is your 4th quarter packet for 8th grade science. The packet is broken down into five different weeks or sections. There are three sections on earth science and two sections on calories.

Week 1: EARTH SCIENCE- Plate tectonic questions
Week 2: EARTH SCIENCE- Vocab Packet
Week 3: EARTH SCIENCE- Fossils in Time Activity
Week 4: FOOD MOLECULES AND CALORIES
Week 5: CALORIE COUNTING (Do your best with this)

If it is possible you should check out my google classroom (optional) for extra information on these concepts. As always email me with questions.

Take care,

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<u>Earth Science Background Information</u>

<u>Article #1</u>

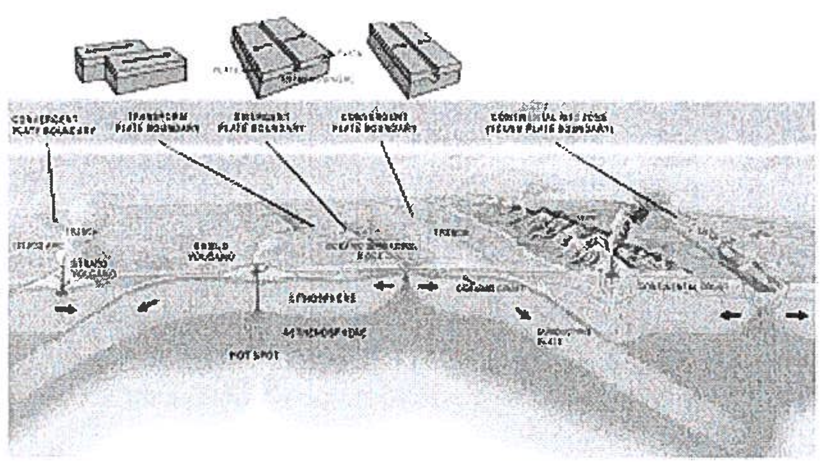
For billions of years, Earth has been remodeling itself. Huge masses of molten rock rise from deep inside Earth, cool into a solid, travel along our planet's surface and then sink back down. The process is known as plate tectonics.

The term *tectonics* comes from a Greek word meaning "to build." Tectonic plates are huge moving slabs that together make up Earth's outer layer. Some span thousands of kilometers (miles) on a side. In all, a dozen major plates cover Earth's surface.

You might think of them as the cracked eggshell jacketing a hard-boiled egg. Like an eggshell, plates are relatively thin — on average only about 80 kilometers (50 miles) thick. But unlike an egg's cracked shell, tectonic plates travel. They migrate atop Earth's mantle. Think of the mantle as the thick white part of a hard-boiled egg.

Earth's hot, liquid innards also are always in motion. That's because warmer materials are generally less dense than cooler ones, notes geologist Mark Behn. He's at the Woods Hole Oceanographic Institution in Massachusetts. So, hot stuff in Earth's middle "rises up — kind of like a lava lamp," he explains. "Once it gets back to the surface and cools off again, then it will sink back down."

The rising of hot rock from the mantle to Earth's surface is called upwelling. This process adds new material to tectonic plates. Over time, the cooling outer crust becomes thicker and heavier. After millions of years, the oldest, coolest parts of the plate sink back into the mantle, where they remelt again.
"It's like a giant conveyor belt," explains geophysicist Kerry Key at the Scripps Institution



Where tectonic plates meet, they can be pulling away from each other, pushing towards one another or sliding past each other. These motions create mountains, earthquakes and volcanoes.

of Oceanography. It's at the University of California, San Diego. That conveyer belt drives the movement of the plates. The plates' average speed is about 2.5 centimeters (roughly an inch) or so per year — about as fast as your fingernails grow. Over millions of years, though, those centimeters add up.

So over eons, Earth's surface has changed a lot. For instance, roughly 250 million years ago, Earth had one giant landmass: Pangaea. Plate movement split Pangaea into two huge continents, called Laurasia and Gondwanaland. As Earth's plates kept moving, those landmasses each broke apart more. As they spread and traveled, they evolved into our modern continents.

Although some people mistakenly talk about "continental drift," it's the plates that move. Continents are just the tops of plates that rise above the ocean.

Moving plates can trigger huge impacts. "All the action is mostly at the edges," notes Anne Egger. She's a geologist at Central Washington University in Ellensburg.

Colliding plates can crush against each other. Abutting edges rise as mountains. Volcanoes can form when one plate slides beneath another. Upwelling also can create volcanoes. Plates sometimes slide past each other at places known as faults. Usually these motions happen slowly. But large movements can trigger earthquakes. And, of course, volcanoes and earthquakes can cause massive destruction.

The more scientists learn about plate tectonics, the better they can understand these phenomena. If scientists could warn people when these events were coming, they also might help limit damage.

continent (in geology) The huge land masses that sit upon tectonic plates. In modern times, there are six geologic continents: North America, South America, Eurasia, Africa, Australia and Antarctic.

earthquake A sudden and sometimes violent shaking of the ground, sometimes causing great destruction, as a result of movements within Earth's crust or of volcanic action.

fault In geology, a fracture along which there is movement of part of Earth's rocky, outermost shell, or lithosphere.

geology The study of Earth's physical structure and substance, its history and the processes that act on it. People who work in this field are known as geologists. Planetary geology is the science of studying the same things about other planets.

geophysics The study of matter and energy on Earth and how they interact.

Pangaea The supercontinent that existed from about 300 to 200 million years ago and was composed of all of the major continents seen today, squished together.

plate tectonics The study of massive moving pieces that make up Earth's outer layer, which is called the lithosphere, and the processes that cause those rock masses to rise from inside Earth, travel along its surface, and sink back down.

subduct or **subduction** The process by which tectonic plates sink or slide back from Earth's outer layer into its middle layer, called the mantle.

subduction zone A large fault where one tectonic plate sinks beneath another as they collide. Subduction zones usually have a deep trench along the top.

tectonic plates The gigantic slabs — some spanning thousands of kilometers (or miles) across — that make up Earth's outer layer.

upwelling The process by which material rises from Earth's middle layer into its outer layer, where it will become part of the tectonic plates.

volcano A place on Earth's crust that opens, allowing magma and gases to spew out from underground reservoirs of molten material. The magma rises through a system of pipes or channels, sometimes spending time in chambers where it bubbles with gas and undergoes chemical transformations. This plumbing system can become more complex over time. This can result in a change, over time, to the chemical composition of the lava as well. The surface around a volcano's opening can grow into a mound or cone shape as successive eruptions send more lava onto the surface, where it cools into hard rock.

Article #2

Continental drift describes one of the earliest ways geologists thought continents moved over time. Today, the theory of continental drift has been replaced by the science of plate tectonics.

The theory of continental drift is most associated with the scientist Alfred Wegener. In the early 20th century, Wegener published a paper explaining his theory that the continental landmasses were “drifting” across the Earth, sometimes plowing through oceans and into each other. He called this movement continental drift.

Pangaea

Wegener was convinced that all of Earth’s continents were once part of an enormous, single landmass called Pangaea.

Wegener, trained as an astronomer, used biology, botany, and geology describe Pangaea and continental drift. For example, fossils of the ancient reptile mesosaurus are only found in southern Africa and South America. Mesosaurus, a freshwater reptile only one meter (3.3 feet) long, could not have swum the Atlantic Ocean. The presence of mesosaurus suggests a single habitat with many lakes and rivers.

Wegener also studied plant fossils from the frigid Arctic archipelago of Svalbard, Norway. These plants were not the hardy specimens adapted to survive in the Arctic climate. These fossils were of tropical plants, which are adapted to a much warmer, more humid environment. The presence of these fossils suggests Svalbard once had a tropical climate.

Finally, Wegener studied the stratigraphy of different rocks and mountain ranges. The east coast of South America and the west coast of Africa seem to fit together like pieces of a jigsaw puzzle, and Wegener discovered their rock layers “fit” just as clearly. South America and Africa were not the only continents with similar geology. Wegener discovered that the Appalachian Mountains of the eastern United States, for instance, were geologically related to the Caledonian Mountains of Scotland.

Pangaea existed about 240 million years ago. By about 200 million years ago, this supercontinent began breaking up. Over millions of years, Pangaea separated into pieces that moved away from one another. These pieces slowly assumed their positions as the continent we recognize today.

Today, scientists think that several supercontinents like Pangaea have formed and broken up over the course of the Earth's lifespan. These include Pannotia, which formed about 600 million years ago, and Rodinia, which existed more than a billion years ago.

Tectonic Activity

Scientists did not accept Wegener's theory of continental drift. One of the elements lacking in the theory was the mechanism for how it works—why did the continents drift and what patterns did they follow? Wegener suggested that perhaps the rotation of the Earth caused the continents to shift towards and apart from each other. (It doesn't.)

Today, we know that the continents rest on massive slabs of rock called tectonic plates. The plates are always moving and interacting in a process called plate tectonics.

The continents are still moving today. Some of the most dynamic sites of tectonic activity are seafloor spreading zones and giant rift valleys.

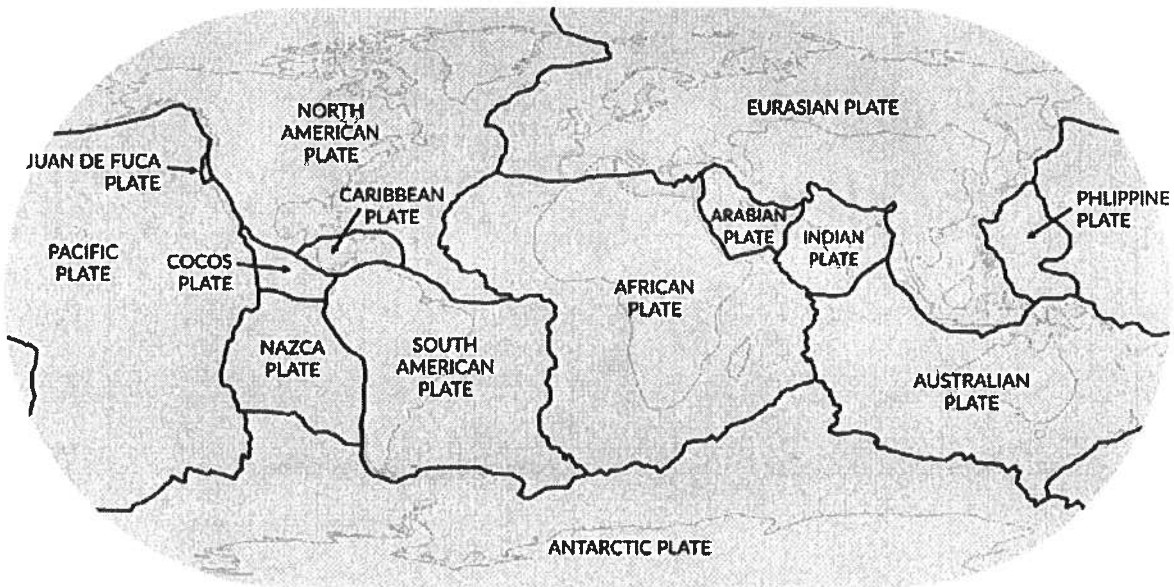
In the process of seafloor spreading, molten rock rises from within the Earth and adds new seafloor (oceanic crust) to the edges of the old. Seafloor spreading is most dynamic along giant underwater mountain ranges known as mid-ocean ridges. As the seafloor grows wider, the continents on opposite sides of the ridge move away from each other. The North American and Eurasian tectonic plates, for example, are separated by the Mid-Atlantic Ridge. The two continents are moving away from each other at the rate of about 2.5 centimeters (1 inch) per year.

Rift valleys are sites where a continental landmass is ripping itself apart. Africa, for example, will eventually split along the Great Rift Valley system. What is now a single continent will emerge as two—one on the African plate and the other on the smaller Somali plate. The new Somali continent will be mostly oceanic, with the Horn of Africa and Madagascar its largest landmasses.

The processes of seafloor spreading, rift valley formation, and subduction (where heavier tectonic plates sink beneath lighter ones) were not well-established until the 1960s. These processes were the main geologic forces behind what Wegener recognized as continental drift

Week 1

1) On the picture below draw where you think volcanoes are located and earthquakes occur.



2) What was the supercontinent called that contained all of our continents together?

3) What force could possibly cause the continents to move apart from one another?

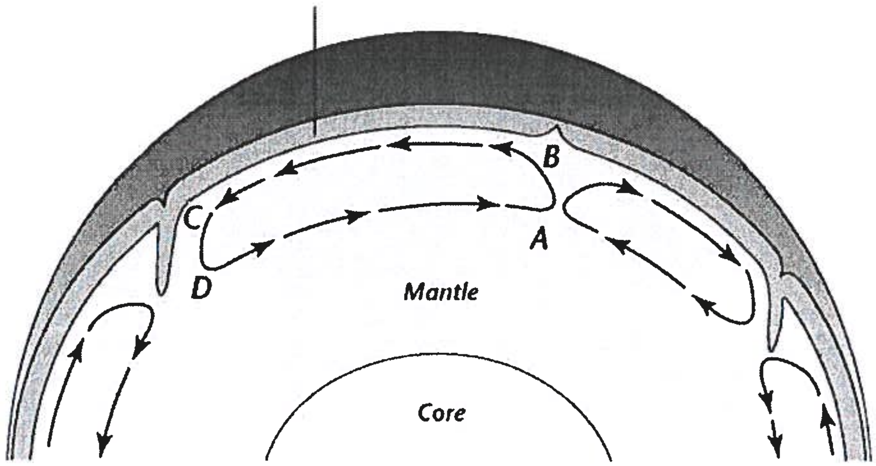
4) When pressure has built between two tectonic plates and then they slip past each other, what happens?
   a) A mountain forms
   b) A volcano erupts
   c) An earthquake happens
   d) A trench forms

5) What is the relationship between a continent and Earth's plates?
   a) The continent is part of a plate
   b) The continent is next to but not part of a plate
   c) The continent is on top of a layer of water that is above a plate
   d) The continent is directly on top of a plate but is not a part of the plate.

What's Happening During Convection?

The figure below shows a convection cell in Earth's mantle. A **convection cell** is one complete loop of a convection current. Use the figure to answer the questions that follow.

Answer the following questions.



1. Where does the heat come from that drives this convection current in the mantle?

2. Where is the temperature of the mantle material greater, at point A or point B? Explain why.

3. Where is the density of the material greater, at point B or point C? Explain why.

4. What causes the convection cell to turn to the left at point B?

5. What happens to the temperature and density of the material between points B and C?

6. What force causes the convection cell to turn down at point C?

7. What happens to the temperature and density of the material between points D and A?

8. What causes the convection cell to turn up at point A?

9. How do you think this convection cell might affect the crust material above it?

Week 2

Make quality drawings and create definitions for each word. Use the articles provided.

Plate tectonics	Continental drift
Volcanoes	Earthquakes
Earth's crust	Oceanic plate/rock
Lava	Convection

Continental plate/rock	Fault Line
Magma	Mountain
Fossil Evidence for Pangaea	Pangaea
Mantle	Continents

WEEK 3

Name ______________________________ Date ___________________ Period _____ Score out of 25_____

Corrected by ________________________________

Fossils in Time Activity

Movements of Earth's continental and oceanic plates through time, with associated changes in climate and geographic connections, have affected the past and present distribution of organisms.

Fossils provide evidence of how life and environmental conditions have changed.

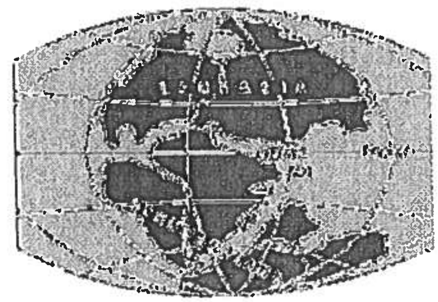
In early 1915, the German scientist Alfred Wegener theorized all of the continents had been part of one large land mass about 225 million years ago. This super-continent was called Pangaea, a Greek word that means "all earth." It broke up over time, and the pieces have been drifting apart ever since.

A few years after Wegener proposed his theory, South African geologist, Alexander Du Toit, further theorized that Pangaea divided into two supercontinents. Du Toit called the northern supercontinent, Laurasia, and the southern one called Gondwanaland.

In this investigation you will use several fossils to try to reconstruct how Earth's landmasses may have appeared approximately 225 million years ago.

Fossils are the remains or evidence of living organisms. They come in different forms, including casts, molds, imprints, amber, and ice of both plants and animals. Scientists use fossils as a tool to understand how the continents appeared millions of years ago.

PERMIAN
225 million years ago

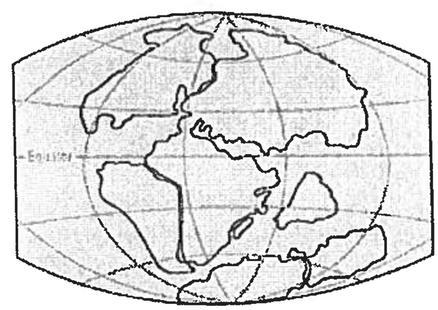


TRIASSIC
200 million years ago

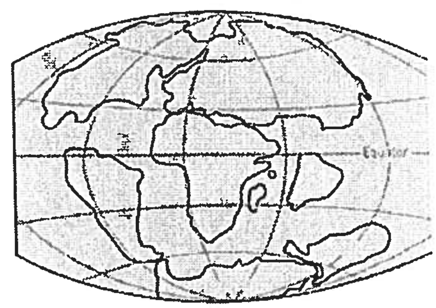
Materials

- Fossil map
- Scissors
- Glue stick
- Title Page

☐ Cut out the continents and color the patterned areas with colored pencils.



JURASSIC
135 million years ago

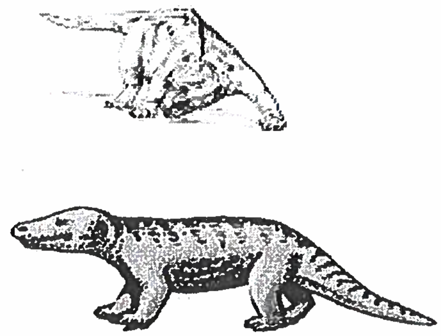
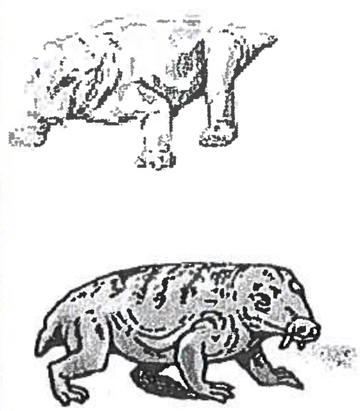
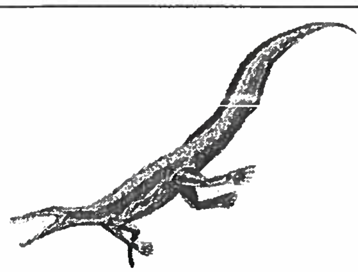


CRETACEOUS
65 million years ago

☐ Assemble the continents and land masses (Africa, India, Australia, Antarctica, South America, and Madagascar) together on the title page. The patterned areas (fossil plant and animal occurrences) along with the shape of each landmass will provide clues to how the continents fit together.

☐ Glue and label each continent.
Note: Central American did not exist 240 million years ago.
India was once attached to Africa and Antarctica.

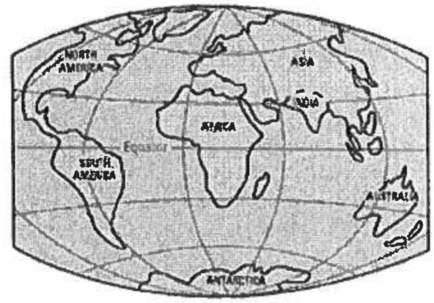
Table 1 Fossils and Where Found

	Description	Locations found
 Cynognathus	• A mammal-like reptile, not a dinosaur the size of a wolf • Lived on open plains • Probably warm-blooded • May have given birth to live young	South America (Argentina), southern Africa (near Cape Town)
 Glossopteris	• Deciduous (loses leaves in the cool season) • Seed fern • Leaves tongue shaped • About 12 ft (3.6 m) tall	southern tip of India Antarctica (Prince herald Coast and Oates Coast) Southeastern Australia (near Melbourne),
 Lystrosaurus	• Reptile (not a dinosaur) • No teeth – two tusk-like fangs made of horn • Plant-eater • 3 feet (1 m) long • Lived in herds near lakes and swamps.	Antarctica (Wilhelm II Coast) Madagascar Africa (Eastern Tanzania) Central India
 Mesosaurus 	• Fresh-water dwelling reptile (not a dinosaur) • Carnivore - probably ate fish and shrimp • Elongated head and snout with nostrils near its eyes • Flattened tail used for swimming • 1.5 feet (45 cm) long. was one of the first aquatic reptiles.	southern South America (Eastern Brazil) West Africa (Cameroon)

Name ________________________________ Date _______________________ Period ________

Stop and think

For each plant or animal, explain if it would have been possible for them to have crossed the ocean if the continents were in their present day configuration.



PRESENT DAY

1. Cynognathus ____
____
____
____

2. Glossopteris ____
____
____

3. Lystrosaurus ____
____
____

4. Mesosaurus ____
____
____

5. Which of the fossils were found in Antarctica?
____

6. Finding reptile-like fossils in Antarctica seems strange or unexpected. Why?
____
____

7. Glossopteris is an extinct type of plant referred to as a seed fern. These plants most likely thrived in warm tropical climates. Do any of the locations where the fossils of the glossopteris have been found seem strange? Explain your answer.
____
____

8. How did the fossils of Cynognathus help you construct your map?
____
____

9. Where on your new map is Australia? What continents is it connected to? Which fossils did you use to help place Australia? How were they useful?
____
____
____

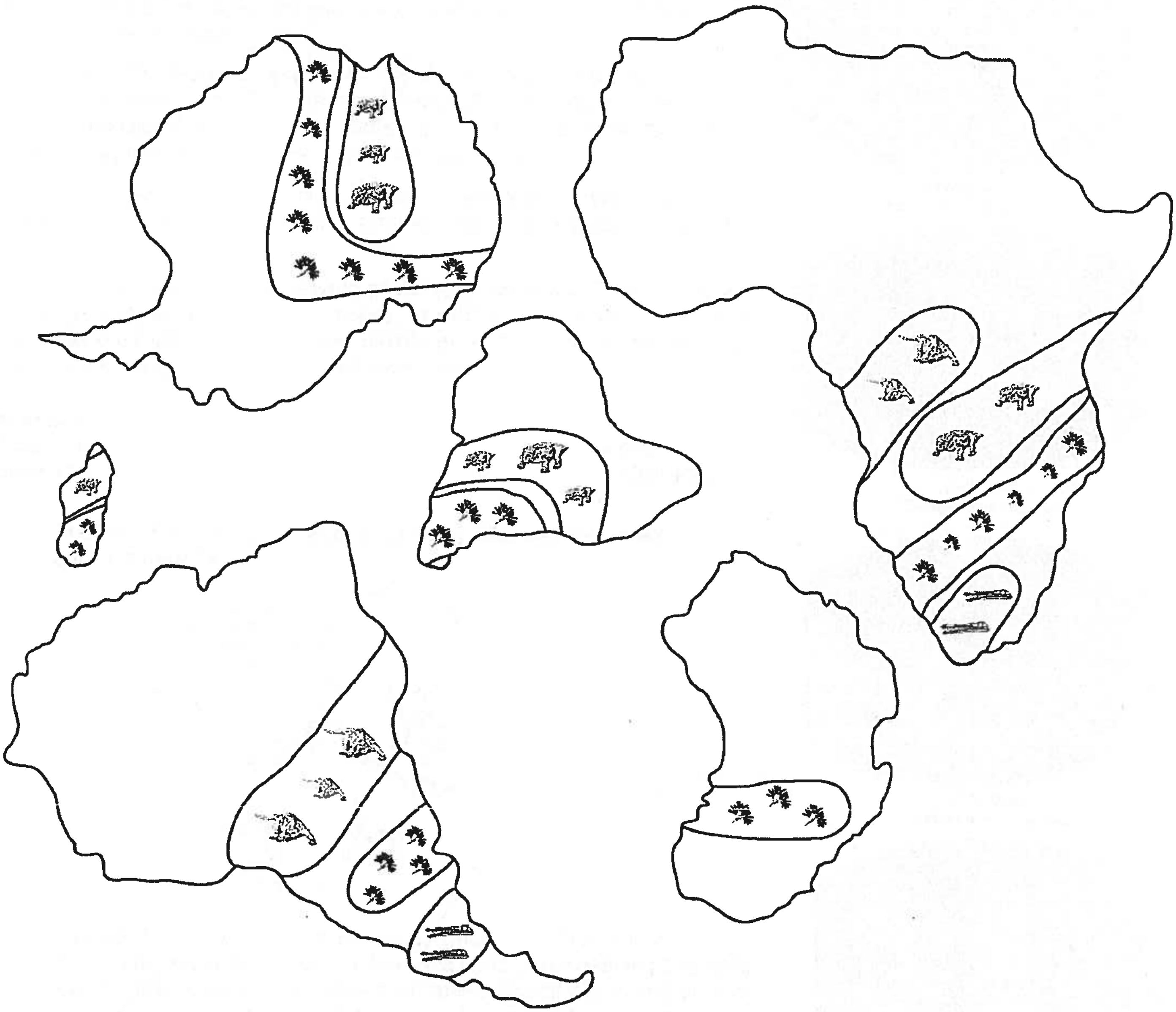
10. What other evidence might be useful for connecting the continents together into one giant landmass?
____
____
____

IF POSSIBLE, CUT OUT EACH CONTINENT, COLOR THE AREAS OF EACH TYPE OF FOSSIL A DIFFERENT COLOR, AND GLUE THE CONTINENTS TOGETHER IN A WAY WHERE THE SAME TYPES OF FOSSILS LINE UP.

Fossil Map

- ☐ Color the fossils with colored pencils, each in its own color.
- ☐ Cut out the land masses.
- ☐ Assemble the continents and land masses (Africa, India, Australia, Antarctica, South America, and Madagascar) together on the title page. The patterned areas (fossil plant and animal occurrences) along with the shape of each landmass will provide clues to how the continents fit together.
- ☐ Glue the land masses.

GLUE ONTO SOME SEPERATE SHEET AND ATTACH TO PACKET.



Food Molecules Background Information

What Are Calories?

A calorie is a unit of energy. Historically, scientists have defined "calorie" to mean a unit of energy or heat that could come from a variety of sources, such as coal or gas. In a nutritional sense, all types of food — whether they are fats, proteins, carbohydrates or sugars — are important sources of calories, which people need to live and function.

"Our brains, our muscles — every cell in our body — require energy to function in its optimal state," said Jennifer McDaniel, a registered nutritionist dietitian in Clayton, Missouri, and spokesperson for the Academy of Nutrition and Dietetics. "So for one, we want to nourish our body right and our brain right. If we don't get enough of those nutrients [that calories provide], there are negative consequences, whether its losing lean muscle mass, not being able to concentrate or not having the energy we need on a day-to-day basis."

How many calories should people eat every day?

How many calories a person needs in a day depends on the individual's activity level and resting metabolic rate, which can be measured at a doctor or dietitian's office, McDaniel said. "There's conventional wisdom that men shouldn't eat fewer than 1,500 calories and women 1,200 calories to ensure that they're getting a balance of major nutrients and micronutrients."

The National Institutes of Health (NIH) provides general guidelines of calorie requirements for various ages and activity levels. A middle-age moderately active female should consume 2,000 calories per day. A middle-age moderately active male should consume 2,400 to 2,600 calories per day.

What are high-calorie foods?

Foods that are considered high-calorie, or calorically dense, have a high amount of calories relative to their serving size, according to the Mayo Clinic. Oils, butter and other fats; fried foods; and sugary sweets are high-calorie foods. While high-calorie foods are often associated with junk food, some are high in nutrients, as well.

Healthy foods that are high in calories include avocados (227 calories each), quinoa (222 calories per cup), nuts (828 calories per cup of peanuts), olive oil (119 calories per tablespoon), whole grains, and, in moderation, dark chocolate (648 calories per bar), according to the USDA Nutrition Database.

Raisins are an example of a high-calorie food that might surprise some people; you could eat 1 cup of grapes and get the same amount of calories as from one-quarter cup of raisins, according to the Mayo Clinic. Dried fruits are usually calorically dense; for this reason, they are popular among hikers burning a lot of calories.

What are low-calorie foods?

Foods that are considered low-calorie have a low amount of calories relative to their serving size. Fruits and especially vegetables are usually relatively low in calories. For example, 2 cups of shredded romaine lettuce or spinach have 16 calories, a large stalk of celery has 10 calories, 1 large ear of corn has 123 calories, 1 cup of broccoli has 15 calories and an orange has 70 calories, according to the USDA Nutrition Database.

Calories and weight loss

Though it is important to consume sufficient calories, counting and cutting calories can help many people shed pounds. Calories are expended through physical activity. For example, running a mile might burn around 112 calories, according to Runner's World magazine. The Centers for Disease Control and Prevention (CDC) refers to the balance of calories burned and calories consumed as caloric balance. It functions like a scale; when you are in balance, the calories consumed are balanced by the calories burned. This means you will maintain your body weight.

According to the CDC, if you are maintaining your weight, you are in caloric balance. This means that every day, you are consuming roughly the same amount of calories you are burning. If you are in caloric excess, you are eating more calories than you are burning and you will gain weight. If you are in caloric deficit, you are burning more calories than you are eating, and you will lose weight.

Week 4

1) What is a calorie?

2) What are some foods that are high in calories?

3) What are some foods that are low in calories?

4) Add information or examples of foods that help define each type of food molecule.
   a) Fats

   b) Proteins

   c) Carbohydrates

5) Describe the following:
   a) Caloric balance

   b) Caloric deficiency

   c) Caloric excess

Name:______________________________

How Long do I have to Exercise?

Food Sample	Amount of Calories in 100g of Food
Marshmallows	400 Calories
Potato Chips	600 Calories
Cooking Oil	900 Calories

These results are for the average 125 lb. person.

Walking: 3.5 mph (17 min/mi) for 60 minutes would use 240 Calories
Running: 6 mph (10 min/mile) for 60 minutes would use 600 Calories

How long would it take to use up the Calories from 100g of Marshmallows walking?

How long would it take to use up the Calories from 100g of Marshmallows running?

How long would it take to use up the Calories from 100g of Chips walking?

How long would it take to use up the Calories from 100g of Chips running?

How long would it take to use up the Calories from 100g of Cooking Oil walking?

How long would it take to use up the Calories from 100g of Cooking Oil running?

Week 5: Calorie Counting

Use this table to keep track of everything that you eat for a week. You might be amazed with how much food it takes to keep your body running. Remember that food is our fuel, and we have to eat in order to stay alive.

To do this activity you are going to have to read nutrition fact labels on everything you eat and keep track of your portion sizes. Or, all foods can be googled to see how many calories are in them.

Here is a made up example for one day:

	Breakfast	Lunch	Dinner	Snacks	Weight (Optional)	Total calories eaten today
Monday	3 eggs(78 C each) 2 pieces of toast (79 C each) 1Tablespoon Butter (102 C) Total C=494	Sandwich 2 pieces of bread (79 C each) 140g of ham (203 C) 1 slice of cheese (113 C) 1 Tbsp Mayo (94 C) Total C= 568	Burger Bun (236 C) ¼ pound ground beef (1506 C) Slice of cheese (113 C) 1 Tbsp Ketchup (19 C) Total C= 1874	1 Banana (105 C) 1 Apple (95 C) 1 cup peanuts (828 C) Total C= 1028	180 pounds	Total Calories for the day is 3,964

	Breakfast	Lunch	Dinner	Snacks	Weight (Optional)	Total calories eaten today
Monday						
Tuesday						

Wednesday						
Thursday						
Friday						