Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Period:\_\_\_\_\_

**7th Grade End of Year Study Guide**

**Physics**

1. What does Newton’s 2nd law of motion tell us about the motion of objects?
2. What are the steps to designing an experiment?
3. How many variables can you test at one time in an experiment? What should you do to all the other variables?
4. What is the independent and dependent variables in an experiment?
5. What does Newton’s 1st law of motion tell us about the motion of objects?
6. Use Newton’s 1st law of motion to explain the following:
   1. When you hit the brakes on your car, your body moves forward.
   2. When you are on a spinning amusement park ride you feel like you are being pushed to the outside.
   3. When you accelerate quickly in your car, you feel pushed into your seat.
7. You have designed a device to protect an egg from breaking when it hits the ground. Your design includes a parachute. Draw all of the forces on your device as it is falling and as it hits the ground.
8. Use Newton’s 3rd law to describe the forces on a car on the freeway.
9. Draw what happens to iron filings when they are near a bar magnet.
10. How do the number of coils on an electromagnet affect the strength of an electromagnet?
11. How does the amount of electricity moving through a wire affect the strength of an electromagnet?
12. What would you do to make the strongest electric motor possible (think about questions 10 and 11)?
13. How does your mass change on the moon? How does your weight change on the moon? Why?
14. How does your mass change on Jupiter? How does your weight change on Jupiter? Why?

**Earth**

1. Fill in the blanks showing the steps in the rock cycle.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ → \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ → \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ igneous rock

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ → \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ → \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ sedimentary rock

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ → \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ → metamorphic rock

1. Where does the energy come from to weather and erode rocks?
2. Where does the energy come from to heat up and melt rocks?
3. What is evidence that the Grand Canyon formed over a very long time scale?
4. What geologic processes happen over a short time scale?
5. What is something in geology that is on a large spatial scale? A small spatial scale?
6. What are some strategies for building things that will withstand an earthquake?
7. What is the difference between a scale model and a non-scale model? Give an example and a non-example.
8. Graph this data:

|  |  |
| --- | --- |
| Depth | Temperature |
| 0 km | 28°C |
| 40 km | 870°C |
| 600 km | 1600°C |
| 2900 km | 2700°C |
| 5150 km | 4700°C |

1. Draw a model of Earth’s interior layers (try to make it to scale).
2. What happens to the density of Earth’s layers? Why does this happen?
3. What are common elements in Earth’s core? Why are they there?
4. What are common elements in Earth’s crust and mantle? Why are they there?
5. Where are Earthquakes and volcanoes compared to plate boundaries? Why?
6. Draw a picture showing what is happening at deep-sea trenches.
7. Why do we think that the continents used to be together in one large continent (Pangea)?
8. Define uniformitarianism.
9. Draw a diagram that shows the principle of superposition.
10. Give an example of how fossils can be used to determine Earth’s past environment.
11. What is an unconformity? Use a diagram to illustrate it. What kind of environment does an unconformity indicate?

**Cells and Systems**

1. What can livings things do that non-living things can’t do? List 6 things.
2. If you looked at a microscopic view of a rock and a tree leaf, how would they be different?
3. How are the cells of unicellular organisms different than the cells of multicellular organisms?
4. What is a system?
5. Is a cell a system? Why or why not?
6. What are the functions of each of these cell organelles? How do they work together to meet the needs of cells?
   1. Mitochondria
   2. Chloroplasts
   3. Cell Membrane
   4. Cell wall
   5. Nucleus
7. What are the 5 levels of organization?
8. Draw a diagram that shows how the levels of organization relate to each other.
9. What is the function of each of these systems?
   1. Circulatory
   2. Respiratory
   3. Digestive
   4. Urinary
   5. Nervous
   6. Skeletal
   7. Muscular
10. Give two examples of how one system depends on another system.
11. All cells need food and oxygen. Describe how the circulatory, respiratory, digestive, and nervous systems get food and oxygen to all of our cells.

**Genetics and Heredity**

1. Fill out the table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Definition** | **Benefits** | **Negatives** | **Examples** |
| **Sexual reproduction** |  |  |  |  |
| **Asexual reproduction** |  |  |  |  |

1. Why is variety in offspring a benefit to organisms?
2. What are adaptations that plants have that help them reproduce?
3. What are adaptations that animals have that help them reproduce?
4. What are behaviors that parents (of animals) do to help their offspring survive?
5. What is a mutation?
6. Give an example of a mutation that helps an animal or plants to survive.
7. Give an example of an environment or situation where the mutation in the previous questions would be harmful.
8. Give an example of a mutation that is neutral to a plant or an animal.
9. If a mutation happens to an animal that is helpful, what will happen with that mutation over many generations?
10. Describe selective breeding (also called artificial selection).
11. What is genetic modification?
12. What are the pros and cons of genetic modification?
13. In rabbits, black fur is dominant (B) to white fur (b). If you cross a **homozygous recessive** male with a **heterozygous** female, what are the possible genotypes and phenotypes of the offspring?

**Evolution**

1. What is evolution?
2. Give examples of adaptations that plants or animals have that help them to do the following:
   1. Get food (hunt prey)
   2. Avoid being food (avoid predators)
   3. Survive a harsh environment
3. How do animals develop these adaptations over time? (hint: describe natural selection? There are three steps)
4. What evidence do we have that evolution has happened over the Earth’s history?
5. What are analogous structures?
6. How do scientists use analogous structures?
7. How do the embryos of some animals compare to other animals?