**Cyber Friday Jan. 30, 2020** ***(Exercise Due Monday Feb. 3, 2020 at Class Time)***
**Geologic Time and Age Dating of Rocks**

**Part 1. Watch the two video links below and answer the following review questions:**
**A. Overview of Geologic Time** https://people.wou.edu/~taylors/g202/GeologicTime.mpeg **(~22 minutes)**

1. What is the estimated age of the Earth based on current geologic analysis.
2. How is the age of the Earth recorded? What is the basis for knowing geologic time.
3. True or False: the geologic record of the Earth is discontinuous.
4. Explain the difference between "relative age dating" and "radiometric age dating".
5. True or False: sedimentary rock materials form from a multitude of surface environments from mountains to the sea.
6. Who was James Hutton? What is his claim to fame as one of the grandfathers of geology?
7. True or False – the rate of deposition in sedimentary layers is constant and of known time increments?
8. Who was William Smith? What is his claim to fame as one of the grandfathers of geology?
9. The study of rock layering is referred to as _____.
10. True or False: tectonic uplift of the land surface encourages erosion and stripping of rock record.
11. True or False: sinking and lowering of land encourages sediment deposition and recording of geologic time.
12. List the four broad Eras of geologic time, from oldest to youngest.
13. What are index fossils? How are they used? Provide an example.
14. What is an isotope? Define and provide examples
15. What is radioactivity and how does it related to the concept of "half-life"?
16. True or False: all radioactive isotopes decay at the same rate or half life.
17. As an example, what is the daughter product of radioactive Uranium?
18. What element is common in rock forming minerals, and commonly used as a radioisotope?
19. What is the half-life of carbon 14? How is it formed at the Earth's surface?

**MORE QUESTIONS ON BACK…**

20. When is the estimated age boundary between the Cretaceous and Tertiary periods?

21. Provide a brief summary, with examples, of how relative age dating and numeric age dating are used in combination to yield insights into the history of planet Earth.

**B. ES202 Video Exercise – Basics of Radioactive Dating Video (~13 minutes)**
https://people.wou.edu/~taylors/g202/Radioactive_Dating.mpeg

1. How is time measured? Provide some examples.

2. What is carbon-14 and how does it differ from carbon-12?

3. How is carbon-14 formed? Where is it formed on planet Earth? What element is C-14 derived from?

4. What is the ratio of C-14 to C-12 atoms in the recent, natural world.

5. True or False: C-14 is stable and does not decay to a daughter isotope?

6. What is the half-life of C-14? How is this information used to measure the age of Earth materials.

7. What type of materials are amenable to C-14 dating?

8. True or False: geologists must be knowledgeable in chemistry to be able to understand and measure the age of the earth?

9. True or False: C-14 dating is useful for old geologic materials, up to and greater than 40,000 years ago.

10. What are the daughter products of potassium-40 (K-40). What is the half-life of K-40? What are the most common rocks used with K-40 dating?

11. What is the half-life of Uranium-238?

12. True or False: U-238 isotopes are useful for dating very young materials less than 100,000 years old.

13. True or False: this video was creepy. Please explain your answer.

**Part 2. ES202 Stratigraphy and Geologic Time Class Assignment**
**Cyber Friday Assignment Due Monday Feb. 3, 2020 (at class time)**

Visit the class Moodle Site, and link to the Lab Manual documents: "Lab 8 Dating of Rocks, Fossils, and Geologic Events" Your task is to complete portions of Lab 8 in your lab manual (AGI 10th Ed.).

Part A. Short Answer. Read the lab materials on p. 207-215 and define the following terms and concepts / answer the questions.

1. Discuss the difference between relative age dating and absolute age dating, as pertaining to the geologic rock record.
2. Law of Original Horizontality –
3. Law of Lateral Continuity
4. Law of Superposition –
5. Law of inclusions-
6. Law of Cross-Cutting Relations
7. Unconformity
8. Angular Unconformity
9. Disconformity
10. Nonconformity
11. Isotope
12. Parent vs. Daughter
13. Half-Life
14. What is the daughter product and half life of Carbon 14?
15. What is the daughter product and half life of Uranium 235?
16. Can C-14 be used to numerically date materials that are 10 m.y. old? Why or why not?

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**Part B. Lab Activities. Complete the following lab exercise questions on the worksheets provided.**

Activity 8.2 p. 219 Geologic Cross Sections 1 and 2
Activity 8.4 p. 222 Part A and Part C