**What’s Up?**

**A Relative Age Dating Activity**

By Christine McLelland

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

**Purpose**: In this activity you will learn to determine the sequence of geologic events from cross-sections of strata (rocks) in a given area. It is a bit of a mind-puzzler, so have fun!

**Background**: Before absolute dating of rocks was developed in the 20th century, geologists had to rely on relative age dating, which places geologic events in their order of occurrence. The method begins with the careful drawing and description of strata (the geologic cross section or profile). Relative age dating assumes that the lower layers in any particular cross section are older than the upper layers in that cross section (“the law of superposition”) and that an object cannot be older than the materials of which it is composed. Igneous rocks are dated according to whether they caused metamorphism in the surrounding rock (proof that they intruded into the preexisting rock), whether they cross cut preexisting rocks, or whether sediments were deposited on them after they were formed. The profile from one location is then compared with profiles from surrounding sites to determine the geologic history of a larger area. If fossils are present in the rocks, they may also be used to correlate rock layers across large distances and, now that absolute time has been established, to determine the age of the rocks.

**How?** In this process, you will study the rocks and events in a geologic cross section and put them in the correct order from oldest to youngest. In order to do your best on this activity, you must understand a few of the basic principles that are applicable to relative age relationships between rocks:

**Principle (law) of superposition**: in a sequence of undeformed sedimentary rocks, the oldest beds are on the bottom and the youngest are on the top.

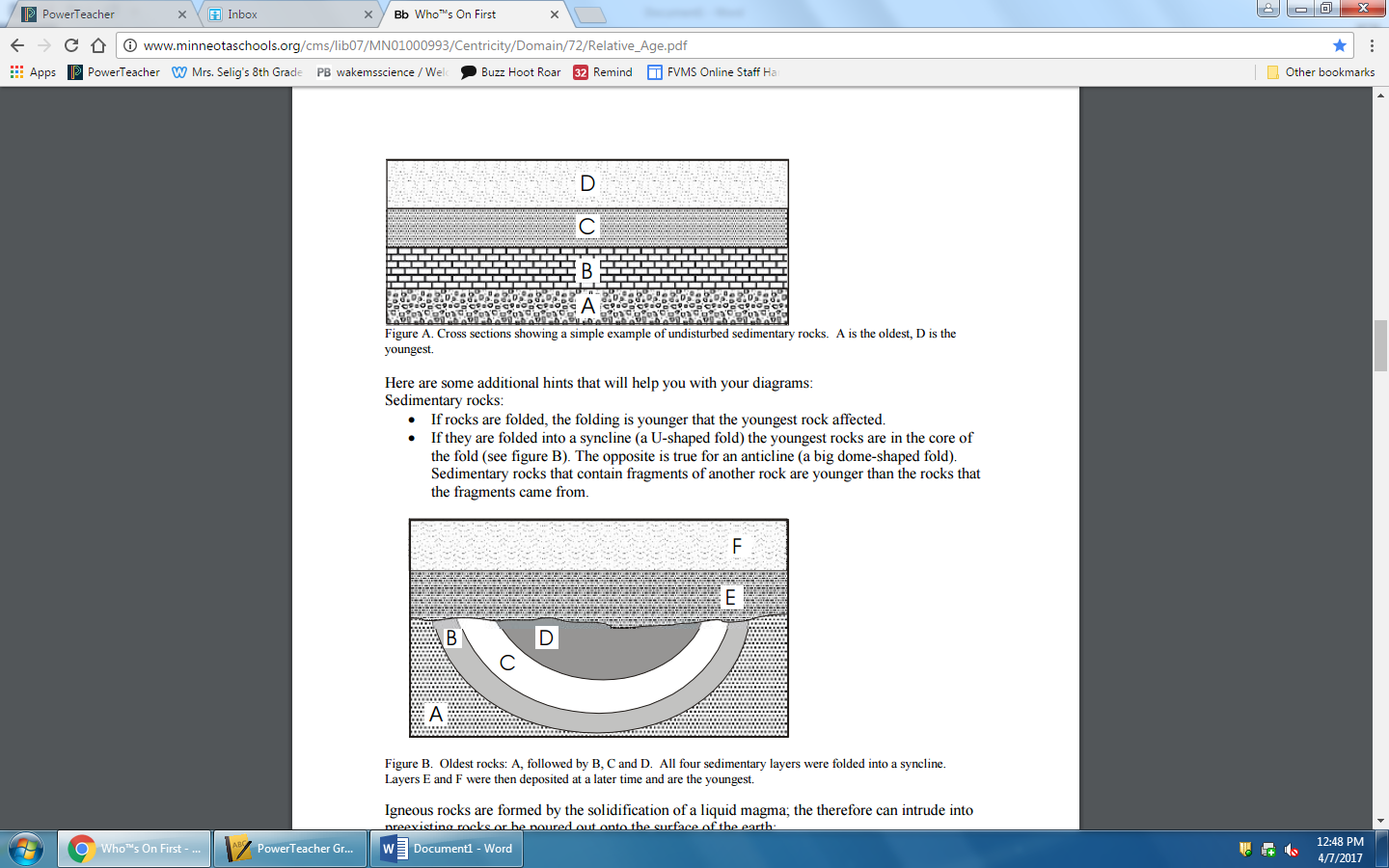
**Principle of original horizontality**: sedimentary layers are horizontal, or nearly so, when originally deposited. Strata that are not horizontal have been deformed by movements of the Earth’s crust.

**Principle of faunal succession**: groups of fossil plants and animals occur in the geologic record in a definite and determinable order. A period of geologic time can be recognized by its respective fossils.

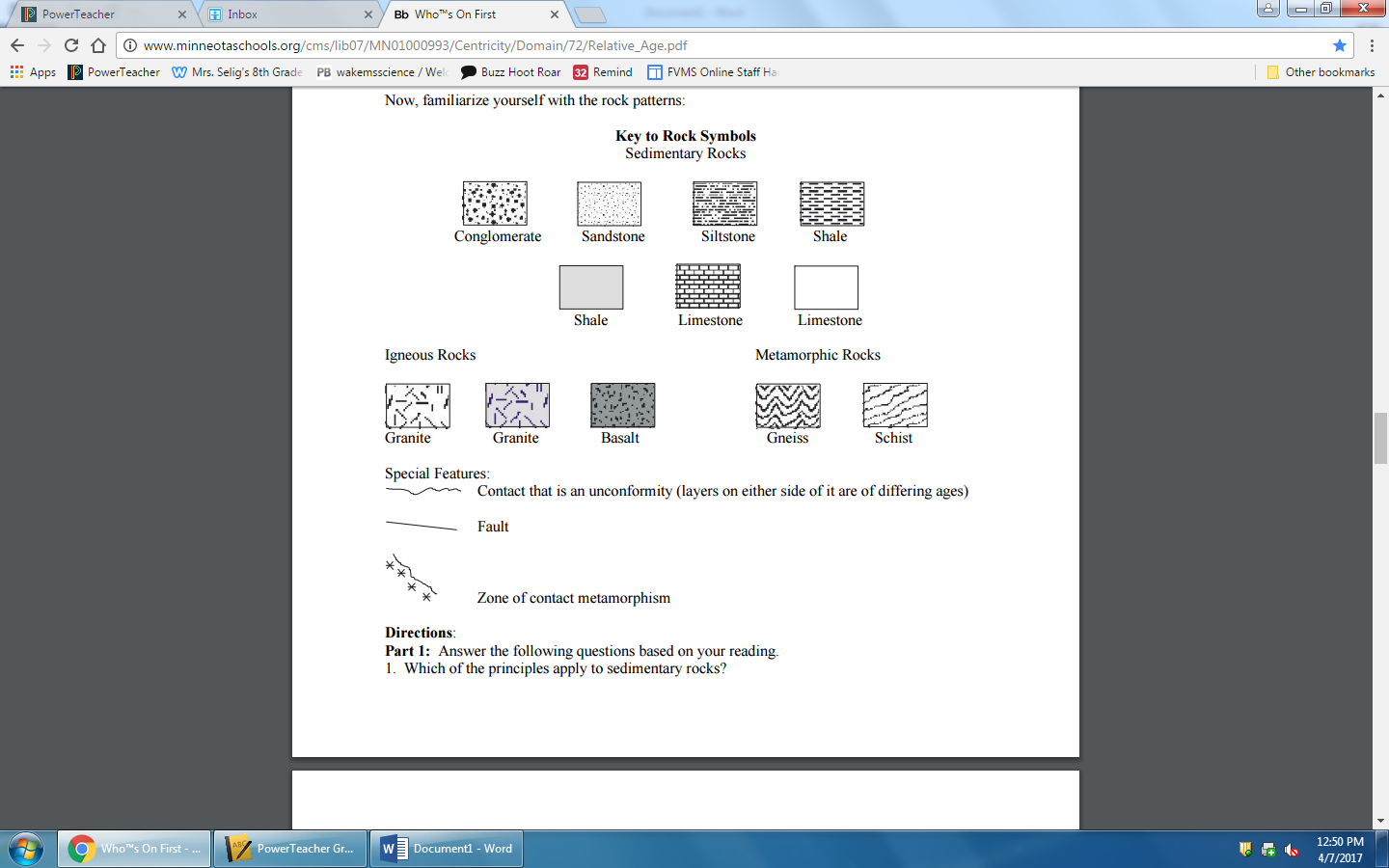
**Principle of crosscutting relations**: geologic features, such as faults, and igneous intrusions are younger than the rocks they cut.

**Principle of inclusion**: a rock body that contains inclusions of preexisting rocks is younger that the rocks from which the inclusions came from.

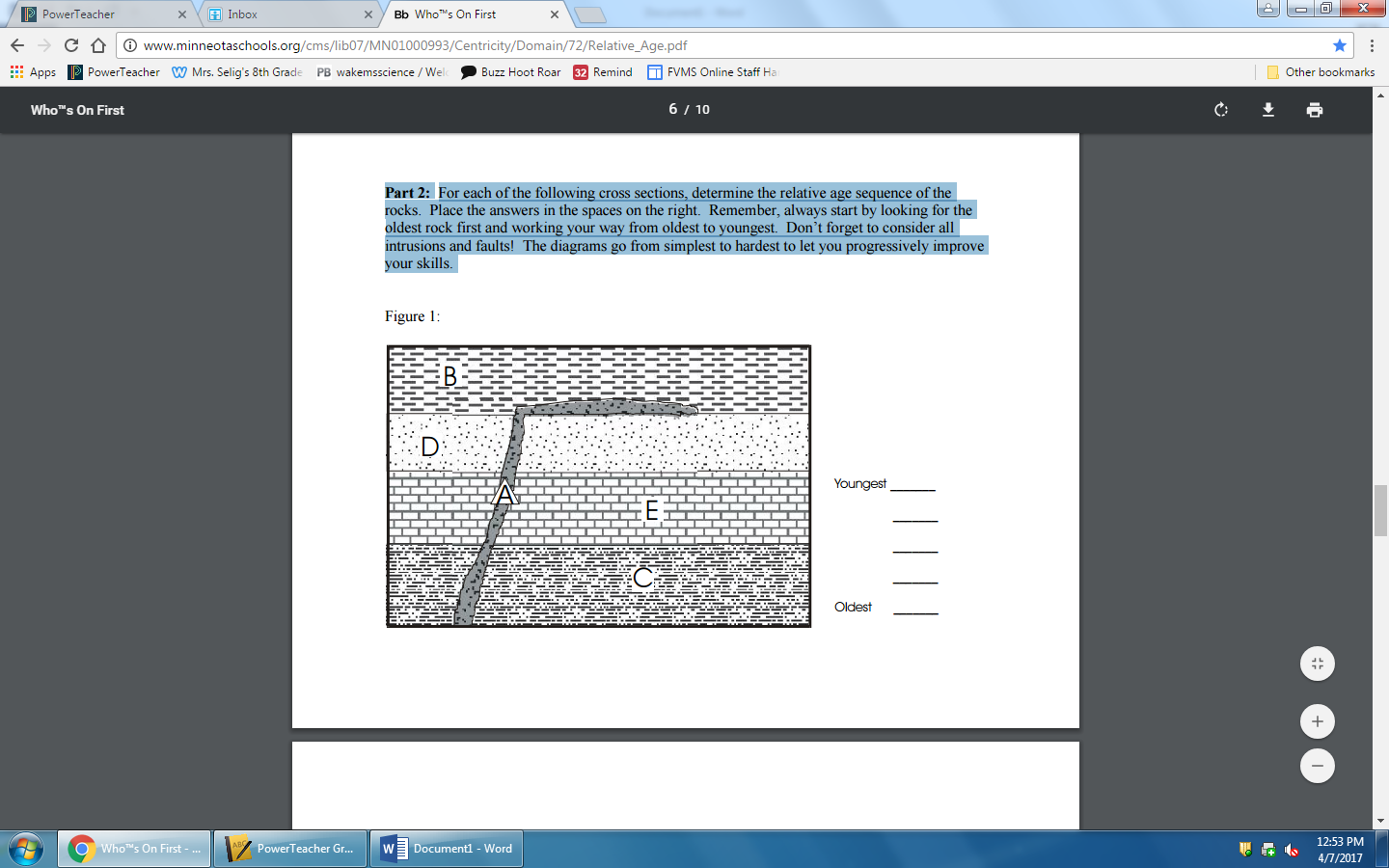
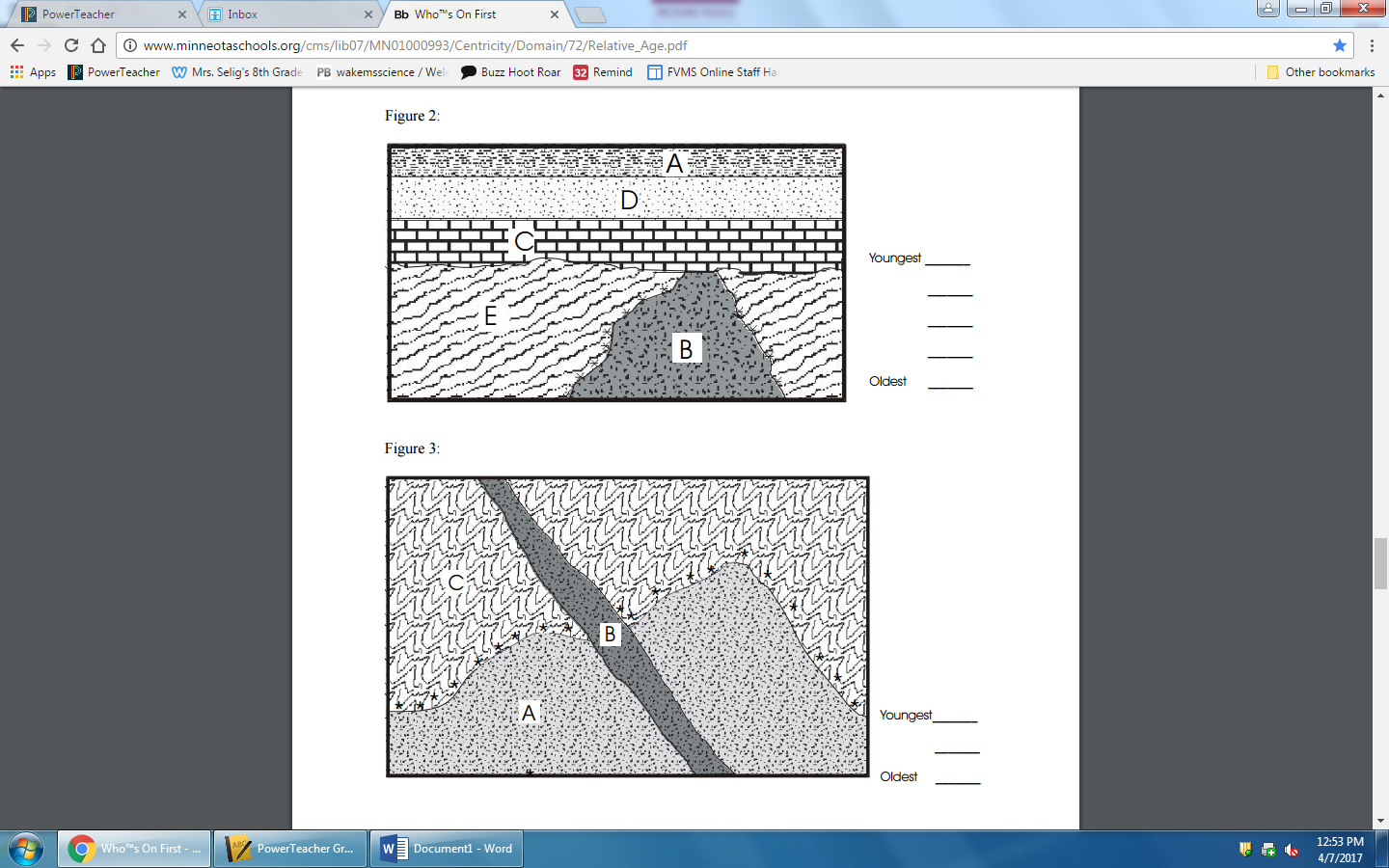
The easiest way to do relative age dating is to work from oldest to youngest. Try to find the oldest rock (usually located near the bottom) in the diagram below and work your way up. Your first example is the diagram below. Review the **principle of original horizontality** and the **principle of superposition** and you will see that the only possible answer to this puzzle is that layer A is the oldest and layer D is the youngest.

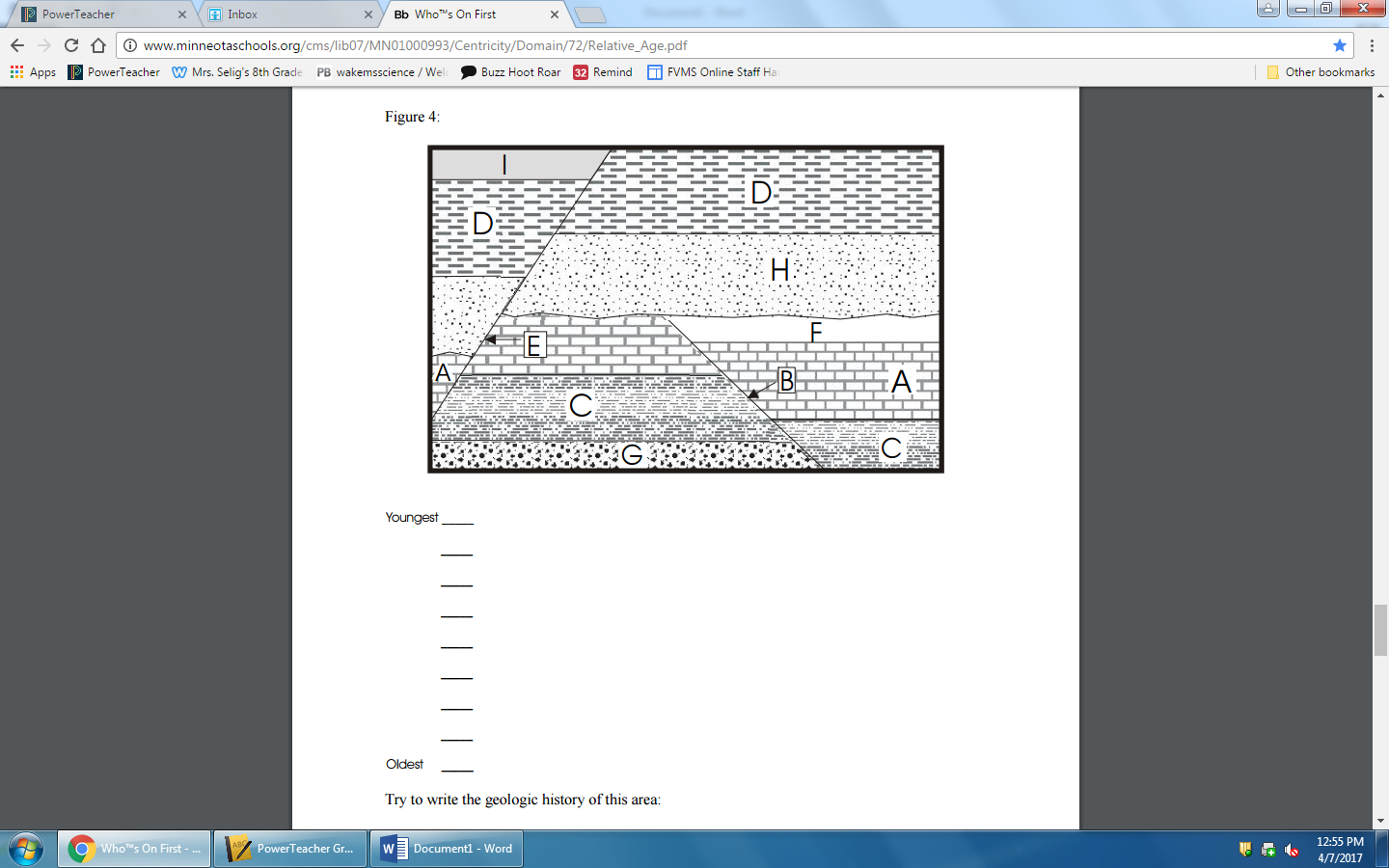


Now, familiarize yourself with the rock patterns:



**Directions**: For each of the following cross sections, determine the relative age sequence of the rocks. Place the answers in the spaces on the right. Remember, always start by looking for the oldest rock first and working your way from oldest to youngest. Don’t forget to consider all intrusions and faults! The diagrams go from simplest to hardest to let you progressively improve your skills.



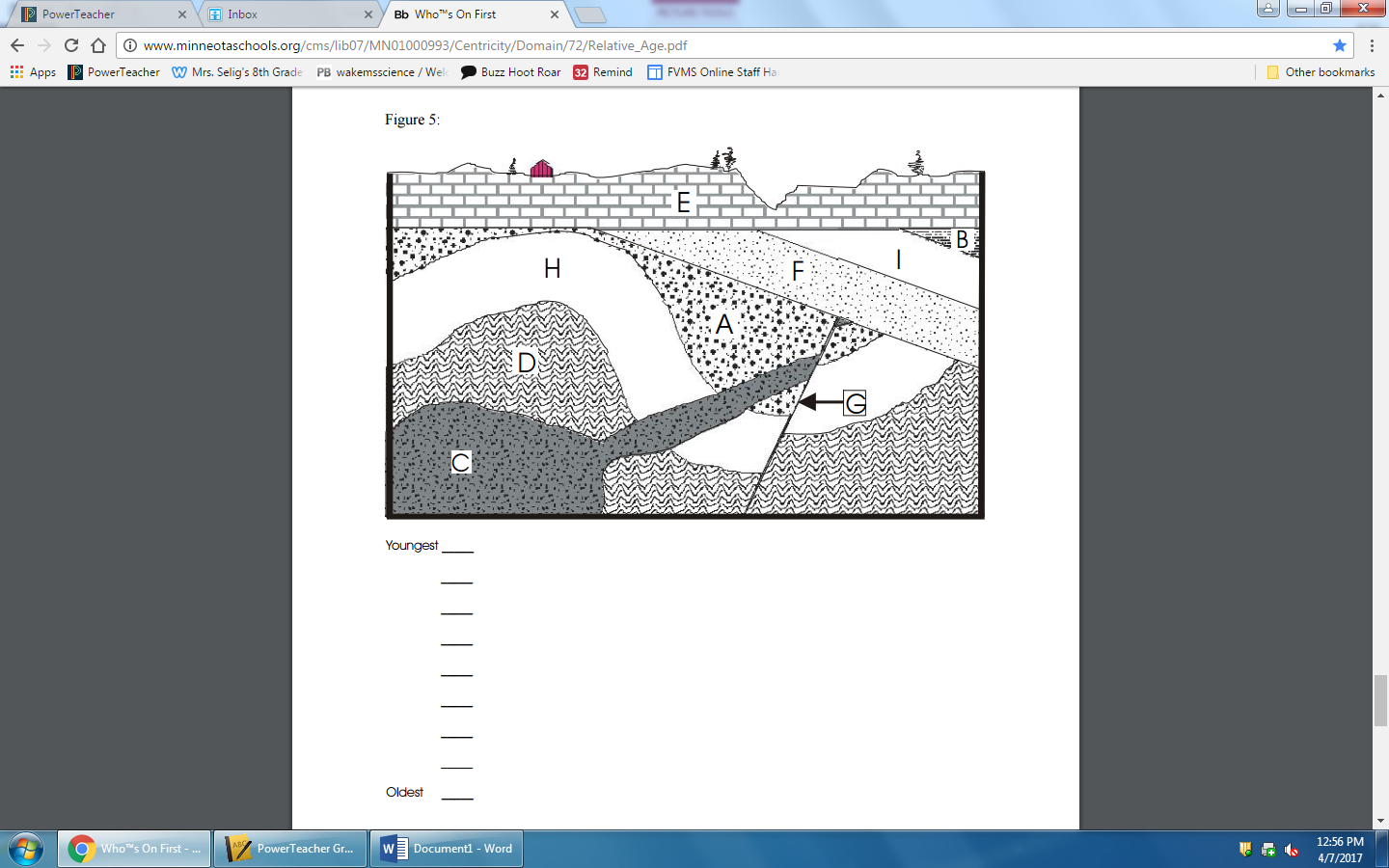


Figure 6

