

## Sedimentary Sandwiches – Student Activity

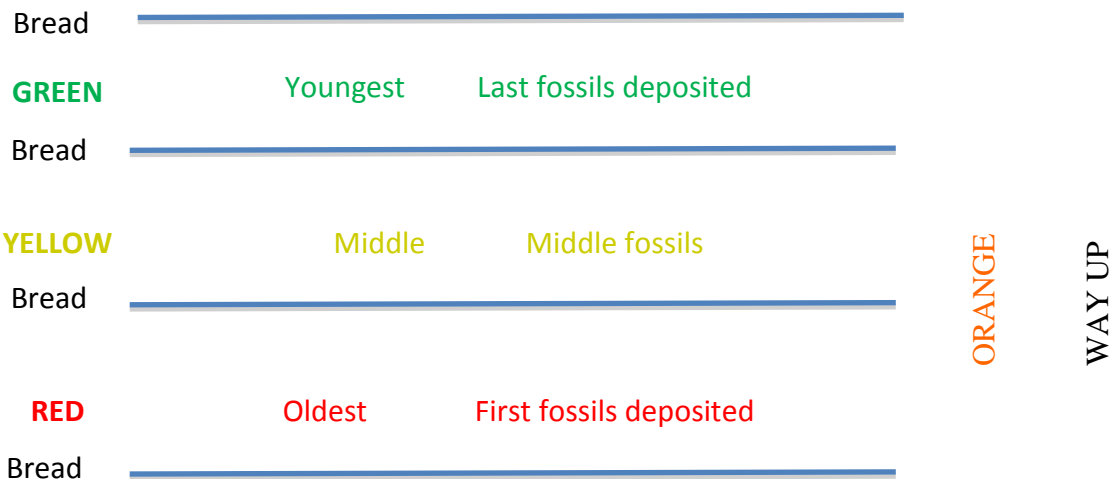
It can be critical to know which way up your rocks lie. We assume that they were originally deposited as flat lying beds (The Principle of Original Horizontality). Later they may have been faulted, folded or even overturned. Under pressure at depth, rocks fold like plasticine. If you wish to drill down to a gold bearing bed or an oil bearing bed you need to know which **“WAY UP”** your sediments lie or you could be drilling (very expensively) in the wrong direction.

How would graded bedding tell you **“WAY UP”**?

Some fossils can also indicate age. These are known as ***index fossils***. Index fossils are useful if:

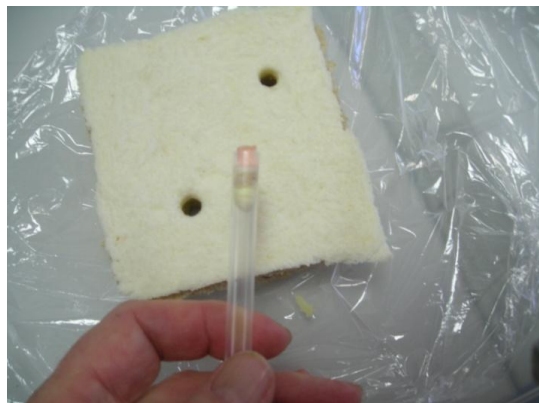
- They existed for a short period of time.
- They existed over a wide geographic range.

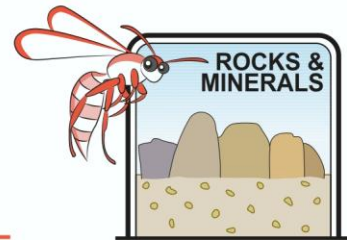
By matching up these index fossils across the country you can find rocks of similar ages and work out quickly if a rock sequence is the right **“WAY UP”**.



Materials per student or group

- Four slices of bread with the crusts removed
- Scissors
- Three thin slices of green, red and yellow snake and 9 orange. (Scissors work better than knives). These colourful slices represent fossils.
- 1 plastic sandwich bag
- 1 drinking straw.
- Old newspaper to cover bench or table





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1. Lay a sheet of newspaper onto the bench
2. Slice the snakes so that you have 3 slices of 3 different colours (index fossils) and 9 orange slices (fossils which do not indicate any specific age).
3. Place the first layer of sediment (slice of bread) onto the newspaper
4. Place three red “fossils” on the bread and add three orange ones. This is the oldest bed.
5. Cover with another slice of bread/layer of sediment
6. Place three yellow “fossils” on this slice and add 3 orange ones. This is the middle bed.
7. Cover with a slice of bread/layer of sediment
8. Place 3 red “fossils” on this slice along with any orange ones that remain
9. Cover with a slice of bread/layer of sediment
10. Since sediment needs to be cemented and compacted before it becomes rock, slip the pile into the sandwich bag, do not seal it and then sit on it for a count of twenty.
11. Pick up the bag and turn it in your hands several times
12. Pass this bag on to another group without speaking
13. Collect your new bag and gently slip the pile of bread/sediment onto your newspaper. The sedimentary pile cannot be moved after this.
14. You will be using the straw to drill down into the pile to see if you can find any fossils and work out way up

Each drill hole will cost you half a million dollars. You only have a budget of three million dollars.

You should consider these ideas before you start:

What does finding an orange fossil tell you? \_\_\_\_\_

What does finding a yellow fossil tell you? \_\_\_\_\_

If gold is found in the beds with the green fossils will you have a short way to drill or a long way?

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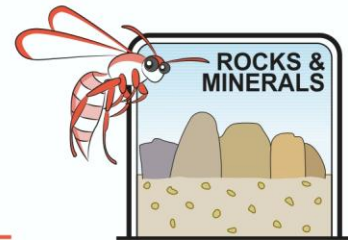
Before we think of drilling, which is expensive, we use geophysics or remote sensing to guess what might lie below the surface. Without moving your sedimentary pile, run your fingers gently over the surface. Are there any clues which might help you to site your drill holes?

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Have a good look at your sedimentary pile. Can you see any indications of which way up it lies?

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Decide whether to concentrate drilling over any indications in a square grid or radiate outwards. These are questions that exploration geologists, geochemists and geophysicists have to consider.

Drill core in the straw can be removed by squeezing or gentle blowing

15. Drill your first three holes

How many holes did you have to drill until you knew "Way Up"?

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