Graded bedding – Teacher Notes

Currents of wind and water will carry clasts. The faster a stream flows the larger the clasts it can carry. Fast flowing currents carry medium and fine particles in suspension whilst heavier and larger particles bounce along the base of the current in a process known as ***saltation.*** Wading through rivers or in the wave surge near the shore we can feel these larger particles around our ankles but not at our knees.

Examining long rivers such as the Swan or Murchison two things become evident:

1. **Decrease in clast size from source to sea**
   Clast size decreases from the source to the sea because friction with the riverbed reduces the carrying energy of the current.
   - Near the source large clasts with some medium and small clasts will be deposited (boulders, gravel, sands and a little silt)
   - On the plains mostly medium clasts with some fine clasts will be deposited (sands and silt)
   - When the river enters the sea its flow is rapidly slowed permitting most of the sand to be deposited as wedge shaped deltas.
   - Fine silts and muds are deposited as the current eventually is slowed down to a stop.

A crude version of this can be demonstrated using a downpipe from the school's gutters. The flow decreases away from the base of the down pipe as does clast size.

ASIDE: information on making a student-friendly grain size indicator and acquiring specimens of different grain sizes is on the accompanying "Grain size indicator Teacher" sheet

2. **Graded bedding**

Each rain or wind driven current surge will also create vertical variation within beds. Beds are coarser at the base and decrease in clast size upwards as rain or wind current power ceases. This is termed graded bedding. During a wet or windy season the current will pulse many times gradually decreasing in carrying power towards the end.
The rock here is Devonian sandstone showing classic graded bedding patterns. It demonstrates sandy sediments deposited by water during a wet season about 360 million years ago. Overall the grain size decreases from the base upwards. We can use this classic reduction in grain size to tell if rock beds are lying right way up or have been

turned upside down. When a fresh surge of water carries new material it can cut into the underlying beds. The rock represents deposition during a single wet season.

Teacher demonstration

Teachers can demonstrate graded bedding by:

1. Placing mixed clast sizes into a large transparent glass jar until it is half full
2. Add water and secure the lid or cap
3. Ask your most energetic student to vigorously shake it for 5 minutes
4. Leave the jar to settle.

Ask the students to formulate an hypothesis as to what they think will happen when the shaken jar is left to settle. The larger heavier clasts will settle first to form the bottom layer, to be followed by medium clasts and the fine. Graded bedding is demonstrated

In a riverbed this also can be seen.

This photograph is of the side of the Swan River near Bell's Rapids.

The bands of larger pebbles indicate the end of rainfall when flow energy starts to decrease.

Grainsize decreases upwards until the next flush of rainfall causes the river to begin to deposit again.

Graded bedding – Teacher Notes

Graded bedding activity

Students can create their own representation of graded bedding. They may need reminding that the youngest beds lie at the top. A rubbish bin has its most recent rubbish deposited on top of older material.
When drawing geological sections we always draw the oldest rocks at the bottom to mirror Nature. The history of deposition of their rock will start at the bottom and progress upward. Students will write the history on the right side of the worksheet and either draw or stick materials to the left side. This activity encourages students to learn verbally and visually.

Materials per student or group

- Glue sticks or glue
- Containers of coarse, medium and fine material. If you have coarse sand, medium sandy soil and silt to hand, please ensure it is dry. Silt can be sieved from potting mix, mixed sand and soil can be used for medium grained sediment and coarse sand can be accessed from building sites and river bends. Lentils or split peas can represent coarse grained sediment, breadcrumbs for medium grained and cocoa or flour for fine grains.
- Old newspaper to cover work areas.

1. Please remember that the bedding grades upward so no sharp boundaries or gaps should be apparent.
2. First write up the deposition history of your stream in the right hand column starting at the bottom.
3. Coat the left hand column with glue and sprinkle grains onto it to represent the story described in your history column. Larger fragments that do not stick to the paper can be drawn.
4. Draw in an arrow pointing to the younger beds and write “WAY UP”.