



Pathfinder Honour: Trainer's Notes

Sand



Instructions to Trainers / Instructors of this Honour

Thankyou for being involved with this Honour. These notes have been developed to assist in teaching / instructing this honour. We recognise that there is much more information available and we are grateful that you should share your expertise.

Please remember that Honours are designed to develop our Pathfinders in many ways; their interests, their knowledge and their relationship with their Saviour and Creator. Your enthusiasm and creativity will have a huge impact on those doing the honour.

To complete an Honour, the following (where applicable) must be completed satisfactorily:

- Physical and Practical Requirements.
- Honour Workbook.
- Honour Assessment Sheet. (*On SPD Honour Website but Leader's level access is required*)

Additional Reference Material

<http://en.wikipedia.org/wiki/Sand> Please see comment re Wikibooks below.

Acknowledgements

http://en.wikibooks.org/wiki/Adventist_Youth_Honors_Answer_Book/Nature/Sand

The above Wikibooks site was used extensively for these notes and this contribution is valued. However, it should be noted that material on any Wikibooks website is beyond the control of the SPD.

Sand Honour

REQUIREMENT 1: What does the term “sand” mean? Name two kinds of sand.

Sand is a naturally occurring granular material composed of finely divided rock and mineral particles. As the term is used by geologists, sand particles range in diameter from 0.0625 mm (ie 1/16 mm) to 2 millimetres. An individual particle in this range size is termed a sand grain. Sand feels gritty when rubbed between the fingers; silt, by comparison, feels like flour.

There are three major types of naturally occurring sand:

Terrigenous

This type of sand is eroded from rocks (sedimentary, volcanic, and crystalline), and is generally transported by water. Most sand is of this type.

Carbonate

This type of sand has organic origins, being made from ground sea shells, corals, and other marine sources.

Pyroclastic

This type of sand is created when volcanoes erupt and blow their ash (pyroclastic sand) into the atmosphere.

REQUIREMENT 2: Give the origin of naturally occurring sand and mineral content.

Sand is made when rock of any kind is eroded by wind or by water. The mineral content of sand is the same as the parent rock - quartz, granite, feldspar, etc. The colour of the sand depends on the parent rock.

REQUIREMENT 3: What is the difference between sand and soil?

Soil is very similar to sand, and it is formed in much the same way. In fact sand is a component of soil. The main difference though is that soil contains a lot of organic material (such as decayed plants, decayed animals, etc). Also, sand tends to have been shifted from other places by wind or water and accumulated to form beaches and sand hills.

REQUIREMENT 4: What is meant by shape, surface, grain size and grain fracture?

Shape

The shape of a grain of sand can tell us about its history. Rounded grains are those which are relatively old, the rounding being caused by the grain getting blown around by wind or pushed around by water. Grains with more angular surface are relatively young, not having had time to get rounded by the forces of nature.

Surface

The surface texture of grains may be polished, frosted, or marked by small pits and scratches. This information can usually be seen best under a binocular microscope, but a ‘strong’ magnifying may also be used.

Grain Size

Grain size, also called particle size, refers to the diameter of individual grains of sand.

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Grain Fracture

In the field of mineralogy, fracture is a term used to describe the shape and texture of the surface formed when a mineral is broken. Minerals often have a highly distinctive fracture, making it a principal feature used in their identification.

The following fracture modes are included as a point of interest.

Conchoidal fracture

Conchoidal fracture is a curved breakage that resembles the concentric ripples of a mussel shell.

It often occurs in amorphous or fine-grained minerals such as flint, opal or obsidian, but may also occur in crystalline minerals such as quartz.

Subconchoidal fracture is similar to conchoidal fracture, but not as curved.

Pictured: Obsidian



Uneven fracture

Uneven fracture is self descriptive. It occurs in a wide range of minerals including arsenopyrite, pyrite and magnetite.

Pictured: Magnetite



Earthy fracture

Earthy fracture is reminiscent of freshly broken soil. It is frequently seen in relatively soft, loosely bound minerals, such as limonite, kaolinite and aluminite.

Pictured: Limonite



Splintery fracture

Splintery fracture comprises sharp elongated points. It is particularly seen in fibrous minerals such as chrysotile, but may also occur in non-fibrous minerals such as kyanite.

Pictured: Chrysotile



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REQUIREMENT 5: Define the following and discuss the use of each:

a. Glacial sand

Glacial sand is sand produced by the action of a glacier grinding the rock over which it passes. Uses depend on the parent material and cover a wide range as covered below.

b. Calcareous sand

This sand is composed primarily of calcium carbonate. This sand can be the result of the erosion of limestone country. It is common on beaches that are surrounded by coral reefs. Calcium carbonate has widespread uses. To name a few, it is used for making cement, in blast furnaces to purify the molten iron, in plastics and as an inert filler in medicinal tablets.

c. Quicksand

Quicksand is composed of fine granular matter (such as sand, silt and clay) and water. There is so much water that often a film of 'sand' floats on the top. A person or animal thinks the quicksand is solid but on entering breaks through the surface. One consolation is that, because of the density of quicksand, a person is unlikely to disappear completely out of sight. The main problem is that the person may become stuck. It is generally considered of little use to man, but it does provide a source of drama for stories.

d. Glass sand

Glass sand is sand with low iron content, and high silica (SiO_2) content. This type of sand is ideal for glass making.

e. Moulding sand

Moulding sand, foundry sand, or green sand is sand that when moistened or oiled tends to pack well and hold its shape. It is used in the process of sand casting molten metals.

f. Polishing sand

Sand is used as an abrasive material for polishing materials. One example is sandpaper which comes in many grain sizes. Usual practice is to start with a coarse grain size and gradually go to the finer ones; the finer the sand paper the smoother the surface. Sand is also used as an abrasive in some soaps such as sandsoap. Sand is also used in sand blasting where 'heavy' grains of sand are driven by a jet of compressed air or water against a surface to clean or abrade it.

g. Building sand

Building sand is used for making concrete and other building products such as brick, pavers and tiles. Sharp sands (with angular surfaces) are preferred.

h. Filter sand

Sand can be used to filter water or other liquids. A media filter is a type of filter utilizing a bed of sand, crushed granite or other material to filter water for drinking, swimming pools, aquaculture, irrigation, stormwater management and other applications.

i. Furnace sand

Furnace sand is used for lining the floor of industrial furnaces which are used for processing molten metals such as steel.

j. Mineral sand

Mineral sands are usually black in colour and are often called heavy mineral sands because of their weight. They are an important source of zirconium, titanium, thorium, tungsten and rare earth elements. In Australia, they can be found in the dunes and beaches (particularly at the high tide wash area) of northern New South Wales, south east Queensland and south west Western Australia.

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REQUIREMENT 6: Memorize and discuss Genesis 22:17, Proverbs 27:3 and Psalms. 139:17-18.

All the following texts are taken from the NIV Bible.

Genesis 22:17 I will surely bless you and make your descendants as numerous as the stars in the sky and as the sand on the seashore. Your descendants will take possession of the cities of their enemies

Proverbs 27:3 Stone is heavy and sand a burden,
But provocation by a fool is heavier than both.

Psalms.139:17-18 How precious to me are your thoughts, O God!
How vast is the sum of them!
Were I to count them,
They would outnumber the grains of sand.
When I awake,
I am still with you.

REQUIREMENT 7: Make a collection of 20 various coloured and / or textured sands and name of locality where secured. (Note: Have a package of sandwich bags, a pencil, and a small spoon or scoop to gather the sand. Mount in small bottles).

Sand can be found almost anywhere. Lakes, rivers, beaches, ponds, and even backyards are all places where you can find sand. When you have collected sand from a location, check there again - most places have more than one colour of sand.

While collecting, you will need plastic sandwich bags (in which to store the sand), and a permanent marker (to label the bags). Label each bag with your name, the date, and the location where the sand was found. Be as specific as possible (perhaps recording latitude and longitude if you have a GPS receiver).

Be sure to collect enough sand to share with others. If you are working on this honour with your club, 20 samples should not be very difficult to achieve if everyone collects enough sand for everyone else. You may be able to trade sand with other Arenophiles (sand collectors) whom you can contact via the Internet:

Another source of sand is your local hardware, gardening or landscape suppliers. Often the sand provided is produced mechanically by rock crushing machinery etc. Under magnification the sharp edges of the grains are evident.

IMPORTANT. Don't forget to collect enough sand for your work-of-art in Requirement 8

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REQUIREMENT 8: Examine five types of sand specimens under magnification and observe the various characteristics.

Using a powerful magnifying glass or a microscope, examine the sand grains, looking for the features described in Requirement 4 (shape, surface, grain fracture, and grain size). You can also note its colour and its variability are all the grains the same size? Are they all the same shape, or are there big differences from one grain to the next?



Pictured: Sand from Pismo Beach, California. Components are primarily quartz, chert, igneous rock and shell fragments. Scale bar is 1.0 mm.

Source: <http://en.wikipedia.org/wiki/Sand>

REQUIREMENT 9: Create a work-of-art in a clear bottle using different colours of sand.

This is a simple craft. Besides the different sands, all that is required is a clear bottle with a secure lid. Any shape is OK. The glass may be plastic, but glass is best. The steps are as follows:

1. Ensure both the sand and the bottle are dry.
2. Put the different colours of sand in the bottle to make a pattern or picture.

Periodically tap the bottle to ensure that the sand settles and the different colours don't run into each other.

You can put different colours of sand in the bottle in layers, keeping the bottle at the same angle or changing the angle from time to time.

Creative folks will invent ways of placing sand at strategic places to make clever designs or pictures. For starters, why not try passing sand through a tube (such as large drinking straw) to place it exactly where you want it.

3. When the bottle is full and the sand is compacted, secure the lid.
4. Stand back and admire your creation!