

Comparisons: Science by Keith Kelly

AGE: Teenagers
LEVEL: Intermediate
TIME NEEDED: Approx. 80 minutes
OBJECTIVES: to compare the properties of different soils; identify features of good soils; practise using language related to expressing comparisons
KEY SKILLS: reading, speaking, writing, listening
MATERIALS: one copy of the worksheet per student; a good-quality soil sample – approx. 10 ml per pair of students; one copy of the paired speaking exercise per pair of students (cut out).
For the experiment (per group of three students): samples of sandy, loam and clay soils; three plastic cups; cotton cloth; scissors; a retort stand and clamp; a measuring cylinder

Content focus Comparing soils

Warm-up: 10 minutes
Activity 1: 6 minutes
Activity 2: 6 minutes
Activity 3: 8 minutes
Activity 4: 15 minutes

WARM-UP

Divide the students into pairs. Distribute small soil samples among them (approximately 10ml per pair). Ask the students to touch it, crumble it, feel it and discuss its properties in their pairs. Ask the students if they think the sample to be a good soil for growing crops. What makes them think that?

Take three or four answers from the class.

ACTIVITY 1

Ask the students to read the article *Different soils and their properties* and in their pairs, discuss how close their ideas are to those in the text. Gather some thoughts as a whole class.

ACTIVITY 2

Ask the students to turn over their worksheets so they can't see the article from Activity 1. Divide the students

into pairs and hand out the cut-out paired speaking activity (located on the last page of the lesson plan). Tell the students not to look at their partner's sheet of paper but, instead, try to fill in the gaps on their own sheet of paper by asking questions to each other. The students may need some guidance on what questions to ask. You could give the following examples:

What are the particles in sandy soil like?
What plants are able to grow in very sandy soil conditions?

Key

Student A: 1. large; 2. porous; 3. good; 4. tiny; 5. tiny; 6. sticky, heavy
Student B: 1. certain; 2. medium; 3. more; 4. a lot more; 5. difficult

ACTIVITY 3

Ask the students to fill in the table for the properties of different soil types. Check the answers as a whole class, focussing the discussion on comparisons of the soil types. Point out when the students use comparison phrases such as *more*, *less*, *whereas* or *while*. Refer the students to [Your CLIL Comparisons: Science](#) for more useful words related to comparisons.

Key

	<i>sandy</i>	<i>silty</i>	<i>clay</i>
particles	<i>mostly large</i>	<i>medium-sized</i>	<i>tiny</i>
water	<i>holds little</i>	<i>holds more</i>	<i>holds a lot</i>
crop-growing	<i>certain plants</i>	<i>good for crops</i>	<i>difficult for crops</i>

ACTIVITY 4

Put students into groups of three and ask them to collect all the necessary equipment for the experiment from you. Then, ask them to carry out the experiment to compare the water-holding capacity of sand, loam and clay soils, monitoring closely. Refer the students to the article if they need to check what *loam* soil is. When the experiment is complete, ask the students to answer questions 1-3.

ACTIVITY 5

Ask the students to prepare a one-minute presentation revealing their results of the experiment, using the answers to the questions in Activity 4 and the language support provided. Again, refer the students to [Your CLIL Comparisons: Science](#) for help in constructing their presentation. Feedback when all the presentations have been made to highlight any necessary vocabulary or grammar points.

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Language focus
Comparisons

Activity 1: 5 minutes
Activity 2: 15 minutes
Activity 3: 15 minutes

ACTIVITY 1

Ask the students to complete the wordsearch to find the comparative and superlative forms.

Key _____
best, better; bigger, biggest; faster, fastest; greater, greatest; larger, largest; lower, lowest; slower, slowest; smaller, smallest; worse, worst



ACTIVITY 2

Ask the students to choose the correct word to complete the sentences.

Key _____
1. differ; 2. compare; 3. vary; 4. exceed; 5. reduce; 6. increase

ACTIVITY 3

Ask the students to complete the crossword. All the answers are words to do with comparisons.

Key _____
*Across: 3. more; 6. similar; 8. least
Down: 1. unlike; 2. however; 4. while; 5. less; 7. most*

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Content focus

Water pollution

WARM-UP

- Your teacher will give you a sample of soil. Feel the soil in your fingers. What words can you think of to describe it? Share them with a partner.
- Do you think this is good soil for growing crops? Why? Why not? Share your ideas with the class.

ACTIVITY 1

Read the article below. How close are your ideas about what makes soil good for growing crops to those in the text? Share your ideas with the class.

Different soils and their properties

Soils from different parts of the country will almost certainly be different colours. Soils can be black, red, yellow, white, brown and grey. They will also have different structures and textures. Soils are formed from the breaking down of rocks; because different rocks contain different types of minerals, they generate different types of soils.

There are three main mineral components of soil: sand, silt and clay. Different soils contain different amounts of these components, which affects the properties of the soil, such as:

- the amount of water the soil can hold;
- how easily water can pass through the soil;
- the nutrients found in the soil;
- how fertile the soil is;
- possible uses for the soil.

Sandy soils

The particles in sandy soils tend to be large, so there are big spaces between them. The spaces between the particles trap a lot of air but also allow water to drain away easily. We say these soils are *porous*. Sandy soils have low nutrient content, because the nutrients that are dissolved in the soil water are lost as the water drains away. This is known as *leaching*. Only certain plants can grow in very sandy soils.

Silty soils

Silt particles are medium-sized, so silty soils hold more water than sandy soils. This means they also

contain more dissolved nutrients that plants can use. Silty soils are good for growing crops.

Clay soils

Clay soils have tiny particles and so the spaces between the particles are also tiny. This makes it more difficult for water and air to move through the soil. Clay soils hold a lot more water than sandy soils and drain very slowly. Clay particles swell and stick together when they become wet, making a sticky, heavy soil. As the soil dries, the clay shrinks, leaving large cracks, down which water can flow quickly, without wetting the soil. This makes clay soil difficult to grow crops in.

Soils also contain other components, for example *humus*, organic material formed when leaves and other plant materials are broken down by micro-organisms.

Although silt is a fertile soil, *fertility* increases when it contains a mixture of clay, sand and silt as well as plenty of humus. This mixture is called *loam* and is the best kind of soil for growing plants.

The colour of a soil is generally a good indication of its composition. Black or dark soils are rich in humus; an indication that the soil is very fertile. Red soils are rich in iron compounds, while light-coloured soils may be rich in sand or some kinds of clay.

Adapted from *Macmillan CXC Science Series*,
Integrated Science by Tania Chung-Harris pp. 352-353
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ACTIVITY 2

Your teacher will give you a paired speaking activity. Turn over your worksheet, so that you cannot see the *Different soils and their properties* text. Read the paired speaking activity to each other out loud and work together to fill in the gaps in each text.

ACTIVITY 3

Working on your own, look again at the *Different soils and their properties* article and use it to help you complete the table. Compare your answers with the class.

	sandy	silty	clay
particles			
water			
crop-growing			

ACTIVITY 4

Work in groups of three to complete the experiment below.

Comparing the water-holding capacity of sand, loam and clay soils

Equipment needed:

a retort stand and clamp
 a measuring cylinder
 three soil samples: sand, loam and clay
 three plastic cups
 cotton cloth
 scissors
 a large beaker

Procedure:

1. Poke several small holes in the bottom of each cup and line the bottom with a piece of cotton cloth. (Look at Figure 1.)
2. Pack each container with the same amount of each soil.
3. Take one of the cups and set up the apparatus as shown in Figure 1.
4. Measure 50ml of water in a measuring cylinder and pour it onto the soil sample.
5. When the water has stopped coming through the soil, measure how much water has collected in the beaker.
6. Calculate the amount of water left in the soil.

$$\text{volume of water left in soil} = \text{volume of water poured on to soil} - \text{volume of water collected}$$

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7. Repeat for the other two soils.
8. Make a table of your results.

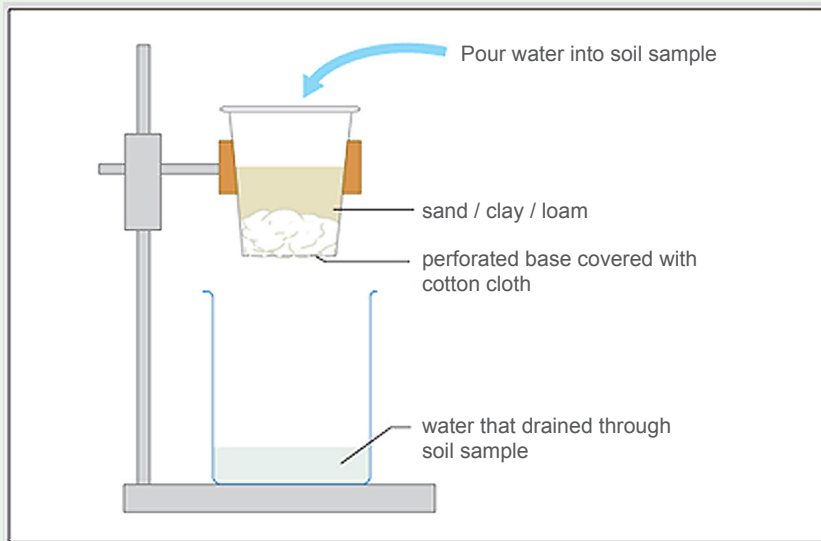


Figure 1: Apparatus for comparing water-holding capacity of soils

Adapted from *Macmillan CXC Science Series*, Integrated Science by Tania Chung-Harris pp. 352-353 © Macmillan Caribbean 2005

1. Which soil sample retained the most water? Why?
2. Which soil sample retained the least water? Why?
3. Which soil sample would be most suitable for growing crops? Why?

ACTIVITY 5

You are going to prepare a one-minute presentation of your comparisons and findings from the experiment in Activity 4 to share with the class. Use the questions and the language support in the table below to help you.

The loam soil _____ whilst the sandy soil _____			
The clay soil _____ however _____			
The sandy soil	retained	more water (than _____)	which indicates _____
The loam soil		(the) most water	
The clay soil		(the) least water	
The reason for this is _____ / This is because _____			
Sandy soil has	the biggest	particles	which means _____
Loam soil has	the smallest		
Clay soil has	medium-sized		
Therefore, the sandy / loam / clay soil is _____			

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Language focus
Comparisons

ACTIVITY 1

Complete the wordsearch and find the comparative and superlative forms of the adjectives.

R	E	A	S	P	S	P	S	J	L	O	W	E	S	T	F
S	G	E	T	F	X	O	L	S	T	H	R	C	J	E	Q
A	T	R	C	H	S	F	O	B	S	N	I	Y	O	R	E
G	E	L	E	N	S	A	W	E	A	G	K	S	S	E	C
G	E	O	Y	A	T	S	E	T	E	S	S	A	I	A	Q
R	G	L	T	A	T	T	S	T	R	F	D	E	U	R	O
C	V	H	O	X	A	E	T	E	I	T	T	M	M	T	R
N	A	S	P	W	G	S	R	R	S	T	R	R	S	F	T
J	O	P	R	R	E	T	M	E	G	L	G	R	O	A	N
I	Z	G	A	T	F	R	B	A	T	Z	O	T	W	S	M
G	N	L	A	V	D	S	I	I	L	W	O	W	S	T	R
G	P	E	D	U	S	R	G	T	G	L	M	T	E	E	I
S	R	B	A	A	O	D	G	L	I	G	E	F	G	R	B
G	D	I	O	O	Y	C	E	I	O	S	E	R	G	L	I
S	H	E	H	W	O	R	S	E	N	W	A	R	M	H	E
S	M	A	L	L	E	S	T	Y	H	L	F	A	S	M	T

- bad
- big
- fast
- good
- great
- large
- low
- slow
- small

ACTIVITY 2

Choose the right comparison word to complete the sentences. The first one has been done for you.

exceed compare reduce ~~differ~~ increase vary

- State four ways in which red blood cells differ from white blood cells.
- Exchange results with four other people in your class and _____ the results.
- Energy and other dietary requirements _____ with age, sex and level of activity.
- A cyclone is classified as a hurricane when the wind speeds _____ 120 km/h.
- Why do streamlined objects _____ the energy required to move forward?
- To _____ the upward force, the wing can be tilted by pointing the nose of the plane up.

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ACTIVITY 3

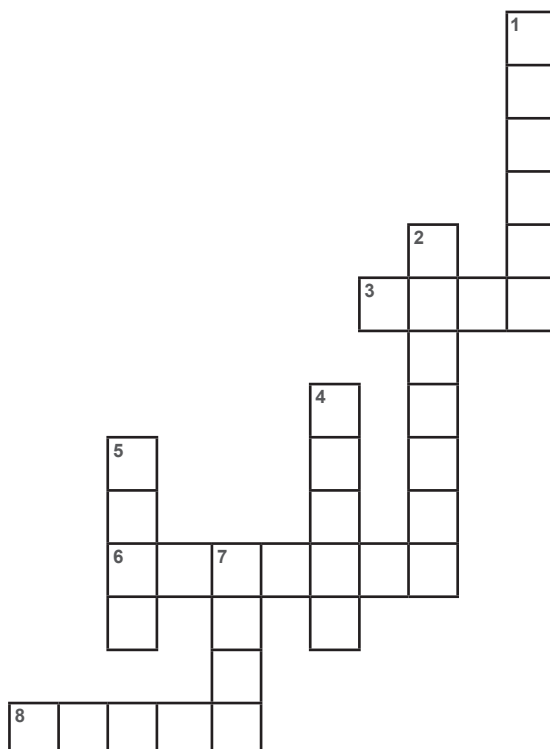
Complete the crossword. All the answers are words associated with comparisons.

Across

- 3. The _____ pulleys there are in a combination system, the less effort is required to move the load.
- 6. Grafting is a technique _____ to budding but the scion is a twig rather than a bud.
- 8. Brushing your teeth at _____ once a day helps to remove plaque, which helps prevent tooth decay and gum disease.

Down

- 1. _____ the particles in a solid, the particles in liquids and gases can move around relative to each other.
- 2. Plants respire both in the day and at night, _____ in sunlight, they also photosynthesize.
- 4. Solids transfer heat by conduction, _____ liquids and gases transfer heat by convection.
- 5. Remember that warmer liquids are _____ dense and so rise.
- 7. What is the _____ common use of the convex lens?



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Paired speaking activity

Different soils and their properties

Student A

Sandy soils

The particles in sandy soils are mostly _____ (1). The spaces between the particles trap a lot of air but sandy soils hold very little water, because the water drains away easily. We say these soils are _____ (2). Sandy soils have low nutrient content, because the nutrients that are dissolved in the soil water are lost as the water drains away. This is known as leaching. Only certain plants are able to grow in very sandy soils.

Silty soils

Silt particles are medium-sized, which means these soils can hold more water than sandy soils. This means they also contain more dissolved nutrients that plants can use. Silty soils are _____ (3) for growing crops.

Clay soils

Clay soils have _____ (4) particles and so the spaces between the particles are also _____ (5). This makes it more difficult for water and air to move through the soil. Clay soils hold a lot more water than sandy soils and drain very slowly. Clay particles swell and stick together when they become wet, making a _____, _____ (6) soil. As the soil dries, the clay shrinks, leaving large cracks, down which water can flow quickly, without wetting the soil. This makes clay soil difficult to grow crops in.

Different soils and their properties

Student B

Sandy soils

The particles in sandy soils are mostly large. The spaces between the particles trap a lot of air but sandy soils hold very little water, because the water drains away easily. We say these soils are *porous*. Sandy soils have low nutrient content because the nutrients that are dissolved in the soil water are lost as the water drains away. This is known as *leaching*. Only _____ (1) plants are able to grow in very sandy soil conditions.

Silty soils

Silt particles are _____ (2) -sized, which means these soils can hold _____ (3) water than sandy soils. This means they also contain more dissolved nutrients that plants can use. Silty soils are good for growing crops.

Clay soils

Clay soils have tiny particles and so the spaces between the particles are also tiny. This makes it more difficult for water and air to move through the soil. Clay soils hold _____ (4) water than sandy soils and drain very slowly. Clay particles swell and stick together when they become wet, making a sticky, heavy soil. As the soil dries, the clay shrinks, leaving large cracks, down which water can flow quickly, without wetting the soil. This makes clay soil _____ (5) to grow crops in.

