



## Family Home Learning Pack

# SUPER SOIL

### Notes for parents and carers:

These home learning packs have been compiled by Better Planet Education to support you whilst your children are at home during the Covid-19 lockdown.

Each week, we will include suggestions for activities you can do alongside your children, as well as those that they can do independently, whilst you are working from home.

We will attempt to suggest activities which require no special materials other than those you may find around the house. It may be possible to pick up some resources during your occasional shop for essentials but please do not aim to shop specifically for listed supplies! We will also attempt to minimise the need to print out any materials.

### In your pack each week:

- \* Open ended project ideas and research topics
- \* Activities to explore independently or together
- \* Games to play
- \* Ideas for science experiments
- \* Art and craft ideas
- \* Links to other learning resources
- \* A use each week for toilet roll tubes...



# ACTIVITY IDEAS

Soil isn't very interesting, right? It's just the grubby stuff on the ground that we walk on and grow plants in... Or is it?

Did you know that there are actually lots of different types of soil? Or that soils are made up of many many complex minerals and all kinds of decaying organisms? Did you know that we rely on healthy soil to survive? Soil is sometimes referred to as 'the skin of the earth' and in this pack, we'll show you just how important - and interesting - soil can be!

## The 3 main types of soil:



**Sand** is actually small grains of rock, worn away over time by weather. Sand grains range from 0.05 mm to 2 mm, so you can see them and feel them if you rub them between your fingers. Sandy soil isn't very good at holding water or nutrients in it, so it isn't very useful for growing plants.

**Silt** feels a bit like a powder and can be thought of as a very fine sand. It will hold water quite well, compared with sand, but still not really enough to make it useful for growing plants. Silt grains are between 0.002 and 0.005mm wide! You'd have to use a magnifying glass if you wanted to make out those individual grains.



**Clay** has the smallest particles with individual grains measuring less than 0.002mm across. A gram of coarse sand contains about 1000 grains, but a gram of clay contains about 90 billion of them! Clay is very good at holding nutrients and water. It forms shapes well, which is why we use it to make objects such as cups and plates!

Other types of soil are mixtures of these three types. Loam is a mix of all three of the above and is useful for gardening because it holds nutrients well, but is also good at draining away excess water.





### Soil exploration:

Take some different samples of soil from your garden, or local area. Be careful when gathering soil samples as there can be many microbes living in the soil. How does the soil look? Is it crumbly or sticky? Does it look sandy?

### soil?

Use pieces of white or black paper to put your soil on and, if you have one, look at it through a magnifying glass. Can you see any creatures, such as worms or woodlice living in the soil? You can sieve the soil gently to check, or use a spoon or wooden lolly stick to move the grains aside.

### What lives in your



### Soil observation jars:

Find out what type of soil you have in your garden with this simple test. You will need some soil samples that you have already checked for living creatures. Take any that you find out of the sample and put them back outside (near where you found the soil, if possible.)





Next, you need a jar filled  $\frac{3}{4}$  of the way up with water. Simply add your soil to the jar, shake well and leave to settle. Leaving over night is best.

When the mixture has settled, you can see they layers start to form. Any rocks will be at the bottom, together with the sandy part of the soil.



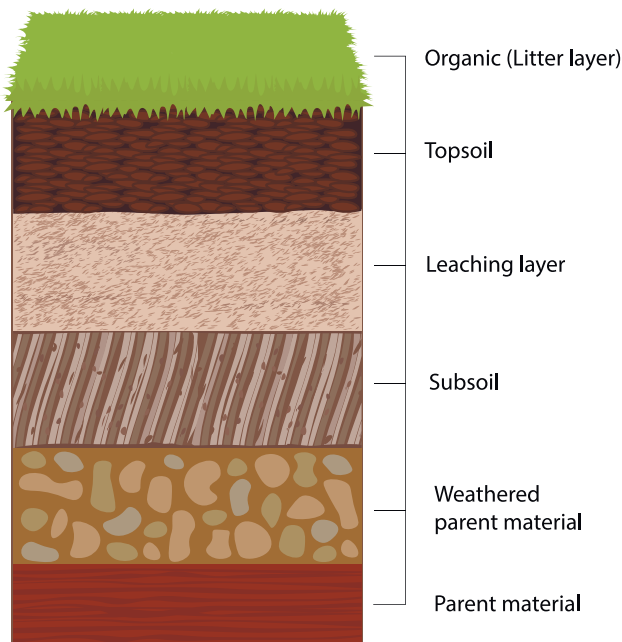
Next will be a layer of silt. If there is clay in the soil, that will be on top. Then there will be a layer of water and any organic matter, such as twigs or leaves, will float on the top!

Thank you to Henry and Charlie in St. Albans for trying this



out for us!





## Soil horizons:

If you were to dig a slice of the ground out from anywhere on Earth, you'd eventually hit rock. This slice of the ground would give you a 'soil profile' showing all the layers of the soil.

The very top might have organic matter, such as grass growing on it. It might have a layer of 'leaf litter' This can be a thick or thin layer, or it may not exist at all in some places.

Next, you get to the topsoil. A clay and mineral layer follows, then the subsoil

before you arrive at the rocky deposits beneath. You can learn about soil horizons in more detail here: <https://www.soils4kids.org/about>

## Make Lego soil horizons:

To help explain the different soil horizons, why not discuss them while making a model of them in Lego?! Alex in Durham made this awesome model of the different layers. Can you spot them all?



## Make a layered 'soil' pudding:

This tasty activity can help children understand the different soil horizons AND they can eat the



pudding afterwards! The following link has the instructions to make a big family sized pudding or individual portion sizes.

<https://www.doctordirt.org/dirt-pudding>

The site is American, so some of the specific products suggested can be replaced with alternatives.

Lottie in St Albans made this delicious version (P.T.O):

Lottie used chocolate biscuits in big pieces to make the bedrock, with chocolate chips and honeycomb bar pieces for the rocks.

Next, she added creme patissiere / custard for the subsoil layer. You could use butterscotch pudding.

Chocolate mousse or pudding (or chocolate spread) for the 'humus' layer (that's NOT the same as hummus!) ... you could put jelly worms in this layer!

The topsoil was made of finely crumbled chocolate biscuits pieces (you could put your biscuits in a bag and bash them with a rolling pin).

Finally, she topped off the pudding with desiccated coconut mixed with a little green food colouring to make the grass!



## Erosion observation:



Soil erosion refers to the way that topsoil is worn away by exposure to weather conditions. In this demonstration, you can see how different types of ground cover and planting affect the amount of soil that is eroded by rainwater runoff.

Lily and Callie in Rochdale tried the activity to see this in action.

### You will need:

- 3 plastic bottles or drinks cartons
- 3 glasses or jars
- water
- soil (turf)
- soil with leaf litter
- plain soil





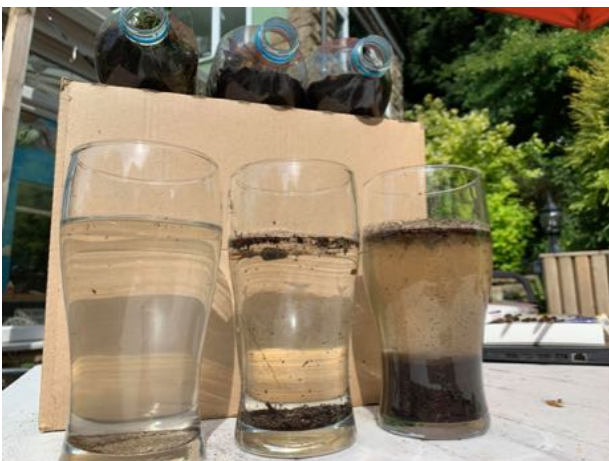
Cut a slice off the top of each bottle or drinks carton and remove the lid.

Fill one carton with soil, one with soil covered in leaf litter and in the final one, use soil that grass is growing in. The roots are important, so don't just sprinkle grass on the top!

Place the three bottles up where you can position a glass or jar under the openings of each one, as shown.



Next, pour water into each of the containers and allow it to trickle through and pour into the glass.



Observe what happens - which bottle contained soil that was most easily washed away? How could we use that information to stop a field from being eroded too easily? For an explanation of this activity, follow this link (Youtube link, supervision recommended):

<https://youtu.be/im4HVXMG168>

## Make a wormery in a bottle:

Worms are very important for the health of soil. They help to recycle decaying leaves and other matter and they oxygenate the soil. Making a wormery, is a great way to see worms in action as well as providing you with some healthy, well mixed soil for your garden!

Sara and Victor from Colchester followed the tips here to make a brilliant wormery in a bottle:

[https://www.nottinghamshirewildlife.org/get-involved/how-you-can-get-involved/wildlife-gardening/make-your-own-wormery?](https://www.nottinghamshirewildlife.org/get-involved/how-you-can-get-involved/wildlife-gardening/make-your-own-wormery?fbclid=IwAR0gR6Xv95LHBXYIR84tAcyVKslliwDkb7e8W9MeINdourwO4bRoEqP4WW4)

[fbclid=IwAR0gR6Xv95LHBXYIR84tAcyVKslliwDkb7e8W9MeINdourwO4bRoEqP4WW4](https://www.nottinghamshirewildlife.org/get-involved/how-you-can-get-involved/wildlife-gardening/make-your-own-wormery?fbclid=IwAR0gR6Xv95LHBXYIR84tAcyVKslliwDkb7e8W9MeINdourwO4bRoEqP4WW4)

### You will need:

- A 2l drinks bottle
- scissors
- a flower pot
- soil
- sand
- water
- newspaper
- WORMS!
- leaves
- paper
- cling film



First, cut the bottom off your bottle, using scissors or a craft knife. Be careful and ask an adult for help, if needed.

Remove the lid from the bottle and invert it inside a flower pot.

Next scrunch up some newspaper and put it into the bottle.







Wet the newspaper by pouring water on to it, then add a layer of soil on top.



Next, add a layer of sand, then more soil, and finally some more sand.



Then comes time to add your worms. You can look for these in the garden. Be very careful not to harm them, or get special composting worms, such as Tiger Worms online. (You don't need as many as this, 4 or 5 worms will do!)





Fill the rest of the bottle with another thick layer of soil and add some grass and leaves on the top.



Then, cover the bottle with a lid of cling film and piece some holes in the top.



Wrap the bottle in paper, so that the worms are in the dark as they would be under the ground.



Finally, place the wormery somewhere in your garden where it will not be disturbed. You can check on the worms every few weeks to see how they are getting on with mixing the soil.



# RESEARCH IDEAS

## How can we save our soil?



**The world needs healthy, nutrient rich, topsoil to grow 95% of its food. However, if we continue to damage the soil that we have, we could run out within 60 years.**

### Find out:

- What is 'no-till' farming and how does it improve soil?
- What is meant by a cover crop?
- What is 'mono culture farming' and how does it affect soil health
- How can good soil health prevent flooding?
- Explore what is meant by 'crop rotation'. How could this help farmers to protect soil?

**What are the 3 most important things you think would help improve soil health?**

**If you have a garden or allotment - try out your ideas!**

# MATHS CHALLENGES

## Millie's Mud Pies

**Millie made some mud pies in her mud kitchen.**

In 5 days she made 80 sandcastles.

Each day she made 4 fewer castles than the day before.

How many castles did she make each day?

Lisa went on making 4 fewer castles each day. How many castles did she make altogether?



## Make 5 numbers

Make 10 cards numbered 0 - 9:



Each time use all ten cards.

Arrange the cards to make:

- five numbers that are **multiples of 3**
- five numbers that are **multiples of 7**
- five **prime numbers**

Make up more problems to use all ten cards to make five special numbers.

*Questions adapted from Mathematical Challenges for Able Pupils, DFE, 2000.  
Solutions at end of the pack!*



# WORD CHALLENGES



## Mud pie recipe and menu:

Everyone likes to make a mud pie with some tasty gravel crunchy pieces, or juicy leaf topping! Why not have a look at some recipe books and some menus to give you ideas and then adapt what you find to suit the pies from a mud kitchen?

## A home for the Worm Family:

Imagine that you were trying to encourage a family of worms to want to come and live in your new wormery (or your garden). What sort of home would they like? Would they prefer a certain type of soil? Are there any special benefits of your wormery, such as having a lid to protect them from being pecked at by birds? Look at some house adverts for inspiration, then try writing an advert for a wormery!



## The 'oil' in 'soil'



Pixabay

The word soil contains the phoneme **'oi'** and then ends with **'l'**. Work your way through the alphabet to see how many other words you can find that end **-oil**.

When you get to the end of the alphabet, try some different end sounds such as **'n'**.



# ART AND CRAFT

## Bake 'soil' cupcakes:

These cakes might look like they are mud pies, but they are actually sprinkled with crushed up chocolate biscuits and are completely edible! The recipes for the cake and

for the buttercream icing were taken from here:

[https://addapinch.com/the-best-chocolate-cake-recipe-ever/?](https://addapinch.com/the-best-chocolate-cake-recipe-ever/?fbclid=IwAR24PiEaRRNkzeJR-)

[fbclid=IwAR24PiEaRRNkzeJR-](https://addapinch.com/the-best-chocolate-cake-recipe-ever/?fbclid=IwAR24PiEaRRNkzeJR-)

[bs4CQtvCPEPseK33beduH8Qgkx8GDHLJmE5pz71-rc](https://addapinch.com/the-best-chocolate-cake-recipe-ever/?fbclid=IwAR24PiEaRRNkzeJR-bs4CQtvCPEPseK33beduH8Qgkx8GDHLJmE5pz71-rc) and the cakes were baked for us by Sally and Beth in Berkshire.

First, preheat your oven to 180°C or gas mark 4. Instead of making one big cake, Beth and Sally wanted cupcakes, so they lined a patty pan with cake cases.



Mix your dry ingredients (flour, sugar, cocoa, baking soda, salt and coffee if you are adding it) in a large bowl or blender.



Add the milk, oil, eggs and vanilla to the mixture and stir together well. Carefully add the boiling water and mix until very well combined.

Distribute the mixture evenly between the cake cases and bake for 25 - 30 minutes until a toothpick or knife inserted in the centre of a cake comes out clean - check the timings as they will depend on the size of your cakes!







Remove from the oven and cover with chocolate buttercream. For the buttercream, use 50g unsalted butter - beat it until it looks almost white, then add 100g icing sugar, a splash of milk and 25g of cocoa powder. Finally, beat again until smooth.



Crush up 6 - 9 chocolate biscuits, either in a blender, or by putting them in a ziplock bag and bashing them with a rolling pin! Sprinkle this 'soil' mix over your cakes.



Beth made her leaves from fondant icing, but you could use real mint leaves if you have them! Yum!

## Use soil to make paint:

Soil has been used for many years to make paints. If you don't live in a region with as many interesting coloured pigments in the soil, you can even buy some online! This site has a good explanation of how to mix up a glue and paint mix using soil samples: <https://www.earthsciweek.org/classroom-activities/painting-soil>



This artwork called Yamatane ('Earth Seed') by artist Yusuke Asai, is made using pigments made from the different soils found in Texas, US. The painting covers the walls and floors of a whole gallery room! Here is some information about the amazing work and the artist: <http://www.ricegallery.org/yusuke-asai>





### Use mud to dye fabric:

You can also use pigments from soils to dye fabrics. This technique has been used since ancient times in Japan and in many parts of Africa.

West African 'mud cloth' or Bogolan is a very famous art of the area. There are different ways that you can fix the colours from salt ash and vinegar to soy

milk. This link tells you how to do this:

[https://plymagazine.com/2019/12/dyeing-cloth-with-mud/?fbclid=IwAR05boQyU\\_S-geUzpcjyikZk\\_w6\\_zzKZNZgnSR4qsCosGztdfypbvaqKWcQ](https://plymagazine.com/2019/12/dyeing-cloth-with-mud/?fbclid=IwAR05boQyU_S-geUzpcjyikZk_w6_zzKZNZgnSR4qsCosGztdfypbvaqKWcQ)

Aurora from London used a more immediate approach, by tie dyeing a T-shirt directly from the mud in the garden! As you can see, this will also work, though the colours are more brown and they will fade after laundering without the fixatives.





## This week's use for a toilet roll tube:

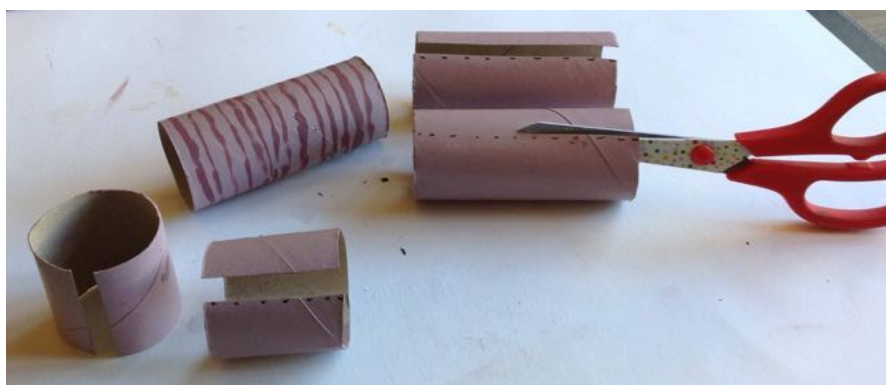
### Make a model earthworm:

To make your worm, you will need at least 4 toilet roll tubes (though you can make a longer worm by adding more and more sections.)

Paint all 5 tubes in a wormy sort of pink.

Keep three tubes in one piece, but cut the other one in half.

Take one tube and paint a few stripes round the middle. This is the middle of your worm.



Cut a slit down the length of each of the other pieces of tube.

Insert each of the half tubes into either side of the middle section.

Then insert the next two half pieces one on each side. If you have more tubes that you want to add, this is the time to do it!

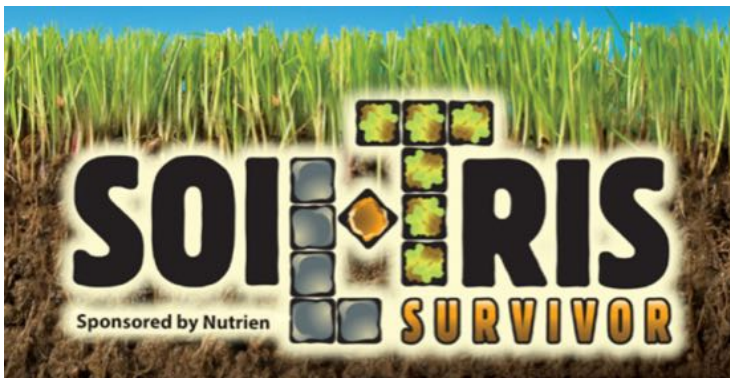
Finally, fold the end sections of the last two whole tubes until they form a pointy cone shape and poke them in at the ends.



# GAMES & SONGS

## Stuck in the Mud:

A classic 'tag' game. One player is 'it' and runs around trying to tag the other players. When this happens, the tagged players must stand with arms and legs wide - they cannot move as they are 'stuck in the mud'. Other players can free these people by tapping them on one of their outstretched arms, but must avoid getting tagged whilst doing so!



Nutriens

## Soil Tetris:

Play this online, Tetris-like game to help a seed grow in the right kind of soil. Choose your blocks carefully though, pack your particles too closely and the roots won't have optimum chances for the plant to grow!

<https://leara-elearning.com/projects/nutrien/soiltris/>

## Sleeping seeds:

Much like sleeping lions, but the children pretend to be seeds which are waiting to sprout. Waiting, curled up tightly... For a long time... Once they start growing, they can emerge from the soil very slowly, with an arm or leg appearing as the shoot first, before they stand up as the fully grown plant. Depending how much work you need to get done, you may encourage the seed to stay in the soil for an extended period!

## Mud, Mud Glorious Mud:

A favourite sing a long song! Join in with the lyrics on display here (Youtube link, supervision recommended):

<https://www.youtube.com/watch?v=2cGc8Lczn5E>



# LEARNING LINKS

There are a large number of resources available for online learning at this time. We'd always recommend that you support your child with this and only follow links from reputable names. **Any links provided here have been checked for suitability.**

This amazing site by **Dig Deeper** will tell you all you need to know about soil! It's a US based site, so the state soil maps and the 'careers in soil' sections are based there, but the other information is relevant world wide:

<https://www.soils4kids.org/about>

A slightly simpler site about soil can be found here. There are some quizzes at the end to test your new soil knowledge:

[https://www.ducksters.com/science/earth\\_science/soil\\_science.php](https://www.ducksters.com/science/earth_science/soil_science.php)

**The Kid's Garden** has a page with some facts about soil here:

<http://www.thekidsgarden.co.uk/teachingkidsaboutsoil.html>

If the study of soils captures the interest of one of your children and you want to dig a bit deeper, this selection of lesson plans is deigned for teachers but has a good range of supportive videos and materials that would allow you to set up an in depth study at home.

<https://www.soils4teachers.org/lessons-and-activities>

## Answers to Maths Challenges:

### Millie's Mud Pies

Over the 5 days Millie made

24, 20, 16, 12 and 8 mud pies.

She made 84 mud pies altogether.

### Make 5 numbers

For example:

a. 12, 39, 45, 60, 78.

b. 7, 42, 63, 98, 105.

c. 5, 23, 67, 89, 401.

There are other solutions.