

Science - Year 3

Plants – Block 3P

Roots and Shoots

Session 1

Resource Pack

Message from Zinnia

(video at <https://www.youtube.com/watch?v=9bMzrvRbqms>)

Calling Earthlings! Calling Earthlings!

Ahhh! At last there seems to be someone there!

Hello Earthlings! I have been trying to contact someone on your planet for yargons. I can see you but I do not think you can see me!

What's that you say?

You can see me?

Well that's fantastic. Now I'd better be quick because communication windows are very short. I don't have long to explain and I need your help. My name is Zinnia and I come from a very distant planet called Dock 5. We have been watching you on Earth for a long time. We have learnt your languages and love your primitive technology. We have discovered how much Earthlings like to travel and want to set up an Earthling Hotel on our planet so that in the future, human beings will be able to visit us.

We have been studying the kinds of food that you eat and realise that your food mostly comes from strange, green life forms called plants. Is that correct?

Good. So here's the problem. Dock 5 is much too far away to get deliveries of Earthling plant foods for humans to eat at our hotel. We will need to grow our own Earthling food supplies.

That is where we need your help. We do not know how to grow Earthling food. **We need you** to find out exactly what plants need to grow strong and healthy so we can set up our own Earthling food farm on Dock 5. Is that something you could research for us?

Great. Thank you!

We would also like to find out which parts of plants are eaten and a list of different plants you think we should grow. Is this also something you could do for us?

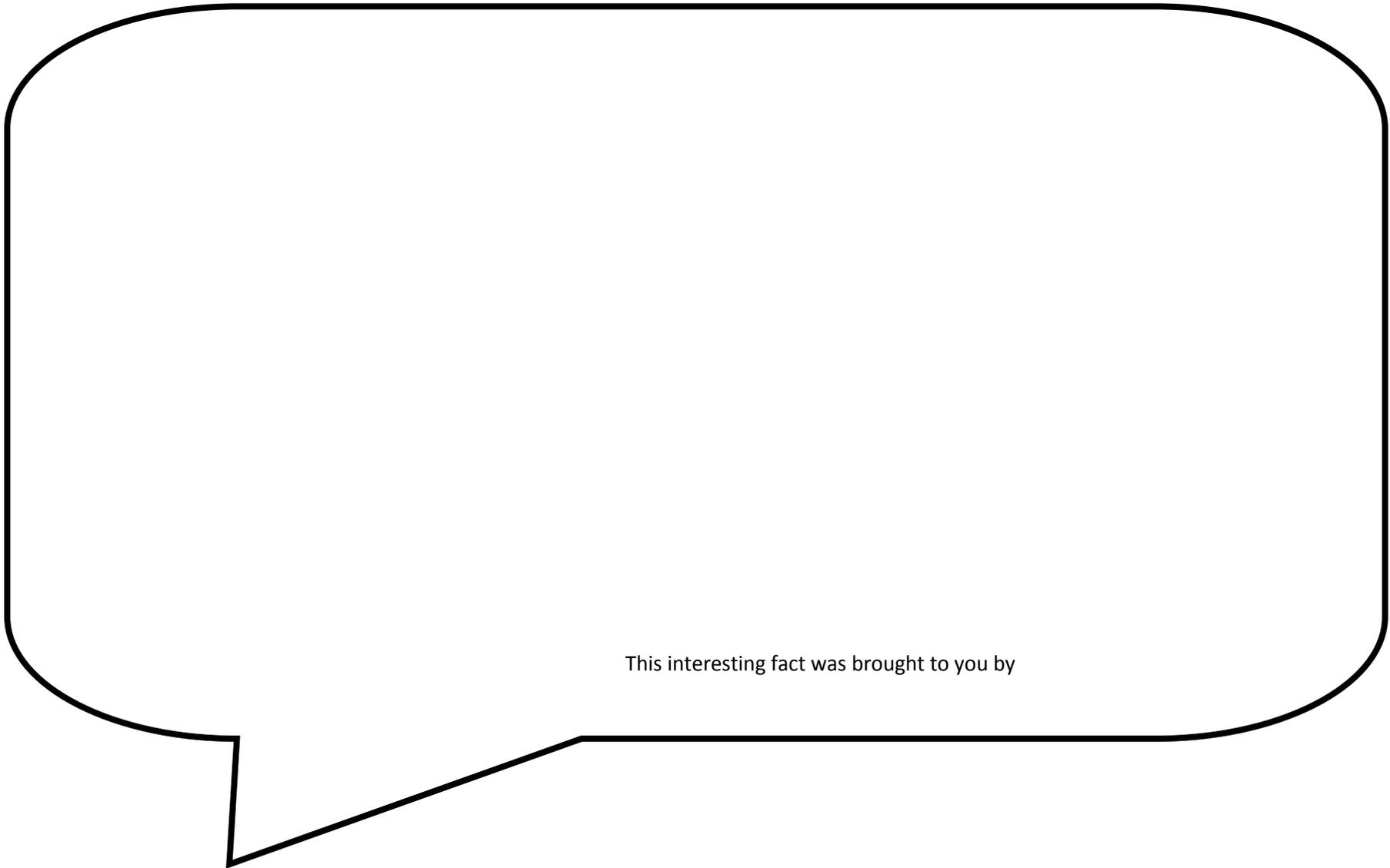
Wonderful. You Earthlings are so incredibly kind and helpful.

I will try to contact you again in ... oh no I think the communication window is about to fail. I'm losing you

Goodbye Earthlings!

Display shapes

Write your plant fact in the speech bubble in neat large handwriting for a "Did you know ...?" display. Draw a picture to illustrate it and colour it in. Write your name in the box. Try to choose a fact that no one else has written.

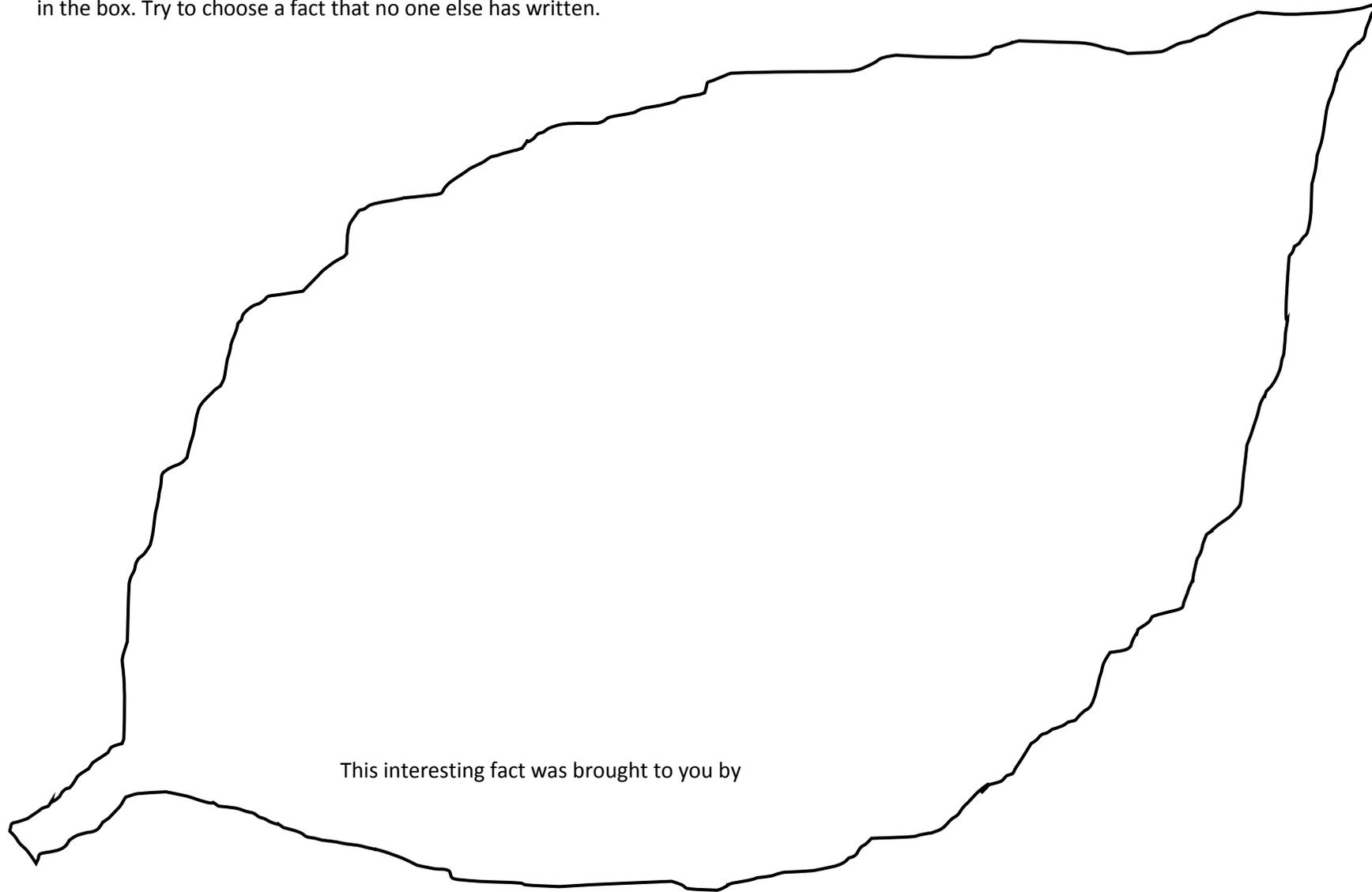


This interesting fact was brought to you by

Write your plant fact in the leaf in neat large handwriting for a "Did you know ...?" display. Draw a picture to illustrate it and colour it in. Write your name in the box. Try to choose a fact that no one else has written.

This interesting fact was brought to you by

Write your plant fact in the leaf in neat large handwriting for a “Did you know ...?” display. Draw a picture to illustrate it and colour it in. Write your name in the box. Try to choose a fact that no one else has written.



This interesting fact was brought to you by

Name:

I can set up an investigation to help answer a question

Investigation Planning Sheet

How important is _____ in the health and growth of seedlings?

To answer this question we will plant 3 seedlings and control the amount of _____ that each one has.

In the boxes below, describe how you will control the amount.

Seedling 1	Seedling 2	Seedling 3
None	Some	Plenty

We will check on our 3 seedlings regularly over the coming days and weeks and take measurements and notes of their growth and health.

Our Results

Days		Seedling 1 (None)	Seedling 2 (Some)	Seedling 3 (Plenty)
0 (Set up day)	Height			
	Notes			
	Height			
	Notes			

Days		Seedling 1 (None)	Seedling 2 (Some)	Seedling 3 (Plenty)
	Height			
	Notes			
	Height			
	Notes			
	Height			
	Notes			
	Height			
	Notes			

Name:

I can find out interesting facts by researching in books and online

There are so many interesting things to discover by reading about plants online or in books e.g.

- Why does a plant need roots?
- What happens in the leaves?
- How do plants make new plants?
- Why do leaves change colour in autumn?
- How long can plants live?
- Why do flowers smell?
- Why are most plants green?
- What is pollen?
- How big or small can a plant be?
- Can plants get ill?

And so much more!

Here are some good websites

<http://www.dkfindout.com/uk/animals-and-nature/plants/>

<http://www.sciencekids.co.nz/sciencefacts/plants.html>

<http://factsforkids.net/plant-facts-for-kids/>

<https://www.bbc.co.uk/bitesize/topics/zgssgk7/articles/zyv3jty>

Task

Try to find out 3 plant facts and write them into these "*Did you know...?*" statements.

Did you know that
Did you know that
Did you know that

If you have time, write one of your facts in a speech bubble for a ***Did you know...?*** display on plants. Make sure you choose a fact that no one else has written up. You could draw a picture to illustrate it.

Session 1 Teachers' Notes

Motivational Scenario

The motivation and purpose for this block comes from a message received from an alien life form (Session 1 resource film clip at <https://www.youtube.com/watch?v=9bMzrvRbqms> – **first message from Zinnia**). The message needs to appear mysteriously on your laptop as it is being shut down at the start of the lesson in a way that leads the children to think that it has been strangely intercepted. Pretend to be doing something else on the laptop as the children settle for the start of the lesson by saying something like

“Sorry everyone, my laptop is really playing up, I’ll just shut it down so we can begin the lesson.

Well that’s strange – what’s this? - then play the clip.

An alien called Zinnia explains that they are trying to set up a hotel for humans on her planet (Dock 5) as they see how much Earthlings enjoy travel. But Dock 5 is too far away to receive deliveries of Earthling food so they will need to create an Earth Plant Farm in space. She needs the children’s help as she has no idea what Earth plants need to grow strong and healthy. She also needs them to find out which parts of plants humans eat and would like a list of popular food plants.

The film needs to appear as if it is a “live transmission” from Zinnia. It is important that you watch it with astonishment. There are a few places in the film that require a reaction from the children so make sure that you and any other adults in the room are ready to lead the way in reacting to her. First she declares that she can see the children but she doesn’t think they can see her. She then leaves a short pause so be ready to say something like “We can see you!” The children will hopefully follow suit. Later in the message she asks the children a few simple questions so once again be ready to lead the way with answers.

Hopefully the children will be excited by the message and it will provide strong motivation and context for their plant research. It is probably necessary to explain that you were planning to do a plant topic in science this term anyway (although nothing like as exciting as this one) since otherwise they may be suspicious of the resources you have prepared.

Encouraging children’s suggestions on the essential factors for plant growth

Zinnia needs the children to research what Earth plants need to grow strong and healthy. This provides the perfect opportunity to set up an investigation on plant growth over time, testing the children’s ideas on which factors are involved. In order to set up such an investigation, the children need to suggest what these factors might be so they can control them as variables. When asked the question “*What do you think plants need to grow strong and healthy?*” they will probably think of water and possibly soil and/or light but may not consider warmth, space or air (carbon dioxide/oxygen). As you need them to investigate all these factors it may be necessary to prompt their thinking with careful questioning.

Soil	Try to use children’s knowledge and experience of plants. Ask if anyone grows any food in a garden, window box, planter or allotment. What do they plant crops in? Possibly compost or soil or they may dig in manure. Why is this? Does it lead to a good crop?
Air	Encourage children to think about the differences between plants growing on planet Earth and Dock 5 by saying something like <i>“I expect Dock 5 will be really different to Earth. Zinnia and the other aliens probably don’t even breathe air like we do. Do you think that might affect plants? Yes, maybe they need the gases that are in our air but are not in the atmosphere on Dock 5.”</i> Some children will know that oxygen is the name of the gas we need in air so they may suggest writing this as a factor. If they do, explain that oxygen is just one of the gases in our atmosphere and it is possible that plants may use other gases as well or instead. At this stage it is best to write “air” rather than a named gas and later use secondary sources to be more precise.

Heat and Light	Remind the children that on planet Earth a lot of our food is grown on farms. Can farmers and gardeners grow crops outside at any time of year? That's right, they mostly plant in the spring and harvest in the autumn. Which months are best for growing? Yes, the summer months. I wonder why that is. Yes, there's usually more sunshine in the summer. I wonder what it is about sunshine that may help plants to grow – yes warmth and light. The days in summer are longer, brighter and warmer.
Space	Once again, try to use children's knowledge and experience of plants. It's fun to grow things isn't it? I've got a very little flowerbed/window box – do you think I could grow all my own potatoes, carrots, peas, cabbages and lettuces? Why not? I suppose you are right, they wouldn't all fit in. Do you think plants need enough space to grow then?

Resources

It is suggested that for this investigation the children use seedlings rather than planting seeds. Seeds have a germination period which will delay the start of the growing investigation. The process of germination may also confuse the data as seeds contain their own food supply so the plant's need for light may not be evident for a few weeks.

Bean seedlings are perfect in that:

- they are quite robust and will stand being handled by the children
- they have good sized leaves which may make it easier for children to find ways to exclude air e.g. wrapping in cling film or painting with PVA
- they grow tall and fast so the height measurements will increase at an exciting pace

You will need about 30 -40 seedlings as some will become damaged during planting and the group investigating space may want to plant several in one pot. You could plant them yourself 2-3 weeks ahead of the first session or buy them as seedlings in trays.

You will also need potting compost and a supply of at least 18 identical flowerpots (choose a reasonable size (e.g. at least 12cm diameter) as your seedlings will be bean plants after a few weeks).

Tasks

There are 2 tasks: i) setting up the investigation (teacher led) and ii) a research task (independent). It is suggested that you divide the children into 6 mixed ability groups so that each group can investigate one of the factors.

Work with 3 groups at a time to set up the investigation whilst the remainder work on the independent research task. Then swap around so all children get to do both tasks.

Investigation

Assign each group to a different factor (water, light, air, space, warmth or soil). Encourage each group to think about what they can do to find out how important their factor is. Discuss ideas. Yes we will need to see if plants can grow without your factor over a length of time. Ask how they might control their factor. How will you know whether it is the lack of *light/warmth/soil* etc. that has affected it? Yes, you will need to grow other seedlings to compare it to. You could compare seedlings with plenty of your factor, a little of it and none at all. Suggest that each group plants 3 seedlings, setting up each with a different amount of their factor. They should discuss and decide how they might vary the amount of their factor. Below are some ideas that you could suggest if they cannot think of a workable way to do it.

Factor	None	Some	Plenty
Water	Do not water	A small measured amount of water per week e.g. a capful	Water regularly so the soil stays moist
Light	Place in a dark place like a cupboard or large lidded box or with a large black bag taped around the flowerpot	Place in a cupboard with the door open or a deep box with the lid off, or in a dark corner of the room away from direct sunlight, or with a translucent bag taped around the flowerpot	Place in a bright sunny place e.g. on a windowsill
Warmth Encourage children in this group to take the temperature now and again in their 3 locations to check the difference and add this to their notes	You could place it in a fridge but children may need to think about the fact that the light only comes on when the door is open so they would be excluding light and warmth.	Place outside in a shady place (keep an eye on the weather as it could become warmer outside than inside)	Place near a radiator or on a sunny windowsill.
Soil	Wash soil away from the roots and put it back into the flowerpot	Plant it in half a flowerpot of soil/compost	Plant it in a full flowerpot of soil/compost
Space	Plant several seedlings in the same pot or use a very small pot	Plant 2 or 3 seedlings in the same pot or use a medium sized flowerpot	Plant only a single seedling in a large flowerpot
Air	Think of ways to keep air out of the leaves (top and bottom). Try covering leaves with cling film or painting leaves with thick PVA. As new leaves are produced over the coming weeks, chn should continue to exclude the air.	Cover half of the leaves with PVA or cling film but leave the rest alone	Do not cover the leaves in any way

Making Observations over time

The children's task sheet encourages them to make regular observations of their seedlings by measuring the height and making notes on their health and appearance. The children could make weekly observations during science sessions but they will probably be motivated to check on their seedlings much more frequently. You can provide more copies of the second page of the task sheet to give space for more observations. The task sheet requires them to note the number of days the investigation has been running for each observation. It would help if you display an investigation calendar so the children can write the number of days it has been running.

Research Task

The independent research task challenges the children to find out three facts about plants and write them on their task sheets. This can be done using age appropriate non-fiction or online. Some suitable websites are

provided but please be aware these sometimes carry advertising. If time the children can write one of their "Did you know..." facts on a display sheet. There is a choice of either a speech bubble or leaves. You could print the leaves on different shades of green paper and make a beanstalk style display or alternatively print photos of the children with facts displayed in speech bubbles.



Provide the children with the display sheets of your choice and encourage them to make sure their display fact is different to those already written.