SCIENCE WEEK

#scienceweek

10-17 Nov 2019

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CLIMATE CHANGE

Classroom Resource Booklet

Discover Primary Science and maths
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DPSM/ESERO

FRAMEWORK FOR INQUIRY

THEME	OVERALL THEME	
CURRICULUM	Strand:	
	Strand Unit:	
	Curriculum Objectives:	
	Skills Development:	

ENGAGE		
THE TRIGGER	**WONDERING**	**EXPLORING**

INVESTIGATE			
STARTER QUESTION	**PREDICTING**	**CONDUCTING THE INVESTIGATION**	**SHARING: INTERPRET-ING THE DATA / RESULTS**

TAKE THE NEXT STEP		
APPLYING LEARNING	**MAKING CONNECTIONS**	**THOUGHTFUL ACTIONS**

Considerations for inclusion

REFLECTION	

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THEME	CLIMATE CHANGE
CURRICULUM	**Strand:** Living Things, Environmental Awareness and Care **Strand Unit:** Environmental Awareness, Caring for my Locality, Caring for the Environment **Curriculum Objectives:** Identify, discuss and implement simple strategies for improving and caring for the environment; Identify positive aspects of natural and built environments through observation, discussion and recording; Identify and discuss a local, national or global environmental issue **Skills Development:** Questioning, Observing, Predicting, Analysing, Investigating, Recording and Communicating

ENGAGE

THE TRIGGER	WONDERING	EXPLORING
Wildfires in the Amazon Rainforest https://www.rte.ie/news/2019/0821/1070179-five-things-to-know-about-the-amazon/ https://www.esa.int/Our_Activities/Observing_the_Earth/Copernicus/Sentinel-3/Fires_ravage_the_Amazon	• What has been happening in the Amazon? • Why is this important to us? • Why is the Amazon called "the lungs of the Earth?" • Why are trees important for reducing Climate Change and protecting Biodiversity? • Do we have similar problems in our country? • Do we have enough trees in our country / our local area? • Do we have enough trees in our school? • What types of trees do we have? • Can we take action in our local area to help protect us from Climate Change and Biodiversity loss? • Could we plant some trees, and if so, what would they need to grow?	• The Story of Energy video, man-made climate change and what causes it https://www.seai.ie/teaching-sustainability/primary-school/resources-for-teachers/ • The Greenhouse Effect https://www.esa.int/esatv/Videos/2018/05/Paxi_-_The_Greenhouse_Effect • Why trees are important https://crann.ie/all-about-trees/planting-tips/why-it-is-important-to-plant-trees-and-hedgerows/ • Looking at trees and forests at different scales, in our country, our local area and around our school. • Google Maps Satellite view and 3D view can show the trees in the school and local area. • http://map.geohive.ie/mapviewer.html can be used to show Ancient & Long-established Woodland Inventory, 2010, National Parks and Wildlife Service. • Growing Seeds and Plants https://www.sfi.ie/site-files/primary-science/media/pdfs/col/sci_at_home_how_plants_drink.pdf

Considerations for inclusion

Consider potential area of difficulty for students with Special Educational Needs.

INVESTIGATION 1 – WHAT DO PLANTS NEED TO GROW?			
STARTER QUESTION	**PREDICTING**	**CONDUCTING THE INVESTIGATION**	**SHARING: INTERPRETING THE DATA / RESULTS**
• What conditions do plants need to grow? Soil, water, air, light, temperature?	• Will my seeds grow without air? • Will my seeds grow without light? • Will my seeds grow without water? • Will my seeds grow without soil? • Will my seeds grow if they are too cold or too hot?	• How will we conduct our investigation? • Can we investigate all questions at once? • Why not? Importance of fair testing. If we change more than one thing, we don't know which gave us our result. • Investigation one looks at whether cress seeds need light to grow. For ideas on investigating other requirements for growth see: http://esamultimedia. esa.int/docs/edu/PR42_ AstroFarmer.pdf • Set up all tests separately. • Consider getting each group to choose a separate starter question and decide how they will investigate.	• Did all of the seeds grow? • Which conditions are necessary for plant growth? • We have looked at what plants need to grow from seed. What about planting trees outdoors? We need to look at suitability.

Considerations for inclusion

Consider potential area of difficulty for students with Special Educational Needs.

INVESTIGATION 2 – MAPPING OUR SCHOOL / OUR LOCAL AREA				
STARTER QUESTION	PREDICTING	CONDUCTING THE INVESTIGATION	SHARING: INTER-PRETING THE DATA / RESULTS	
• Where are the trees around the school?	• Children suggest based on prior observations, then verify by actually mapping.	• Children map their immediate surroundings https://www.epa.ie/pubs/reports/other/education/primary/environmentalcare/EPA_education_environmental_care_treasured_map..pdf • Use Looking at the Earth (ESERO 56) activity on interpreting data from Google satellite view. https://esero.ie/wp-content/uploads/2015/01/56_Looking-at-the-earth.pdf	• How do our maps compare to Google satellite view? • Are there many trees in our local area? • Can we identify areas where we could plant more trees? • How would we go about this, considerations; native species, urban trees, tree size? • Could we plant some more trees in our school? • What trees would be suitable to plant in our school? https://treecouncil.ie/tree-advice/right-tree-right-place/ • Native trees are better for biodiversity.	**Considerations for inclusion** Consider potential area of difficulty for students with Special Educational Needs.

INVESTIGATION 3 – TREE SURVEY			
STARTER QUESTION	PREDICTING	CONDUCTING THE INVESTIGATION	SHARING: INTERPRETING THE DATA / RESULTS
• Can we learn more about the trees in our school / our area? • What types of trees are there? • How tall are the trees?	• Before using the clinometer to measure the height of the tree, children think of other ways to estimate the tree heights e.g. Estimate by comparison with their own height, height of buildings etc.	• Make a clinometer in the classroom http://www.sfi.ie/site-files/primary-science/media/pdfs/col/dpsm_clinometer_activity.pdf • Measure trees in the school grounds. • Can we identify the trees in our school? • Are there any leaves left to help us? • Can we identify the trees without leaves? https://www.woodlandtrust.org.uk/naturedetectives/activities/2015/09/twig-id/	• How did the measured height compare with our estimates? • Were we happy with our measurements? • Were we surprised at the results? • Is there a link between the diameter of a tree and its height? - further investigation • Mark the heights of trees on our map from previous investigation • Could we make a 3D map / model of our school?

Considerations for inclusion

Consider potential area of difficulty for students with Special Educational Needs.

TAKE THE NEXT STEP		
APPLYING LEARNING	MAKING CONNECTIONS	THOUGHTFUL ACTIONS

Other Tree Related Resources
- Trees and Seasons
  http://www.sfi.ie/__uuid/136a942f-959a-46bd-b558-e65c014ad7dc/13119-SFI-Science-Week-2018-Primary-School-Booklet-Updated-Final.pdf
- http://www.heritageinschools.ie/teachers-resources#filters
- Biodiversity and Ecosystem Services
  https://www.youtube.com/watch?v=cAg0TVPsZdM
- Wild Things at School - Éanna Ní Lamhna
  http://www.heritageinschools.ie/content/resources/Wild_Things_at_School.pdf
- The Irish Tree Trail
  http://easytreesie.weebly.com/the-irish-tree-trail.html#
- Brigit's Garden Winter Twigs and Coppicing
  http://brigitsgarden.ie/news/29/92/Down-To-Earth-by-Carol-Barrett-Recognising-Irish-Trees-in-Winter
- Tree Survey in the School
  https://www.schoolearthed.ie/pdf/intouch/ZoomInOnTrees_JanFeb2012.pdf
- Nature Detectives activities from Woodland Trust UK including Winter activities
  https://www.woodlandtrust.org.uk/naturedetectives/activities/

Other Climate Change Resources
- Earth Under the Lid - ESERO
  https://esero.ie/wp-content/uploads/2018/12/PR15_Earth_under_the_lid.pdf
- Understanding Information from Satellite Images
  https://www.esa.int/Education/Teachers_Corner/From_the_ground_and_from_the_sky_Analysing_and_understanding_images_of_planet_earth_taken_from_space_Teach_with_space_PR10
  teacher guide has all the images, 24pp, student guide has space for responses 10pp
- SEAI Resources on Energy and Climate Change
  https://www.seai.ie/community-energy/schools/primary-school/resources-for-teachers/
- Examining the Evidence for Climate Change: Trocaire
  https://www.trocaire.org/sites/default/files/resources/edu/creating-futures-lesson-3.pdf
- How can planting trees help?
  http://blogs.discovermagazine.com/d-brief/2019/07/04/could-planting-tons-of-trees-solve-climate-change/#.XX9orShKiUm

Consider potential area of difficulty for students with Special Educational Needs.

REFLECTION	- Did I meet my learning objectives? - Are the children moving on with their science skills? - Are there cross curriculum opportunities here? - What went well, what would I change? - Did I take into account the individual learning needs of my students with SEN? What differentiation strategies worked well?

WHAT DO PLANTS NEED TO GROW?
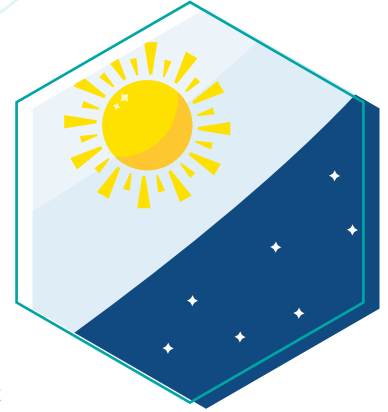
Do plants need light?

The children will investigate how cress grows in different lighting conditions; natural light (preferably near a window) and in constant darkness. If preferred, the children could work in groups on different investigations about what plants need to grow e.g. water, soil, air. For ideas see http://esamultimedia.esa.int/docs/edu/PR42_AstroFarmer.pdf

Equipment

- Cress seeds
- 2 identical pots/containers per group
- Moist potting compost
- Spoons/trowels
- Dark cupboard
- A ruler

Investigation: What lighting conditions are best for cress seeds to grow?

- Working in small groups the children plant the cress seeds.
- Give each group the materials listed above. Groups decide how they are going to make their investigation a fair test – what one thing will they change and how will they keep all other conditions the same?
- Groups plant the seeds and each group places one in natural light and the other in darkness.
- Groups make a prediction on how the cress seeds will germinate and grow in natural light and darkness. Have the children ever seen a plant that has been left in the dark? What will happen to a plant if it cannot get any sunlight? The students could write /or draw their predictions.
- Leave the pots for approximately 4-7 days. Discuss and record results. After a week, the cress grown in darkness should be taller, because it is growing in search of light, did the cress grown near the window bend towards the light? Cress grown in sunlight should have a healthy green leaf. The cress grown in the dark may have a paler yellowish coloured leaf. This is because chlorophyll makes the leaves green and plants need sunlight to produce chlorophyll.

TIP

You can draw a face on the plant pots so the cress looks like hair!

Looking at the Earth (ESERO Lesson 56)

Learning outcomes

- Know that the Earth looks flat on maps
- Work with Google Maps
- Use internet
- Interpret maps

Materials

- 12 computers with internet or you can print some maps from Google Maps. The children can use these printed maps to work from.
- Globe
- Maps of the world

Preparation For the activity

For the activity **What can you see?** you will need a copy of a map of the world. You will also need a globe.

For the activity **Explore the Earth** set up the computers to show the internet page of Google Maps.

What can you see? (10 min).

1. Move the chairs to the side of the classroom and organise the children into pairs. For Task 1 on the worksheet, child 2 stands opposite child 1 and child 1 draws his/her portrait (frontal view). Then child 2 sits on the ground and child 1 draws him/her as seen from above. The children swap roles and repeat the task.
2. Ask the following questions:
   - What is the difference between the two drawings?
   - Can you recognise the child in the second drawing?
   - Why does the same child look so different?
3. Come to the conclusion that you can look at an object from various viewpoints. This means it will look different every time.
   - Give everyone a map of the world.
   - Ask what the difference is between a map and a globe.
   - Can you make a globe from a map?
   - Encourage the children to roll up their map to form a tube.
   - Does the map look the same as the globe now? Why not?
   - How do people know what the world looks like? Explain that we now have satellites orbiting the Earth. These satellites can take photographs of the planet.
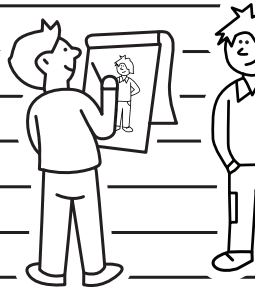
Explore the Earth (40 min).

1. The children investigate what the Earth looks like when viewed from above.
2. The children complete Task 2 on the worksheet.
   - Explain that the photographs they can see on Google maps were taken from satellites or aircraft.
   - Discuss the task. Come to the conclusion that the blue is water, the green is grass, trees and forest, red and grey are houses, and grey is roads. Make sure the children realise that everything is seen from above. The rectangular shapes on the road are cars, the shapes of trees are also visible.
   - Explain that people use Earth observation satellites to look at the world from above. This means you can only see the top of things and people.
   - Discuss the example from the activity. **What can you see?** The children looked very different seen from above than from the front. The children complete Task 2.
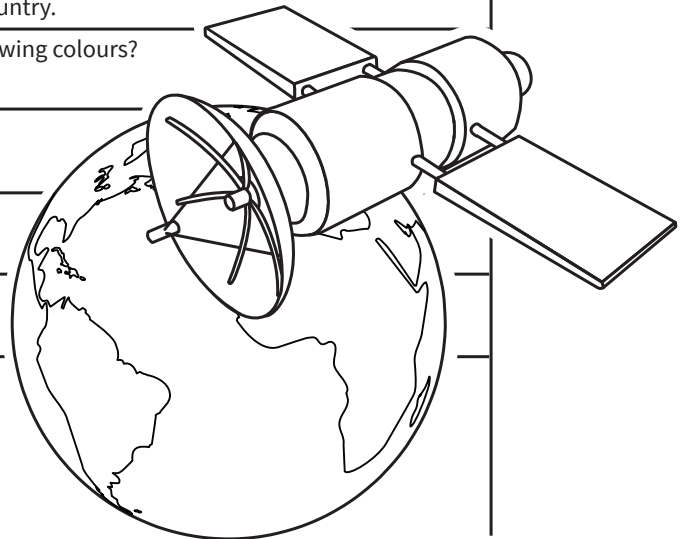
*Reference: ESERO Netherlands

Worksheet

Task 1.

1	What can you see?
a	In the box below, draw the front view of your partner who is standing facing you.

draw your partner HERE

a	In the box below that, draw the top view of your partner who is sitting facing you.

draw your partner HERE

Task 2.

2	**Explore the Earth**
👆	1 Go to Google maps.
	2 Click on the 'Satellite' button in the top right-hand corner.
	3 Go to the search window and type the name of your country.
a	What are the areas with the following colours?
	Blue:
	Green:
	Grey/red:
	Grey:
	4 In the search window type the name of your town, followed by the name of your country.
b	What are the areas with the following colours?
	Green:
	Grey:
	Red:

- Now type the following information in the search window: The street your school is in, the town your school is in, the country your school is in.
- Zoom in by moving the sliding bar on the left all the way up to the plus sign.
- Can you see your school? What part of your school can you see?
- Search for a street near your school. Zoom all the way in by moving the sliding bar all the way up to the plus sign again. What can you see on the street?

## Make a Clinometer and Measure the Height of a Tree

Learning Objective

Observing and recording in the natural environment (SESE: Science, Teacher Guidelines, Exemplar 12, p. 64): "Children should be encouraged to observe and record features of the environment that they are investigating. The children should measure the size of the habitat, using standard or non-standard units".

APPROXIMATE HEIGHT OF TREE = A+B

A = distance from ground to eye

B = distance from person to tree
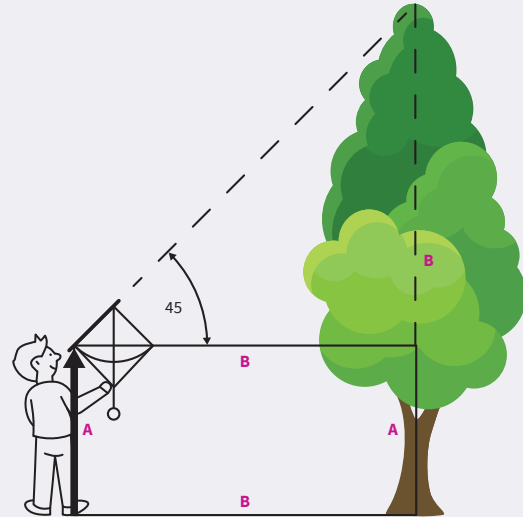
Equipment

- Template
- Card
- Straw
- String
- Sellotape
- Plasticine

Preparation

Photocopy the clinometer template at the end of the activity sheet.

Background information

A Clinometer is a useful piece of equipment for measuring angles and calculating approximate heights. It is used frequently in forestry, engineering and astronomy. It is also called an Astrolabe on account of being used in astronomy. It was invented over 1,000 years ago and was an important piece of equipment for early navigators. You can use it here to estimate the height of a tree (assuming the tree is vertical!). (Activity adapted from 'The TTS Make and Take Book 2')

Trees are one of the longest-living of all plants. They are very important because they absorb carbon dioxide from the air and produce oxygen for us to breathe (photosynthesis). They also become the habitat and source of food for many animals when they are grown, and are a safe habitat for many birds.

## Trigger questions

- Why are trees important? (Oxygen-producers, habitats, etc.)
- Pick the tree whose height you want to measure.
- Make sure you can measure the distance from you to its base.
- What is the name of the tree?
- Does it lose its leaves in winter? etc.
- Can you guess the height of the tree? Do you know your own height? How many times taller than you do you think the tree is? Now can you estimate the height of the tree? (Multiply this number by your own height).

Making the clinometer

- Stick the clinometer pattern onto card and cut it out.
- Tape a straw (cut to the same length) along the top edge.
- Attach some plasticine to a piece of string and hang it onto point X so that it hangs freely.
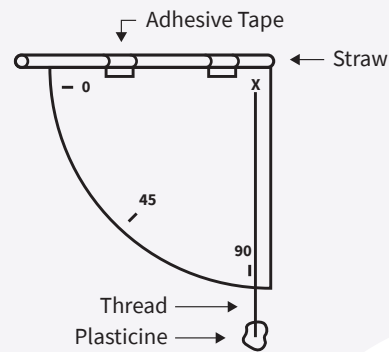
Using the clinometer
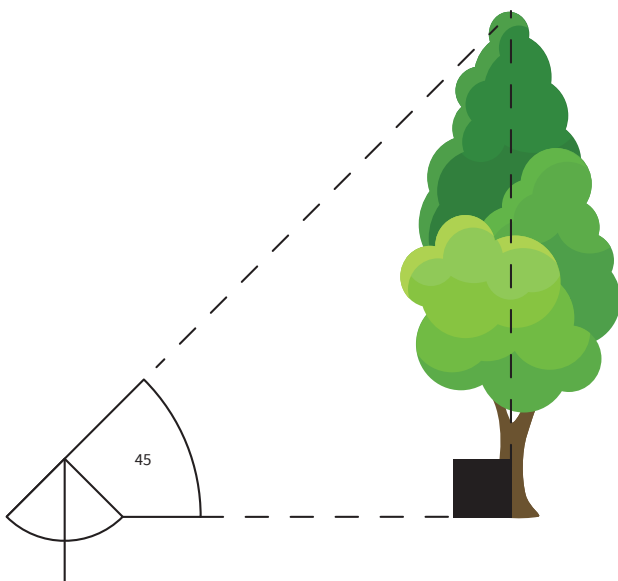
- Face the tree whose height you want to measure.
- Looking through the straw at the end away from the string, adjust the angle of the card until the string hangs at 45°.
- Now walk towards or away from the tree until you see the top of the tree through the straw. (This is easier to do with two people - one looking through the straw while the other keeps an eye on the string.)
- Estimate and then measure the approximate distance from you to the base of the tree. What instrument would you use to measure the distance?
- What sort of triangle is made in this diagram? (Isosceles triangle)
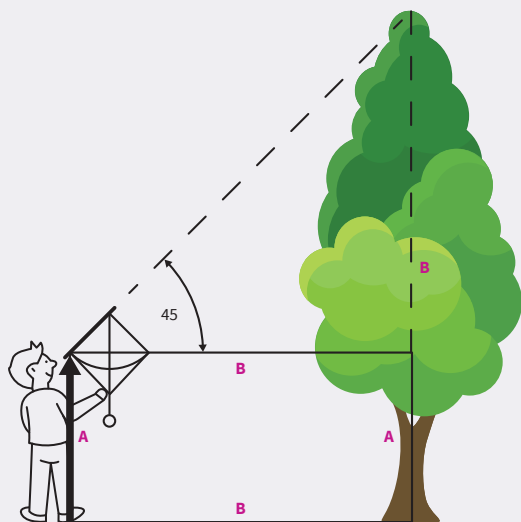
- Can you now estimate the height of the tree? *(it will be approximately the same as the distance from you to the base of the tree, because you have an isosceles triangle).*
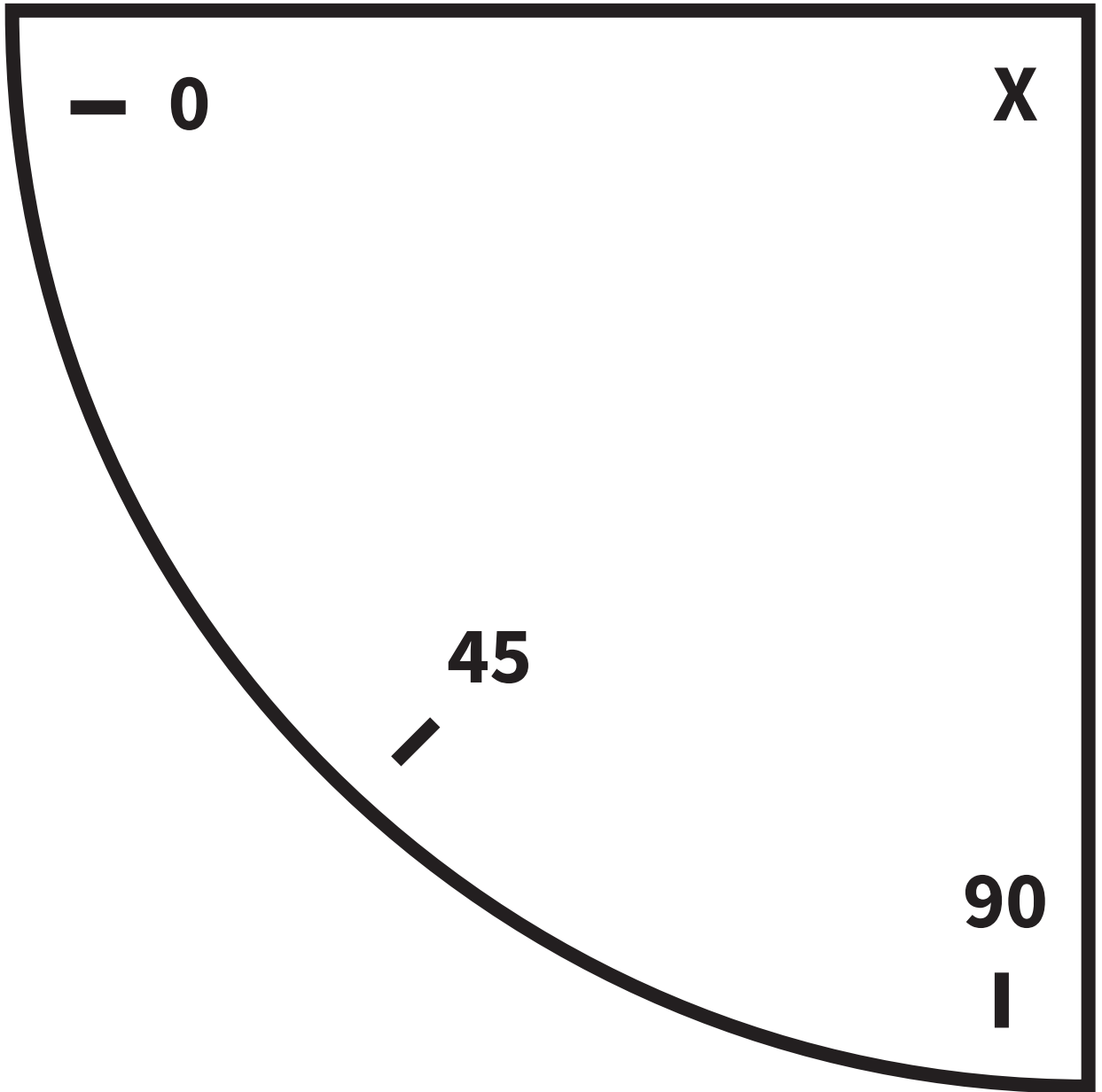- If you want to get a more accurate height for the tree, what do you think you have to add in? *(Your own height).*
  HEIGHT OF TREE = A+B

Safety

Do not look directly at the sun through the clinometer, it would damage your eyes.

Clinometer Template

Attach a straw along this edge

— 0

X

45

/

90

I

FRAMEWORK FOR INQUIRY –
PROMOTING INCLUSION

When planning science activities for students with Special Educational Needs (SEN), a number of issues need to be considered. Careful planning for inclusion using the framework for inquiry should aim to engage students in science with real purpose. Potential areas of difficulty are identified below along with suggested strategies. This list is not exhaustive, further strategies are available in the Guidelines for Teachers of Students with General Learning Disabilities (NCCA, 2007).

ENGAGE

POTENTIAL AREA OF DIFFICULTY
Delayed language development/poor vocabulary/concepts

STRATEGIES
- Teach the language of science demonstrating meaning and/or using visual aids (material, property, strong, weak, textured, dimpled, absorbent, force, gravity).
- Have the student demonstrate scientific phenomena, for example gravity —using 'give me, show me, make me,' as much as possible. Assist the student in expressing ideas through scaffolding, verbalising a demonstration, modelling. Use outdoor play to develop concepts.

INVESTIGATE

POTENTIAL AREA OF DIFFICULTY
Fear of failure/poor self-esteem/fear of taking risks

Understanding Time and Chronology Fine/Gross Motor Difficulties Short Term Memory

STRATEGIES
- Model the speculation of a range of answers/ideas.
- Repeat and record suggestions from the students and refer back to them
- Practice recording the passing of time, establish classroom routines that draw the students' attention to the measurement of time.
- Teach and practice the language of time.
- Allow time to practice handling new equipment.
- Allow additional time for drawing diagrams, making models etc.
- Give students the option to explain work orally or in another format.
- Provide the student with visual clues/symbols which can be used to remind him/her of various stages of the investigation.

TAKE THE NEXT STEP

POTENTIAL AREA OF DIFFICULTY
Developing Ideas
Communicating Ideas

STRATEGIES
- Keep ideas as simple as possible, use visuals as a reminder of earlier ideas. Discuss ideas with the whole group.
- Repeat and record suggestions from students and refer back to them.
- Encourage work in small group and in pairs.
- Ask students to describe observations verbally or non-verbally using an increasing vocabulary.
- Display findings from investigations; sing, do drawings or take pictures.
- Use ICT: simple written or word-processed accounts taking photographs, making video recordings of an investigation.

REFLECTION

- Did I take into account the individual learning needs of my students with SEN? What differentiation strategies worked well?
- Did I ensure that the lesson content was clear and that the materials used were appropriate?
- Was I aware of the pace at which students worked and the physical effort required?
- Are there cross curriculum opportunities here?
- Are the students moving on with their skills?
- Did the students enjoy the activity?

More strategies, resources and support available at www.sess.ie

ENGLISH / IRISH

- Write a description of a tree in the school grounds.
- Write a story from the point of view of a tree in your school or area. How old is the tree? What changes has it seen in the environment?

GEOGRAPHY

- Environmental Awareness and Care: The role of trees in our immediate environment. Why do we plant trees? Why do we need to look after our trees and how can we do that?
- Maps: Where are our nearest hedgerows, parks, forests, peatlands? Draw a biodiversity map of your school.
- Weather, climate and atmosphere: Record the weather. How does the weather affect trees? Dendrochronology.

HISTORY

- Find a large tree and find out or estimate how old it is (Is there a record of when it was planted or can we estimate by its size? Are there any similar sized trees nearby that have been cut down so we can count the rings?). What historical events has the tree witnessed during its lifetime? Can we draw up a timeline?
- History of forest cover in Ireland.
- Ogham and the trees of the Ogham alphabet.
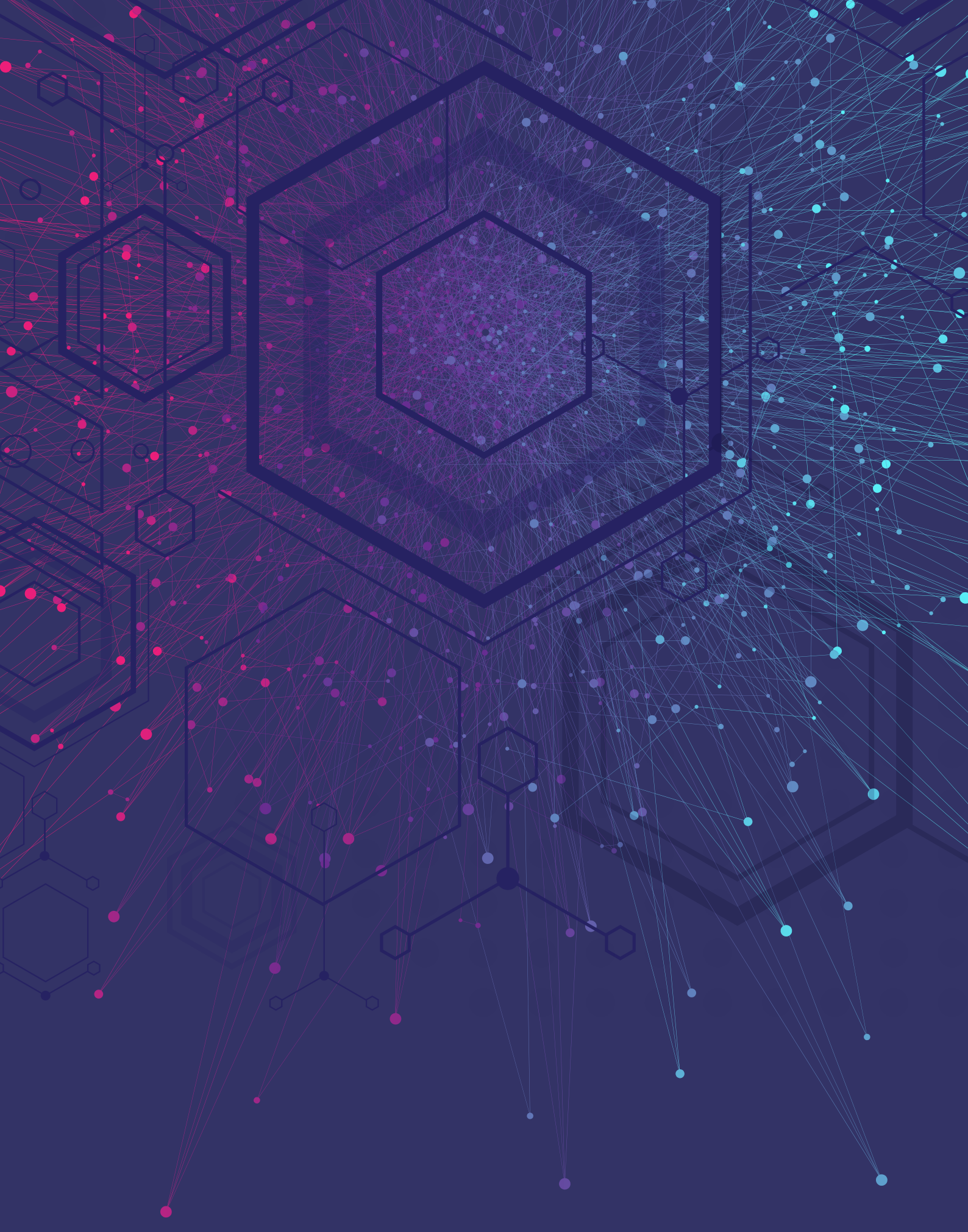- The Brehon Laws relating to trees.

THE ARTS

- Art: Leaf and bark rubbings and art with autumn leaves.
- Music: Vivaldi's Four Seasons.

SPHE

- Myself and the Wider World: Contributing to society and the wider world by tree planting.
- Media Education: Discussion around Climate Change in the media.

PE

- Outdoor and Adventure Activities: Nature walks to look at trees in the local area. Children can collect their own acorns or other seeds, nuts or berries for planting.
- Orienteering or treasure hunts in the woodlands.
- Outdoor winter scavenger hunt.