

TEACHER NOTES

WHAT CAN WE SEE IN THE DARK ON ANGLESEY?

Learners find out more about the stars and planets in our solar system and make a scaled model of the solar system outside. They find out about different star constellations and the stories behind them. Learners explore light pollution on Anglesey and its Dark Sky Discovery Sites, before going outside in the dark to view planets and constellations of stars. They then find out about the effect of light on animals on land and in water, considering food chains. Learners set up a moth trap, identify any moths found and produce an identification guide of moths in Anglesey National Landscape.

CURRICULUM FOR WALES

Areas of Learning and Experience explored:

- Health and Well-being
- Humanities
- Languages, Literacy and Communication
- Mathematics and Numeracy
- Science and Technology

Activity also incorporates aspects of cross-curricular skills outlined in the LNF and DCF.

RESOURCES

Internet enabled device and internet access.

Means of measuring, e.g. ruler, metre rule, sports measuring tape, pedometer.

Print out of constellation – Task 2 screen 13.

Possibly [Star Gazing Guide](#) leaflet – downloaded or printed.

Possibly downloaded free apps such as:

- Star Chart app on [Android](#) or [iPad](#)
- Night Sky app on [Android](#) or [IOS](#)
- SkyView Lite on [Android](#) or [IOS](#)
- GoSkyWatch Planetarium on [iPad](#).

Access to [Find out what every symbol means on an OS Explorer map - OS GetOutside](#).

Large white sheet and torches per group to use as a moth attraction trap.

Means of taking photographs (e.g. smart phone, tablet, camera).



DOING THE ACTIVITY



- Most tasks require learners to work in pairs or groups.
- Encourage learners to share their ideas, and through open questioning, explain and justify their ideas when possible. Focus questions have been suggested to guide learners through the tasks.
- When taking learners outdoors, it is essential that the [Countryside Code](#) is adhered to and any relevant risk assessments have been carried out with risks mitigated.

TASK 1

WHAT DO WE KNOW ABOUT STARS AND PLANETS?

Explain to learners that this task should help them to find out more about the stars and planets in our solar system. Then, they should be able to make a scaled model of the solar system.

Screen 3

Invite learners to consider the questions posed.

Focus questions

- What are stars?
- Which is the closest star to Earth? Why do you think this?
- What are planets?
- Which planets do you know?
- What do you know about each planet?

Then note their answers in the table on the next screen.

Screen 4

Ask learners to try to complete the table with their ideas and use the key below to rate each answer as to how confident they are that they are correct.

1 = confident

2 = slightly confident

3 = not at all confident or don't know

Screen 5

Tell learners that they are going to use the internet to check their answers on the previous screen.

Ask them to think about the points about internet searches.

Before researching think about...

- What search terms could you use? Which are the best? Why?
- What type of sites will be the best to use, why?

When assessing information/data think about...

- Could the information/data be biased? Why do you think that?
- How reliable do you think the information/data is? How could you find out?

Screen 6

This screen shows learners' completed tables so that they can review their answers. Ask learners to check the answers they rated 2 and 3 and to update the table with their findings.

Screen 7

Learners have been working in pairs up to this point. However, putting them into small groups for the rest of the task will be more manageable. Invite learners to do more online research to find out the answers to these questions:

Focus questions

- What planets are in our solar system?
- What order are the planets in from the Sun outwards?
- How far is each planet away from the Sun? Why does this change?
- What is the diameter of each planet?
- What is the diameter of the Sun?

A table is provided on the next screen so they can type in their answers.

Screen 8

This screen gives the table to complete from the previous screen.

Screen 9

Ask each group to think about how they could represent our solar system to scale. Then, to make a scaled model of our solar system they can show others outside.

The mathematics involved in scaling the model requires the use of large numbers which are better represented in standard form. Some of your learners might well be able to manipulate such numbers. However, others might struggle. To support the mathematics, you could ask learners to access [Student Project: Make a Scale Solar System - NASA/JPL Edu](#) which gives detailed guidance on how to build a scaled solar system model from thinking about what type of model to make to where the model will be shown to the calculations required.

Screen 10

Invite learner to build their solar system model outside.

TASK 2

WHICH STARS AND PLANETS CAN WE SEE IN THE NIGHT SKY?

Explain to learners that in this task they will learn about star constellations and the stories behind them. They will find out about light pollution on Anglesey and its Dark Skies Discovery Sites, before going outside in the dark to view planets and constellations of stars.

Screen 3

This screen gives information about stars. Ask learners to discuss the questions posed.

Focus questions

- Why can you see stars in the night sky?
- Why can't you see many stars in the daytime?
- Why can you see some planets in the night sky?
- Why can you see different stars at different times in the night sky?

Screen 4

This screen gives information about light pollution on Anglesey. Ask learners to discuss the question posed.

Focus question

- Where do you think the six main sources of light pollution are on Anglesey?

Then, ask them to use the map to find these six places and type their ideas in the box provided.

Screen 5

An image showing the four Dark Sky Discovery Sites on Anglesey is given here. Ask learners to use the image to try and work out where each site is on Anglesey. Then, to record their answers in the box provided.

Focus question

- What are the names of each of these sites on Anglesey?

Screen 6

Learners' ideas as to where each site is on Anglesey from the previous screen are shown here. Invite learners to use the map to check their ideas and amend them as necessary.

Screen 7

Learners' ideas as to the Dark Sky Discovery Sites on Anglesey are given again here, with the answers so that learners can check how many they had correct.

1. Breakwater Country Park, Holyhead, LL65 1YG
2. Arsyllfa Busby-Braden Observatory, Plas Bodfa, Llangoed, LL58 8ND
3. The Dingle Car Park, Llangefni, LL77 7ED
4. Ynys Llanddwyn Car Park, Llanfairpwllgwyngyll, LL61 6SG

Screen 8

An image of the Milky Way over St Cwyfans Church, Anglesey is shown on this screen. Ask learners to discuss the questions posed.



Focus questions

- What is the Milky Way?
- When have you seen the Milky Way? Where were you?
- Why do you think the Milky Way is so clear over St Cwyfans Church, Anglesey?

N.B. *The Milky Way is the galaxy that includes the Solar System, with the name describing the galaxy's appearance from Earth: a hazy band of light seen in the night sky formed from stars that cannot be individually distinguished by the naked eye.*

Screen 9

This screen gives information about how the star constellations were named, with an image of Perseus and Andromeda.

Screen 10

A Welsh perspective is taken here, with how Perseus and Andromeda are named Llew Llaw Gyffes and Blodeuwedd in Welsh mythology and a revised image.

Screen 11

Explain to learners that sometimes it is difficult to see why star constellations were turned into such complex images. For example, the Pegasus (flying horse) star constellation looks like this. Ask learners to think about:

- Where are the wings?
- Where are Pegasus' rear legs and tail?

Screen 12

A wider perspective is given on this screen, from the Ojibwe, indigenous people of North America, who use their constellations to give life lessons.

Screen 13

Ask learners to think about how they might use the star constellation diagram (of Scorpio) to draw some type of mythical person or beast by linking the stars. You can print off the image so that learners can draw on the constellation. Invite learners to invent a story about their mythical person or beast and to tell it to others in the class.



Screen 14

Inform learners that they are going to go outside to see which star constellations they can identify.

There are many ways they can use to identify the constellations, e.g. an app, a leaflet or a printed sky map. The image on the screen can be printed – this gives the constellations in the northern hemisphere. You may wish to download the [Star Gazing Guide](#) leaflet or download a free app such as:

- Star Chart app on [Android](#) or [iPad](#)
- Night Sky app on [Android](#) or [IOS](#)
- SkyView Lite on [Android](#) or [IOS](#)
- GoSkyWatch Planetarium on [iPad](#).

Screen 15

As learners to complete the quiz before they go outside, so they can get the best experience of viewing the night sky.

Screen 16

Introduce learners to the webpage [Night Sky Map & Planets Visible Tonight](#). From here you can identify planets in the night sky at different times of the year. Ask them to type in their location. The webpage will tell them the planets they can see tonight.

Focus questions

Using the website ask them to discuss:

- Which planets could you see tonight?
- Which planet(s) could you see at midnight?
- Why can you see different planets at different times in one night?
- Why can you see different planets at different times of the year?

Screen 17

Invite learners to go outside to identify some star constellations and planets.

TASK 3

HOW MIGHT LIGHT POLLUTION AFFECT SMALL ANIMALS?

Explain to learners that they will find out about the effect of light on animals on land and in water.

Screen 3

This screen gives information about Dark Skies projects on Anglesey, e.g. The North Wales Dark Sky Partnership, an all-Wales Dark Skies project, including a discussion of light pollution.

Screen 4

Invite learners to access the map on this link: [Wales Dark Skies](https://www.wales.gov.uk/about-us/dark-skies) and search for Anglesey.

Also, to open the OS map of the local area and Anglesey National Landscape. Then, to discuss the questions posed.

Focus questions

- What is the dark sky map telling you? How do you know?
- Where is the most light pollution in Anglesey National Landscape? Why do you think that?
- What is likely to be causing this light pollution? How do you know that?
- Where on the map is the greatest light pollution? How can you tell? What might be causing this? Why do you think that?

Screen 5

Ask learners to view the photograph of Anglesey at night and discuss the questions posed.

Focus questions

- What do you think are the light sources you can see? Why do you think that? List your ideas.
- What are the brightest lights? How do you know?
- What do you think this would look like as an aerial photograph? Why do you think that? Would these lights be visible from an aeroplane in the sky? How do you know?



Screen 6

Explain to learners that light pollution can affect things that live in water.

Ask them to use the OS map and locate the Menai Straits and imagine they lived in the water there. Invite pairs to discuss the questions posed.

Focus questions

- What light sources might affect your life? Why do you think that?
- What light sources might be on land, in the air and on the sea? How do you know?
- What effect might these light sources have on your life? Why do you think that?

Screen 7

Ask learners to read the information about a scientific study about underwater light pollution in the Menai Straits.

Screen 8

Invite learners to use the internet to find out more information about either sea squirts, sea bristles or barnacles. Then, to discuss the questions posed.

Focus questions

- How does this animal feed?
- What food chains is it a part of? How do the food chains link to give a food web?
- What would happen if the population of this animal increased?
- What would happen if the population of this animal decreased?
- How might changes in the population affect humans?

Then, to present their ideas to the class in a 30-second presentation.

Screen 9

Invite learners to present their information about either sea squirts, sea bristles or barnacles.

Screen 10

Ask learners to discuss the questions posed about moths.

Focus questions

- What is a moth? Why do you think that?
- What do they look like? How do you know?
- When do you see them?
- Are they animals? Why do you think that?
- How do they move?
- Do they have wings, legs or both? Why do you think that?

Then, to sketch a moth and label it to show the different parts of the body.

Screen 11

Explain to learners that Anglesey National Landscape is a fantastic place for observing moths. Photographs of the Magpie moth and the Silver Y moth are given.

Screen 12

Explain to learners that many moths are drawn to sources of light, and to discuss the questions posed.

Focus questions

- How do you think moths navigate at night?
- Why could artificial lights be a problem for moths? How do you know?
- What would be the disadvantages for moths flying towards artificial lights? Why do you think that? What might be the advantages? Why?
- How would the situation affect the moths' predators? Why do you think that?

Screen 13

Inform learners that they are going to investigate moths and their attraction to artificial lights. They will make a humane moth trap outside. The trap will be a large white sheet suspended on a line or tree. They will shine a torch onto the sheet to attract moths.

Then, wait patiently for the moths to arrive and try to identify them.



Screen 14

Ask small groups of learners to discuss the questions posed.

Focus questions

- Where could you safely put a moth trap?
- Where are the nearest light sources? Do you think they are far enough away? Why?
- What location do you think is best? Why?

Screen 15

Take learners outside to look for suitable places they could leave your moth trap. Obviously, it will need to be dusk before they set them up.

Screen 16

This screen gives links to online moth identification keys. Ask learners to review the links:

- [Identify a moth - Butterfly Conservation](#)
- [Moths - North Wales Wildlife Trust](#)
- [UK Moth Identification: 12 Common Species – Woodland Trust](#)
- [The NHBS Guide to Common UK Moth Identification - NHBS](#)
- [Identify moths - Wildlife Watch](#)

Then, decide which one would be the best to use.

Screen 17

Take learners outside to set up their moth traps, shine their torch and wait patiently.

Screen 18

Invite learners to review their findings from the moth trap by discussing the questions posed.

Focus questions

- Which species of moths did you find the most of? Is this normal for the time of year and location? How can you find out?
- Which was the largest moth you found? Is this the largest moth you would expect to find at this time of year and location? How can you find out?
- What surprised you about the moths you found? Why?

Ask learners to take down the moth trap as late in the day as possible.

Screen 19

Inform learners that the class is going to make an 'Anglesey National Landscape Moth Guide'.

Each group will select a species of moth from those collected to research. Then, produce a one-page description with images for the guide.

To help learners gather relevant information, ask them to discuss the questions posed.

Focus questions

- What are the distinctive features of this moth?
- Where is it usually found?
- How big is it? What is the wingspan of this species of moth?
- What does it eat?
- What is its life cycle?
- What are its predators?

Screen 20

Ask learners to carry out their research to make the guide.

Screen 21

Invite learners to reflect on the whole task by completing at least one of the sentence starters and share these in class. The sentence starters are:

The key knowledge and skills we used were...; I used to think... Now I think...; The next time we could...; We played different roles in our group when...; We solved problems when...; The thing we found most difficult was...; We had to think creatively to reframe and solve problems when...; We hope other people will benefit from our guide...; Something I still don't understand is....