FULL STEAM AHEAD
A Partnership Approach to STEAM in Youthreach

NYCI National Youth Council of Ireland

Unit 1 EXPLORING LIGHT: Scheme of Work

Based on 1 x 45 minute session per week, can be adapted.

	Introduction to STEAM Unit 1: Exploring Light **Learning Outcomes: 1, 2, 3, 4, 10**	Learners will be able to: 1. Work collaboratively and appreciate the different perspectives which give alternative approaches and solutions. 2. Use problem solving to determine the most effective method and approach through trial and error where appropriate. 3. Describe how light travels through different materials. 4. Illustrate how different colours make up white light. 10. Effectively research to increase understanding of new topics.		Real-World Contexts	Disciplinary and Interdisciplinary	Problem-Solving	Creativity	Design Thinking	Digital Literacy	Appropriate Teaching	
Week	**Content**	**Method**		**STEAM Characteristics**							**Resources (equipment / materials)**
		Learner activity	**Role of facilitator**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	
1	Introduction to Light - What is Light? - How Light Travels - Colours of Light	Look at everyday examples of refraction and describe what we see. Discuss other places we see this, including rainbows.	Leading discussion on light and where we see light bending (refracting) in everyday objects and situations. Describe how a rainbow is formed. Explain that the rainbow is a spectrum. White light can be split into different colours, as in the example of a rainbow.	Real World Contexts					Digital Literacy	Appropriate Teaching Approaches	Pen/pencil in glass of water Diagrams & photos of examples with notes – in downloadable 'Exploring Light' ppt and/or pdf List of Definitions – in downloadable 'LIGHT Additional Info & Resources' doc

2	Colours of Light - Review 'What is Light?' - Making a Spectroscope **Learning Outcomes:** 1, 2, 3, 4	Craft a spectroscope with materials and equipment listed as directed in ppt and video. Use the spectroscope to explore different types of light (artificial light, natural light, different colours) and observe the differences.	Be familiar with construction of spectroscope to direct and assist when necessary. Posing questions for learners to explore, such as; - What does sunlight create in the spectroscope? *DO NOT POINT IT AT DIRECT SUNLIGHT. INDIRECT DAYLIGHT THROUGH A WINDOW WILL WORK* - What about a lightbulb? Is it a full or broken rainbow (spectrum)?		Disciplinary and Interdisciplinary Learning	Problem-Solving					Blank CD Cardboard tube White paper Pencil Scissors Clear sticky tape Spectrometry in Astrophysics - Make your own spectroscope - YouTube Colours of Light Worksheet – downloadable
3	Colours of Light - Exploring colours of light using your Spectroscope - Discussion **Learning Outcomes:** 1, 2, 3, 4	Review crafting a spectroscope with materials and equipment listed as directed in ppt and video, if needed. Revisit using the spectroscope to explore different types of light (artificial light, natural light, different colours) and observe the differences. Research other uses of spectroscope in research, exploration and understanding of the world and beyond the world.	Be familiar with construction of spectroscope to direct and assist when necessary. Tell learners about other ways spectroscopes can be used, e.g. for analysing emission spectra of elements to identify substances and composition of celestial objects.			Problem-Solving	Creativity		Digital Literacy		
4	Colours of Light - Using Spectroscope	Look through the spectroscope at daylight coming through a window. *DO NOT POINT IT AT DIRECT SUNLIGHT. INDIRECT DAYLIGHT THROUGH A WINDOW WILL WORK*.	Posing questions for learners to explore, such as; - What does sunlight create in the spectroscope? *DO NOT POINT IT AT DIRECT			Problem-Solving	Creativity				Window with daylight coming into the room. Artificial light (lamp or overhead light in room). Further details on

		Learners should see a line of rainbow inside the spectroscope. This should be a full spectrum with no gaps between the colours. Look through the spectroscope at a lightbulb in the room. A lamp or overhead light. Learners should see a similar spectrum (rainbow) but with some gaps, so more clearly defined lines. A broken spectrum (rainbow).	SUNLIGHT. INDIRECT DAYLIGHT THROUGH A WINDOW WILL WORK* - What about a lightbulb? Is it a full or broken rainbow (spectrum)? Tell learners about other ways spectroscopes can be used, e.g. for analysing emission spectra of elements to identify substances and composition of celestial objects.								spectroscopy and uses; – in downloadable 'LIGHT Additional Info & Resources' doc
5	Colours of Light - Exploring colours of light using your Spectroscope	Use your spectroscope to examine each colour on the screen one at a time and determine which primary light colour combinations produce each secondary colour. Complete your Light Colour Venn diagram.	Instruct colouring in of the 'Paint' colour diagram with knowledge from art and colour wheels. For the 'Light' colour diagram we need to investigate. Display each of the primary and secondary colours of light on the screen one at a time. Pose questions for the learners; What do different colours produce? Is it as you expected?			Problem Solving	Creativity			Appropriate Teaching Approaches	Colour worksheet printed - downloadable TV Screen/projector to display colours (or individual devices and share link, such as here) Website: Full-Screen Color Test | Powered by Aktiv Media Group (testthisdevice.com) Video: Monitor Color Test / Monitor-Farbtest (RGB/CMYK) (1080p) - YouTube

6	Combining Light - Mixing light - Coloured shadows - Playing with shadows	Darken the room (lights off, close blinds, etc) Set up with all 3 coloured lights and experiment with blocking out one/some/all and using different combinations. What coloured shadows do you see? What does this mean? How does this relate to the spectroscope results? Refer to your light colour diagram.	Assist in the set up while letting learners explore and discover for themselves. Encouraging teamwork – one person holding each coloured light, so learners need to work together and communicate to create the desired result.		**Disciplinary and Interdisciplinary Learning**	**Problem Solving**		**Design Thinking**		**Appropriate Teaching Approaches**	3 lights (torches or phone torches) Coloured cellophane (red, green, and blue) Sticky tape Blank white wall/screen Darkened room See example here – in downloadable 'Exploring Light' ppt and/or pdf
7	Discussion and reflection - Use in technology	How does this relate to our daily lives? What are examples of where we see this used – three colours of light combining to create all other colours of light? How is this used and exploited in different areas? In science research? In art? In computer graphics? Expand to how colour preference and colours of light can affect people – circadian rhythm, etc through research.	Give examples and encourage exploration of more. E.g.: pixels on a screen – there are only red, green, and blue pixels but they can display any shade of any light. This can be seen on any screen (phone, computer, TV, etc) if you can look close enough. Can use a video to demonstrate such as the linked resource.	**Real World Contexts**		**Problem Solving**			**Digital Literacy**		Video displaying pixels on a phone screen; iPhone Clock icon pixels on microscope (zoom x200) - YouTube

8	Going Further	Discussion and research on what else you could use the information learned about light, combining and separating colours could be used for. Use additional optics equipment to explore and experiment.	Use this as an opportunity for further exploration; - What would we need to see close enough to see the pixels on a screen? - Let learners view their phone screen under a microscope, with a macro lens, magnifying glass, etc. - Which works best? Why?		Disciplinary and Interdisciplinary Learning	Problem Solving			Digital Literacy	Appropriate Teaching Approaches	*Optional for further exploration* Magnifying glass Macro Lens Microscope
9	Reflection	What did the learners enjoy or find interesting? Was there anything they found challenging?	Encourage reflection as an opportunity for improvement and determining the direction of future learning. Pose questions around positive and negative aspects of the activities and topics covered. What was good, interesting, fun? What was not good, boring? What could be done differently? Is there something they would like to do more of/explore in more detail?							Appropriate Teaching Approaches	Refer to Part D: STEAM Assessment in STEAM Education Framework for Youthreach, specifically Formative Assessment.