SCIENCE
YEAR 3-4
Cycle B – Unit 9

Light

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RANGE

How things work

5. how light travels and how this can be used

KEY VOCABULARY

properties
travel
beam
source
opaque
transparent
translucent
shadow
block
emit
table
bar chart
axis
tally
scale
Light level (Lux)

Developing thinking
(Plan-Develop-Reflect integrated into activities)

LNF – Main Numeracy Strands covered*

Strand:
Developing numerical reasoning
Elements:
Identify process and connections
Represent and communicate
Review

Strand:
Using data skills
Elements:
Collect and record data
Present and analyse data
Interpret results

**Refer to LNF numeracy framework for details of specific skills within each element.*

LNF – Literacy (writing) opportunities

Element: Organising information and ideas
Writing accurately

Writing to inform, instruct and find out

Developing ICT

School to identify and provide opportunities for developing this skill within the scope of the unit.

Curriculum Cymreig

School to identify and provide opportunities for developing this skill within the scope of the unit.

Personal and social education

School to identify and provide opportunities for developing this skill within the scope of the unit.

Science – Medium Term Planning (half termly)

Year Group	**3/4**	Term	**Cycle B – Unit 9**	Unit Title	***Light***

Range: ***How things work***
5. how light travels and how this can be used

Cross Curricular Links:

Skills (Principal skills in bold italics)	**Suggested activities**	**Resources and web links**	**Assessment Opportunities**
PLAN Identify gaps in prior knowledge **DEVELOP** ***Make careful observations and measurements*** ***Begin to check observations*** **REFLECT** Suggest how the method could have been improved	**1. Big Question: What do you know about light?** • Show a 'light' concept cartoon and/or play true/false game in order to sort simple science statements. • Review children's prior learning by asking questions to elicit ideas about sources of light from their Foundation Phase work. • Complete ideas sheet/KWL grid diagnosing pupils' ideas and/or create a graffiti board of pupils' ideas. • Review science skill targets for this half term. What are pupils' individual skill targets? **Introduce the skill – Observe and communicate ideas** • Show children a range of torches, materials, mirrors and pictures linked to 'light'. • Let children explore shadow formation using torches and other light sources *eg OHP and objects of different shapes and different materials.* • Give pupils a 'five minute challenge' to explore and record their ideas on a group graffiti board. • Discuss primary and secondary sources of light. • Challenge pupils to observe and list sources of light in and around the school building – both primary sources and also reflective sources. • Tally findings and model a whole-class bar chart of results. Can pupils identify simple patterns or trends.	http://resources.hwb.wales.gov.uk/VTC/2009-10/science/cripsat/e34-light/index.html http://www.echalk.co.uk/ http://www.woodlands-junior.kent.sch.uk/revision/Science/lightshadows.html True-false card sort ideas Variety of light sources and materials	Use preferred diagnostic strategy/tool ***Can pupils record measurements using simple equipment? (Level 3)*** Can pupils record findings into a blank table format? (Level 3)

PLAN Ask relevant questions **DEVELOP** ***Make careful observations*** ***Make comparisons and identify and describe trends*** **REFLECT** Decide whether the method was successful	**2. Big Question: Can you explain what a shadow is?** Review previous exploration work on shadows. Show pupils the Concept Cartoon on 'green shadows'. **Introduce the skill – Observe and classify** • Allow pupils to explore a wide variety of coloured plastic acetates and paper etc. Challenge pupils to explore and discuss ideas using as many science words as possible. List key vocabulary in a science vocabulary box on the board. • Tell pupils they will need to sort and classify the materials according to their findings. • Discuss ways of sorting/classifying. **Practise the skill – Observe and classify** • Remind children of earlier work when they saw shadows of wide-toothed combs - demonstrate this again if necessary. Present children with a collection of objects/material including some that are opaque, some that are transparent *eg plastic bottles, colourless and coloured acetate sheets* and some that are translucent *eg fine net, thin nylon, greaseproof paper.* • Ask children to make a prediction about what will happen when a torch is shone onto coloured acetates. Will the green acetate give a green shadow? Ask pupils to predict. • Are pupils able to sort materials into transparent, translucent and opaque categories? • Challenge pupils to describe their groupings. Are there any similarities in materials in each group? • Recap key science ideas - translucent, transparent and opaque characteristics. **To write to inform and explain** **Text type: notes and diagrams**	Variety of books, websites etc http://resources.hwb.wales.gov.uk/VTC/2009-10/science/cripsat/e34-light/index.html http://www.woodlands-junior.kent.sch.uk/revision/Science/lightshadows.html http://www.bbc.co.uk/science http://www.echalk.co.uk/ Concept Cartoon book Coloured plastic acetates Torches Translucent objects/materials	***Can pupils follow instructions to gather findings and measure using simple equipment? (Level 3)*** ***Can pupils identify simple patterns and trends? (Level 3)***
PLAN Ask relevant questions **DEVELOP** ***Make careful observations and measurements*** ***Use prior knowledge to explain*** **REFLECT** Linking learning to similar situations within and outside school	**3. Big Question: Can you describe your shadow?** Discuss Concept Cartoon ideas about shadows. **Introduce the skill – Observe and explain using science ideas** • Tell pupils they will be going outside to observe their own shadows closely. They will need to use science words as much as possible during discussions. • Ask pupils to keep a notebook of the science words they use. **Practise the skill – Observe and explain using science ideas** • Visit the school grounds to observe shadows, possibly including those formed by clouds. • Suggest children explore shadows of themselves in different positions *eg standing, crouched down, with arms extended.* • Record pupils' shadows (with chalk) on the tarmac. • Talk about the shadows with the children and ask them to make drawings to show their observations and to describe what those show. Encourage children to try to explain how the shadows were formed. • Is the shadow always attached to the person? Is it ever detached? • Are all our shadows equally as black? • Pupils could produce an annotated poem to communicate their ideas on shadows. **To write to inform and explain** **Text type: notes/poem**	Tape measures	***Can pupils record measurements using simple equipment? (Level 3)*** ***Can pupils explain using everyday ideas? (Level 3)***

PLAN ***Make predictions using prior knowledge*** ***In a fair test, identify key variables to be controlled*** **DEVELOP** Make careful observations and measurements. Check observations by repeating them **REFLECT** Suggest how the method could have been improved	**4. Big Question: Can you make and test a shadow puppet?** Show pupils a video clip of a shadow puppet. Discuss ideas and predict what will happen if the puppet is moved either closer to or further away from the light source. What happens if the light source is moved away? Ask pupils to predict. **Introduce the skill – Identify variables and plan method** • Offer pupils a card sort activity that allows them to identify the variables to change, measure and keep the same. Allow groups to select different variables to manipulate. • Use the interactive planning boards to demonstrate how to create a simple plan. • Keep the recording straightforward, e.g. placing the torch at 20, 40 and 60cm away from the puppet. **Practise the skill – Identify variables and plan method** • Give pupils roles in groups, e.g. recording manager, equipment manager and thinking manager etc. • Challenge pupils to sort and record their fair test and also create a simple method to follow. • Goups select equipment and carry out the investigation. • Tabulate findings and discuss patterns and trends in data. **To write to inform** **Text type: science write-up/report**	http://www.woodlands-junior.kent.sch.uk/revision/Science/lightshadows.html Planning templates Post-it planning boards Blank table templates Variable cards Card, glue and pencils. Torches Rulers	***Can pupils make predictions using everyday ideas? (Level 3)*** ***Can pupils plan with some independence? (Level 3)*** Can pupils record measurements using simple equipment? (Level 3) Can pupils begin to organize findings, including simple tables and bar charts? (Level 3) Can pupils suggest simple improvements to their method? (Level 3)

COMMUNICATION ***Communicate clearly using tables and bar charts*** **DEVELOP** Make comparisons and identify and describe trends in data **REFLECT** Link learning to similar situations within and outside school.	**5. Big Question: Can you present your results in a bar chart?** Review findings from previous activity. **Introduce the skill – Creating bar charts** • Using the interactive planning boards, demonstrate how data in a table format can be transferred into a graph. To assist pupils, consider treating distance data as discrete data as opposed to continuous data (i.e. plotting 20, 40 and 60cm as discrete points, therefore producing a bar chart rather than a line graph.) **Practise the skill – Creating bar charts** • Allow pupils to use scales provided in order to create bar charts of their findings. • Swap graphs and peer assess. • What are the key features of a bar chart?	Planning template example http://www.mrnussbaum.com/coolgraphing.htm http://www.amblesideprimary.com/ambleweb//mentalmaths/grapher.html	***Can pupils present findings in a given format, e.g. tables and charts? (Level 3)*** ***Can pupils draw their own tables and bar charts? (Level 4)***
DEVELOP ***Use equipment and apparatus correctly and safely*** ***Make careful observations*** **REFLECT** Suggest how the method could have been improved	**6. Big Question: How do we measure light?** **Introduce the skill – Using apparatus and equipment** • Can pupils think of ways of estimating the brightness of different torches? Can they rank order the brightness of various devices? • Introduce pupils to the datalogger as a device that measures light level (units: Lux). **Practise the skill – Using apparatus and equipment** • Use the datalogger to explore the levels of light in and around the classroom. • Record snapshot values of light in different locations. • Tabulate findings and discuss locations with the highest and lowest light levels. • Pupils could record key vocabulary and new ideas around a thumbnail picture of a datalogger (e.g. 'Ideas Poster'). **To write to inform and explain** **Text type: notes/diagrams**	http://www.bbc.co.uk/learningzone/clips/ Datalogger	***Can pupils use simple equipment to gather findings? (Level 3)*** ***Can pupils use standard equipment and record using SI units? (Level 4)***

PLAN Outline the plan/method **DEVELOP** ***Make comparisons and identify and describe trends or patterns*** ***Form considered opinions and make informed decision*** **REFLECT** Linking the learning to similar situations within and outside school	**7. Big Question: Can you test which paper is the best for making envelopes.** Introduce the question to pupils and elicit ideas as to what constitutes the 'best' paper in the context of envelopes. What are their ideas/predictions? **Introduce the skill – Make comparisons and form considered opinions** • Discuss the method/plan and outline a suggested approach. (Some pupils may elect to use the datalogger to record the light penetrating through different papers, others may elect to record how many layers of one type of paper is required to block the light from a source.) • Share ideas in groups and feed back to class. Model class plan/method. • Pupils select equipment and carry out task. **Practise the skill – Make comparisons and form considered opinions** • Gather findings from across the class and discuss patterns and trends. • Model key language patterns using the interactive planning boards. **To write to inform** **Text type: science write-up/report**	Selection of paper Torches Datalogger	Can pupils explain using everyday experience? (Level 3) Can pupils explain using scientific language/ideas? (Level 4) ***Can pupils identify simple patterns and trends? (Level 3)***

REFLECT ***Linking their learning to similar situations within and outside school***	Revisit initial diagnostic assessment. Can pupils demonstrate understanding at end of topic and discuss new skills learned and/or practised?	Use preferred AfL strategy	***Can pupils say what worked and didn't work? (Level 3)***
Evaluation			