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| **Pixie Periscope** | | | |
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| Investigating light and reflection by making a periscope | | | |
| **Subject(s):** Science, Design & Technology, Maths  **Approx time:** 50 - 70 minutes |  | | **Key words / Topics:**   * Christmas * Fold * Light * Mirror * Net * Reflection |
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| **Suggested Learning Outcomes** |  | |  |
| * To understand what happens when light is reflected off a mirror * To be able to make a periscope from a net | | | |
| **Introduction** |  | |  |
| This is one of a series of resources designed to allow learners to use Christmas themes to support the teaching of the primary National Curriculum. They are designed to support the delivery of key topics within science, design & technology and maths. This resource explores what happens when light reflects off a mirror or other reflective surface. The focus is the making of a Pixie Periscope. | | | |
| **Purpose of this activity**  In this activity learners will learn about the reflection of light in a mirror and make and use a periscope. Leaners will have an opportunity to practice making a periscope from a card net. Nets are important as they allow 3D objects to made when folded.  This activity could be used as a starter or main activity to introduce light and build on experiences to explain how light travels. Alternatively, it could be used as a main lesson activity to teach learners how to use nets to make useable objects. It could also be used as one of several activities within a wider scheme of learning focussing on understanding the use of nets in maths. | | | |
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| **Activity** |  | | **Teacher notes** |
| **Introduction (5 minutes)**  Teacher to explain that learners are going to make a Pixie periscope.  Teacher to hand out equipment needed for the task to learners.  **Performing the experiment (35-50 minutes)**  Teacher to demonstrate the steps shown in the teacher presentation and listed below.   * Step 1 – Hand out the Pixie periscope activity sheet. Clearly identify the tabs, solid and dotted lines. * Step 2 – Safely cut out the periscope, taking care not to cut off the tabs. * Step 3 – Score the dotted lines using a ruler and scissors. * Step 4 – Fold the dotted lines, using a ruler if required. * Step 5 – Use glue or sticky tape to stick the periscope together using the tabs. * Step 6 – Stick one mirror into each end of the periscope using strong glue or double-sided sticky tape. * Now test the periscope to see what you can see.   Learners to complete each step to conduct the activity for themselves. The teacher presentation could be left on the whiteboard as a supporting guide as they do this.  **Discussing the results of the activity (10-15 minutes)**  Teacher to discuss the results of the activity with learners. Teacher to explain how light reflects in straight lines and why the mirrors allow them to see whilst being hidden, just like the Pixies and Elves. |  | | This activity demonstrates how nets are used to make graphic products and the resulting periscope can be used to show how light travels in straight lines.  Steps 1 to 6 allow the learner to cut out a net and make a Pixie periscope. Testing the periscope may generate some discussion!  The best results are obtained using small plastic mirrors (for example, cut from silver acrylic mirror sheet or extracted from toy compacts). If aluminium foil is used care must be taken to ensure that this is very flat and the shiny side is used for the reflection; however, the quality of the observed image is likely still to be significantly reduced. |
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| **Differentiation** |  | |  |
| **Basic** |  | | **Extension** |
| Provide the Pixie periscope net pre-cut out. |  | | Learners may add own designs and colour to the periscope template prior to cutting out.  Investigate making the periscope in other shapes i.e. L-shape to look around corners. |
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| **Resources** |  | | icon-ppticon-doc**Required files** icon-pdf |
| * Small plastic mirrors (best method) - if not available use aluminium foil (note: reflection is reduced) * Scissors * Card * Glue sticks, sticky tape * Double-sided sticky tape * Rulers |  | | Teacher presentation – Pixie periscope  icon-pdf Pixie periscope – Activity handout sheet |
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| **Additional websites** |  | |  |
| * **Bitesize** **–** Light**:** <https://www.bbc.co.uk/bitesize/clips/z3mb9qt> * **Bitesize** **–** Light sources**:** <https://www.bbc.co.uk/bitesize/clips/z3vnvcw> * **Bitesize** – What are nets? - <https://www.bbc.co.uk/bitesize/topics/zt7xk2p/articles/z247tv4> | | | |
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| **Related activities (to build a full lesson)** |  | |  |
| **Starters** (Options)   * Ask learners to state three things they already know about light and where it comes from. * Discuss what is meant by ‘reflection’. * Show some examples of products made from nets, such as boxes or packaging. Ask learners to describe how they think these were made. * Watch the Bitesize video. | | **Extension** (Options)   * Learners may add own designs and colour to the periscope template prior to cutting out. * Investigate making the periscope in other shapes i.e. L-shape to look around corners.   **Plenary**   * Test the periscopes | |
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| **The Engineering Context** film |
| Engineers need to have good understanding of how light travels and is reflected off surfaces. This is vital when engineers design rear-view mirrors for cars, periscopes for submarines and giant telescopes to look at the stars. |

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| **Curriculum links** | |
| **England: National Curriculum**  Science  KS2 Year 3 Light   * Explore what happens when light reflects off a mirror or other reflective surface.   Mathematics  KS2 Geometry   * recognise, describe and build simple 3-D shapes, including making nets. | **Northern Ireland Curriculum**  KS2 – The world around us  Science and Technology  Movement and Energy   * How sound and light travels.   KS2 – Mathematics and Numeracy  Shape and Space  build and make models with 3D shapes; create pictures and patterns with 2D shapes |
| **Scotland: Curriculum for Excellence**  KS2 Sciences  SCN 3-11a - Vibrations and Waves   * Demonstrates through practical investigation how refraction can cause a change of direction of light as it passes from one material to another.   Numeracy and Mathematics  Shape, position and movement  MTH 2-16   * Through practical activities, I can show my understanding of the relationship between 3D objects and their nets. | **Wales: National Curriculum**  KS2 Science – How things work   * How light travels and how this can be used   Mathematics  KS2 – Using geometry skills   * construct solids from given nets |

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| **Assessment opportunities** | | |
| * Informal teacher assessment of practical skills through observation of learners making the periscope. * Formal teacher assessment of activity results. | | |
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