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| **Easy rainbow experiment** | | | |
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| Using paper and a CD to create rainbow reflection patterns | | | |
| **Subject(s):** Science  **Approx time:** 15 - 30 minutes |  | | **Key words / Topics:**   * Compact disc (CD) * Colour * Light * Rainbow * Reflection * Torch |
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| **Suggested Learning Outcomes** |  | |  |
| * To know that white light is made up of seven different colours (red, orange, yellow, green, blue, indigo and violet). * To understand how light reflects off objects. * To use a torch, paper and CD to create rainbow reflection patterns. | | | |
| **Introduction** |  | |  |
| This is one of a set of resources developed to support the teaching of the primary national curriculum. They are designed to support the delivery of key topics within maths and science. This resource focusses on using a torch and CD to create rainbow reflection patterns on a piece of paper.  When light reflects off the back of a CD we see all the colours of the rainbow, but why does this happen? In this activity we will find out! | | | |
| **Purpose of this activity**  In this activity learners will use a torch and a CD to create ‘rainbow’ reflection patterns on a piece of paper. They will learn about how light reflects off objects, the colours that make up white light and how these are separated when a torch is shone onto a CD.  This activity could be used as a starter or main activity to introduce the concept of reflection, or as one of several activities within a wider scheme of learning focussing on how light behaves. | | | |
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| **Activity** |  | | **Teacher notes** |
| **Introduction (2-5 minutes)**  Teacher to explain that learners are going to use a torch and a CD to create rainbow reflection patterns on a piece of paper. Teacher to hand out the resources and equipment needed to learners.  **Looking at the back of the CD (2-5 minutes)**  Learners to pick up their CD and look at the back of it. Teacher to ask what they see when they do this.  Learners to tilt the CD to and away from the light in the room. Teacher to ask learners what happens when they do this and why they think it is happening.  **Putting the CD and paper in place (5-10 minutes)**  Using the teacher presentation as a guide, learners to use masking tape to stick a white piece of paper against the wall. They should then place the CD on the floor in front of the wall, with the back (shiny side) facing upwards.  **Creating rainbow patterns (5-10 minutes)**  Teacher to switch the lights off in the room and close all curtains/blinds so it is dark.  Learners to turn on their torch on and point it at their CD. Learners to discuss what happens and why.  Teacher to explain how the different colours that make up the white light are separated by the CD and reflected onto the paper. |  | | This activity could be done as individuals or in pairs.  **Looking at the back of the CD**  Learners should see different colours reflecting off the back of the CD as they tilt it towards the light. Ask them to think about what is happening and why.  **Putting the CD and paper in place**  The paper should be stuck on the classroom wall, just above the level of the floor, with the CD placed in front of it. The paper should be a reasonable size, such as A3, for a good effect. Thin white card could be used instead.    Some experimentation may be needed with placement of the paper and CD to get the effect just right. This can also be done without the paper against a white or lightly coloured blank wall.  **Creating the rainbow patterns**  Working in the dark can be potentially dangerous, so ensure all risk assessments are in place and learners are not moving around the room whilst the lights are switched off.  Learners should see different colours reflect off the CD and onto the paper to create a rainbow effect. They could move the torch around to create different patterns of colour.  Explain that the white light from the torch is made up of seven different colours (red, orange, yellow, green, blue, indigo and violet). These are split into their separate colours by the CD and reflected onto the paper stuck to the wall, thus creating a rainbow effect! |
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| **Differentiation** |  | |  |
| **Basic** |  | | **Extension** |
| Have the paper and CD put into position in advance of learners conducting the experiment, so they can then concentrate on making the rainbow patterns and recording their findings |  | | Make templates of different patterns, such as a snowflake, to create even more interesting visual rainbow effects on the paper. |
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| **Resources** |  | | **Required files** icon-docicon-pdficon-ppt |
| * A3 paper or thin card * Torches * Compact discs (CDs) * Masking tape * Access to room that can be made dark |  | | Teacher presentation – Rainbow reflections |
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| **Additional websites** |  | |  |
| * **Bitesize – What is reflection?:** Video explaining how light reflects off a surface. <https://www.bbc.co.uk/bitesize/topics/zbssgk7/articles/zqdxb82> * **HowStuffWorks - Why do CDs reflect rainbow colours?:** Comprehensive explanation of how and why CDs reflect rainbow colours. <https://electronics.howstuffworks.com/question52.htm> | | | |
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| **Related activities (to build a full lesson)** |  | |  |
| **Starters** (Options)   * Brainstorm and/or write on the board what learners already know about light and reflection from previous study. This could be in the form of a mind map or spider chart. | | **Extension** (Options)   * Make templates of different patterns, such as a snowflake, to create even more interesting visual rainbow effects on the paper.   **Plenary**   * Discuss how and why the light reflecting off the CD creates the rainbow patterns on the paper. * Produce a short-written report of the findings of the experiment. | |
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| **The Engineering Context** film |
| * An understanding of light and reflection are vital to the development of photography, lighting and security equipment. For example, cameras, smart lighting systems and alarm sensors. |

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| **Curriculum links** | |
| **England: National Curriculum**  Science  KS2 Year 6 Light:   * recognise that light appears to travel in straight lines * use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye * explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes. | **Northern Ireland Curriculum**  KS2 – The world around us  Movement and energy:   * the causes and effect of energy, forces and movement. |
| **Scotland: Curriculum for Excellence**  Sciences  Vibrations and waves:   * SCN 2-11b | **Wales: National Curriculum**  Science  KS2 – How things work:   * how light travels and how this can be used. |
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| **Assessment opportunities** | | |
| * Questioning of learners to check understanding of the results of the experiment * Formal teacher experiment of any written findings from the experiment. | | |
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