

Rainbow Collectors Investigation Lesson Plan

In this activity, children will discuss the colours of the spectrum (or rainbow); make a rainbow simple spectral gratings or prisms if you have them and go outside to collect small items from each colour if possible e.g. leaves, flowers, safe litter, anything they can find around the school grounds or garden. Back inside they make a rainbow with items collected or stick them to the correct colours on a rainbow they have drawn or painted.

Credit: <https://primarylibrary.crestawards.org/all-star-challenges/61746949/40>

Resources Needed:

Three or four old DVD's/CD-ROMS (or buy a cheap set of recordable ones)
Pre-cut square sections of DVD as described below - one per pupil/pair as necessary
Collecting trays or bags
Disposable gloves if supervising adults feel it is necessary and if available
Drawing paper, colouring materials, tape and/or glue

Printing/copying:

Rainbow Colouring Template sheets if required, per pupil

How to make simple spectral gratings - for adults in advance:



1. Carefully cut a DVD into segments with a sharp scissors
2. Delaminate the back and front layers of the cut section
3. Turn over the front section - the back of it will be shiny and produce spectra from reflected light
4. The back section will be partly transparent and will show spectra when you look through it at a bright light
NEVER EVER LOOK DIRECTLY AT THE SUN OR ALLOW ANY CHILDREN UNDER YOUR SUPERVISION TO DO EVEN THROUGH THE PIECE OF DVD - THIS WILL CAUSE SERIOUS EYE DAMAGE
5. You will need to experiment to find a good spectrum, rotate the pieces, change your distance from the light, try different types of light but it WILL work!



If you place the piece of transparent layer from the back of the DVD over the lens of a phone camera, you will be able to photograph spectra like this - again, experiment with rotating the piece of plastic, changing distance and angle to the light until you get a good result. This is an actual photo and NOT from an online search!!

Starter:

Use photographs from the Presentation document to discuss the colours of the rainbow which ARE Red Orange Yellow Green Blue Indigo and Violet and not others suggested by certain songs!

(An interesting science back story is that Sir Isaac Newton and a friend were the first to use the name indigo to describe a shade between blue and violet they could see in the spectra they created. Until then indigo was the name of a dye, not a spectral colour

<https://en.wikipedia.org/wiki/Indigo>)

Suggest/discuss occupations and situations where colours and lighting effects are important and useful - see the Teacher Support Section later for ideas

Method:

- Hand out the Rainbow Template worksheets or ask children to draw their own rainbows with seven sections ready for the colours - label these too if you wish ROYGBIV
- Organise the children into teams or pairs and give each group or pair a tray or bag to collect in
- Their mission is to try to find small objects outside for each colour of the rainbow and bring them back in to stick on their drawing later
- Tips and safety:
 - It is the responsibility of the adult leading the activity to
 - choose a safe and secure area to carry out the activity
 - ensure that there is adequate supervision of all children at all times during the activity
 - Brief the children in advance about what objects it is safe and not safe to pick up - TIPS These are good things to encourage discussion with the children in advance):
 - Do not pick up anything that is not loose e.g. do not tear plants apart

- Ask first, or avoid, picking up berries - adults should be sure they know what the plant is before allowing this
 - Do not pick up sharp objects or broken glass - report it to the adults
 - Do not pick up live creatures, even minibeasts such as ladybirds
 - Do not put anything in your mouth
 - In a school setting it is the activity leader's responsibility to check and adhere to the school's Health and Safety policies for Science and Outdoor activities
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- After a suitable amount of time outside, return indoors with the collected items
 - Encourage children to decorate their rainbows with items of the corresponding colours as well as colouring with pencils or paint to produce a visual display of the colours of the spectrum

Outcomes:

All pupils should be able to:

- Discuss observations of the colours of the spectrum using verbal discussion and diagrams
- Use the word spectrum to describe the continuous range of colours visible to the human eye
- Know some different ways in which a spectrum can be produced
- Some may be able to memorise the accepted colours in the correct order ROYGBIV

Challenge and next steps:

- Write a report or design a wall poster to display your rainbow and to report on the colours of objects collected - which were easy and which were hard to find?
- Research how rainbows are formed and add this to the report or prepare a presentation on this to explain it to an audience
- Look for different, transparent objects and test which ones make spectra e.g. the bottom of glasses; a bottle or container of water; investigate whether some shapes of containers, or part of the containers, make better spectra than others
- With a prism or the home made spectral grating, investigate whether different types of light make different spectral patterns
- Design a garden or a stage set using interesting lighting and colour effects - try to use all the colours of the spectrum

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Support Information for Teachers

Who needs to know about colours and spectra?

- **Astrophysicists - the colour of stars tells us how hot they are and what chemicals they are made of**
- **Chemists and forensic scientists - the colours given off by heated chemicals can tell us what substances are made of**
- **Psychologists - light and the colour of light can affect our moods and help us be more relaxed or more active**
- **Lighting designers - for stage sets, shops, exhibitions**
- **Animals - some animals can see colours we can't, like ultraviolet and infra red**

Home Project:

Do a survey of your family's favourite colours - ask other people too and try to find patterns. Does favourite colour depend on age or other things about people? Would you have enough evidence just from asking the people you live with? Try asking your friends by e-mail or messaging them with an adult's permission, and ask their families too. Work with other people you know to share your answers so you will have much more evidence. Write a report or a presentation or an article for a newspaper or magazine to explain what you have found out.