Topic: The Behaviour of Light

Prepared by: **Jenny Bryant**

Issues tackled:

1. **Key ideas, use of language and terminology – Essential terms and ray diagrams.**
2. **Practical work (including Health and Safety) – Experiments with coloured light.**
3. **Differentiation and SEN – Making light more accessible for visually impaired and/or less able pupils.**

Issue 1: Key ideas, use of language and terminology – Essential terms and ray diagrams.

Trainees have already covered on their PGCE course:

Tasks for trainees:

Preparation for tutorial:

1. Make a list of the key words for this topic and check you understand them all. Devise a revision activity for pupils to use at the end of this topic to check their knowledge of the key words (e.g. card loop, crossword etc).
2. Try out the reflection and refraction experiments referred to in this topic. Put together a set of ray diagrams on OHT or computer to show what happens to the light.

Possible activities during tutorial:

1. Present the key word revision activity. Discuss the meanings of the words and difficulties which pupils may have in using the words correctly.
2. Show the ray diagrams and describe what is happening to the light in each one.

Mentor Input:

- Go through the key words and check that the trainees understand them. Introduce other words which pupils may throw in e.g. dispersion, translucent, luminous.
- Go through how to set up a ray box and produce a ray diagram
- Show how to draw appropriate ray diagrams and stress importance of directional arrow.

Reading:

Subject knowledge and understanding

Johnson, K. (1980 or later edition) **Physics for You**, Hutchinson, London, pages 169 and 174 – 191. Includes experimental setup and lots of ray diagrams.

Breithaupt, J. (2000) **Physics**, Macmillan, page 216 or other Key Stage 3/4 text books in school.

Subject pedagogy

QCA Scheme of work
www.standards.dfee.gov.uk/schemes3 and select Science Key Stage 3, then unit 8K Light.

Useful websites and applications

Resources:

Task 1 and **Mentor Input**
Ray box, slit, power pack, selection of mirrors (flat and curved) and Perspex shapes (needed for preparation for task 1 and during the tutorial).
For QCA SoW
www.standards.dfee.gov.uk/schemes3 and select Science Key Stage 3, then unit 8K Light. See language for learning section for key words.

Task 2
Johnson, K. (1980 or later edition) **Physics for You**, Hutchinson, London, pages 169 and 174 – 191. Includes experimental setup and lots of ray diagrams.

Issue 2: Practical work (including health and safety) – Experiments with coloured light

Trainees have already covered on their PGCE course:

Tasks for trainees:

Preparation for tutorial:

1. Plan and try out a class experiment to discover the colours obtained when two colours of light are mixed.
2. Plan and trial a demonstration to show how things appear in different colours of light, perhaps on the theme of stage lighting or disappearing tricks.
3. Devise an activity to show that all the colours of the spectrum can be combined to give white light (e.g. Newton's disc).

Possible activities during tutorial:

1, 2 and 3. Present the experiment, demonstration or activity.

Mentor Input:

- Discuss the problems of experiments which require partial or complete blackout. Include health and safety issues.
- Show how to produce a large clear spectrum with a prism and how to use a second prism to recombine the colours.
- Set up some examples of looking at a coloured object in a different colour of light and ask trainees to explain. e.g. looking at a red object in green light and yellow light.

Reading:

Subject knowledge and understanding

Key Stage 3/4 textbook.
Johnson, K. (1980 or later edition) **Physics for You**, Hutchinson, London, Chapter on colour.

Subject pedagogy

Useful websites and applications

http://www.phy.ntnu.edu.tw/java/color/color_e.html#color has some fun activities about colour mixing and viewing.
www.ase.org.uk/sen look in focus activities at torches and colour. For some simulations which might be useful.

Resources:

Task 1
Ray boxes, colour filters and white screens.

Task 2
Slide projector and colour filters.

Task 3
Newton's disc.

Mentor Input
Ray box, projector, prisms (60'), screen, colour filters.

Issue 3: Differentiation and SEN – Making light more accessible for visually impaired and/or less able pupils

Trainees have already covered on their PGCE course:

Tasks for trainees:

Preparation for tutorial:

1. Find out about colour blindness; make a list of the activities in this topic which may be difficult for pupils who have this condition.
2. Chose one lesson for this topic and adapt it for presentation to less able pupils.

Possible activities during tutorial:

1. Present information about colour blindness. Discuss the problems that pupils with this and other visual impairments may have in accessing sections of this topic. Consider how to handle this sensitively and what might help.
2. Present the lesson plan and resources. Discuss how the adaptations help to make the lesson accessible and whether these modifications can be incorporated into a mixed ability class lesson.

Mentor Input:

- Go through the difficulties that some pupils have with measuring angle and the idea of 'the normal'. Suggest strategies e.g. copy of protractor on experiment worksheet, use an angle measurer, don't measure angles just look for patterns on the ray diagrams etc.
- Discuss other areas of this topic which cause conceptual difficulties.

Reading:

Subject knowledge and understanding

Subject pedagogy

Dorgan, P. (2000). **Physics Workbook** Folens, Dublin.
The section on light has useful ideas for differentiated worksheets and lesson activities.

Useful websites and applications

www.ase.org.uk/sen - look in focus activities at the torches and colour software.

Resources:

Task 1
School scheme of work and internet search for colour blindness. Try
www.iee.org/policy/Areas/Health/cvdintro.cfm
Provides a clear explanation of colour vision defects.

Task 2
Use the ASE website in 'Useful websites and applications' section above.