Light spectrum - Colour

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Subject: Physics.
Country of creation: Lithuania.
Countries of testing: Portugal, Czech Republic and Slovakia.

Aims of the GP

- To use ICT for learning: searching for information, making generalizations and providing information, processing research, experiments and observation data while analysing and modelling natural phenomena.
- To find out the spectral composition of light and object colours.
- To learn the colour order in the visible spectrum.

Teaching material

Computers, worksheets:

http://mkp.emokykla.lt/gamta5-6/lt/mo/1127/
http://mkp.emokykla.lt/gamta5-6/lt/mo/1128/
http://mkp.emokykla.lt/gamta5-6/lt/mo/1136
http://mkp.emokykla.lt/gamta5-6/lt/mo/1483
http://celebrate.ls.no/english/animations/science/regnbuen_fargelegg.swf
http://resources.eun.org/xplora/xapplet01.swf
http://phet.colorado.edu/simulations/sims.php?sim=Color_Vision
http://resources.eun.org/xplora/xapplet02.swf
http://mysite.verizon.net/vzeoacw1/rainbow.html

Age of the students:

12-14

Preparation and teaching time

Preparation: 45 min. Class time: 1 x 45 min period. Homework: 20 min.

Lesson plan

In a classroom equipped with about 15 computers, teachers are advised to divide the students into two different groups according to their abilities (without emphasizing this!).

- 5 min for revising the following concepts: light spectrum, main and additional colours, colour triangle, colour of objects. An English dictionary

of the words used is supplied on the blackboard or on any other type of media.

- 15 min: Using the corresponding exercise sheet, the weaker group does practical exercises using the computer while the stronger group does theoretical tasks.
- 15 min: The groups change places.
- 10 min: Summing-up of the lesson, analysis of mistakes, explanation of uncertainties, student self-evaluation.

Students work with their study objects and exercise sheets.

Alternatively, if there is no opportunity for the students to work using computers because there is only one computer and projector, the students can do the exercises independently, before and after the teacher has performed the virtual experiments, checking their work.

Extracts from worksheets

Work with the following educational resource:
http://mysite.verizon.net/vzeoacw1/rainbow.html

and answer these questions:

- When the light beam is yellow the colour of the outgoing beam is _____.
- Change the length of the wave and get red, green and blue beams. Change the colour of the beam to white. What happens to the outgoing light beam? What conclusions can be drawn?
- What is the name of this phenomenon?
- The line of seven colours is called _____ by physicists, and in colloquial speech it is called _____.

Table 1: Final colours of the light beam.

a)	**RED** beam passes through **GREEN** filter:	
b)	**RED** beam passes through **BLUE** filter:	
c)	**RED** beam passes through **RED** filter:	
d)	**RED** beam passes through **COLOURLESS** filter:	
e)	**WHITE** beam passes through **RED** filter:	
f)	**SKY-BLUE** beam passes through **RED** filter:	
g)	**YELLOW** beam passes through **RED** filter:	
h)	**PURPLE** beam passes through **RED** filter:	
i)	**SKY-BLUE** beam passes through **COLOURLESS**	

filter:	
j) SKY-BLUE beam passes through PURPLE filter:	

Questionnaire

If the white beam passes through the triangular prism the outgoing beam is

White.
The prism doesn't transmit the beam.
It will be dispersed into seven colours.

The line of seven colours is called *by scientists*

Rainbow / Spectrum / Beam

Number the colours of the spectrum from the bottom to the top

a. Green.
b. Yellow.
c. Red.
d. Blue.
e. Indigo.
f. Orange.
g. Violet.

(Answer: c, f, b, a, d, e, g).

Necessary objects to form a rainbow in the sky (*two correct* answers).

Lightning.
Moon.
Rain.
Sun.

Is it possible to see a rainbow at noon when the sun is high above the horizon?

Yes / No

White is the result of mixing certain amounts of *three* colours

Yellow.
Red.
Blue.
Black.
Green.
Purple.

If the red beam passes through a yellow filter the outgoing beam is

White / Red / Yellow

Laura has been painting a picture. She mixed all the spectrum colours on the palette. Did she get the colour white?

Yes / No

Teacher reviews

The teachers who implemented this GP gave good feedback on it, saying that the materials and worksheets were well prepared and clear for the students, and this allowed them to achieve the GP objectives. It was motivating for the students, in particular because of the combination of different exercises: computer-based exercises, paper-based exercises and communication exercises among the students.

The SPICE project

SPICE was a two-year project (December 2009 – November 2011) carried out by **European Schoolnet** (http://europeanschoonet.org) together with **Direção Geral de Inovação e Desenvolvimento Curricular** (http://sitio.dgidc.min-edu.pt/Paginas/default.aspx) from Portugal and **Dum Zahranicnich Sluzeb MSMT** (http://www.dzs.cz/) from the Czech Republic.

The primary objective of the SPICE project was to collect, analyse, validate and share innovative pedagogical practices, particularly those using inquiry-based learning, whilst enhancing pupils' interest in the sciences. SPICE supported this objective by singling out, analysing and validating good practice pedagogies and practices in maths, science and technology (mostly ICT-based) and disseminating them across Europe. SPICE involved 24 teachers from 16 different educational systems (from 15 different countries). This teachers' panel helped the SPICE partners in defining good practices that were then tested in classes by 41 teachers during the school year 2010-2011.

For more information see: **http://spice.eun.org**

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