Body Colors

The task of the experiment is to illuminate colored objects with light of different colors and examine the changes.

Physics > Light & Optics > Light & Colour

Difficulty level	Group size	Preparation time	Execution time
easy	2	10 minutes	10 minutes

This content can also be found online at:

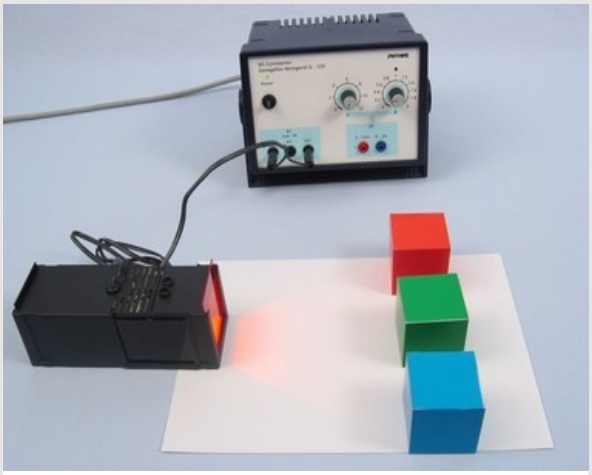
http://localhost:1337/c/616d4c51aeb0ac0003430ac1

PHYWE

Teacher information

Application

PHYWE



Body Colors

Body colour or object colour is the colour of an object that is not illuminated by itself. In order to be perceived, it must be illuminated by an external source of radiation. The light color, in contrast, is the color that emanates directly from a source of radiation.

Depending on the transmission and reflection behaviour of the bodies, their spectral composition changes. The colour impression is created because a certain part of the spectrum is reflected by the body and the other part is absorbed. The body color results as a mixed color of the reflected portion.

PHYWE

Robert-Bosch-Breite 10
37079 Göttingen

Tel.: 0551 604 - 0
Fax: 0551 604 - 107

info@phywe.de
www.phywe.de

Other teacher information (1/3)

PHYWE

Previous

Previous treatment of other experiments on colour mixing is advantageous because the students can then more easily name the colour components in the light of the filters and thus explain the observed phenomena. Conversely, this experiment is also suitable as an introduction and as motivation to deal with colour mixing in more detail.

Principle

Objects in our environment have different colors. They also appear different in the light of the evening sun than when the sun is high in the sky.

Other teacher information (2/3)

PHYWE

Learning

In this experiment, students investigate how this phenomenon, which is well known from everyday life, occurs. In the summary of their observations, the students should find out that the colour of an object depends on the colour of the illuminating light.

Tasks

The task of the experiment is to illuminate colored objects with light of different colors and examine the changes.

PHYWE

Robert-Bosch-Breite 10
37079 Göttingen

Tel.: 0551 604 - 0
Fax: 0551 604 - 107

info@phywe.de
www.phywe.de

Other teacher information (3/3)

PHYWE

Notes on structure and implementation

Observations can be made most accurately and interpreted most easily when the colours of the objects match the filter colours red, green and blue as closely as possible. When these objects are illuminated with the light of the corresponding complementary colour, they appear very dark. Otherwise, the main thing to observe is a change in color.

Safety instructions

PHYWE

The general instructions for safe experimentation in science lessons apply to this experiment.

PHYWE

Robert-Bosch-Breite 10
37079 Göttingen

Tel.: 0551 604 - 0
Fax: 0551 604 - 107

info@phywe.de
www.phywe.de

PHYWE

Student Information

Motivation

PHYWE

The body color of an object is the color that a non-self-illuminating body has. It varies depending on the color and brightness of the radiation source.

The plants in our environment are almost all green, that is because they need mainly the red and blue parts of the light for their growth and therefore abosorb. Their reflection maximum is in the range of green light, which is why they get their characteristic green color.

PHYWE

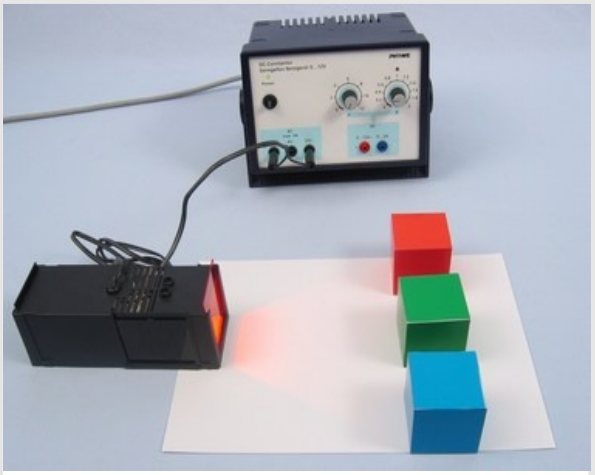
Robert-Bosch-Breite 10
37079 Göttingen

Tel.: 0551 604 - 0
Fax: 0551 604 - 107

info@phywe.de
www.phywe.de

Task

PHYWE



Test setup

Why do objects have different colors?

- Illuminate colored objects with light of different colors and examine the changes.

PHYWE

Robert-Bosch-Breite 10
37079 Göttingen

Tel.: 0551 604 - 0
Fax: 0551 604 - 107

info@phywe.de
www.phywe.de

Equipment

Position	Material	Item No.	Quantity
1	Light box, halogen 12V/20 W	09801-00	1
2	Colour filter set, additive (red, blue, green)	09807-00	1
3	Colour filter set, subtractive (yellow, magenta, cyan)	09808-00	1
4	PHYWE Power supply, 230 V, DC: 0...12 V, 2 A / AC: 6 V, 12 V, 5 A	13506-93	1

PHYWE
Robert-Bosch-Breite 10
37079 Göttingen
Tel.: 0551 604 - 0
Fax: 0551 604 - 107
info@phywe.de
www.phywe.de

Additional material

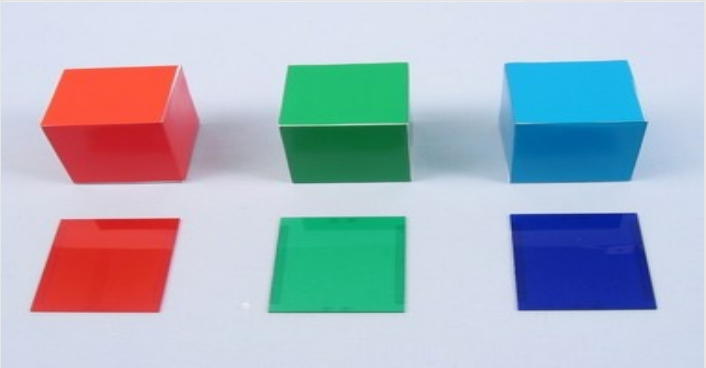
PHYWE

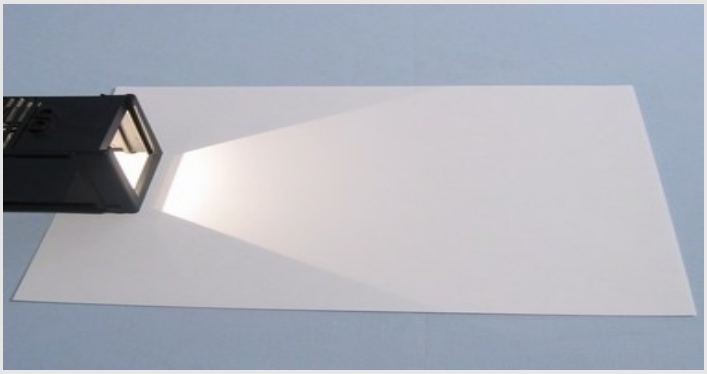
Position	Material	Quantity
1	colored bodies red, green, blue or color card	1
2	White paper (DIN A4)	1

Set-up

PHYWE

- Find colored objects whose color matches the colors of the color filters as closely as possible.
- Lay the sheet of paper across the table and place the light box with the lamp side on the edge.





PHYWE

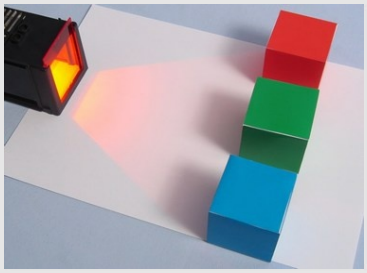
Robert-Bosch-Breite 10
37079 Göttingen

Tel.: 0551 604 - 0
Fax: 0551 604 - 107

info@phywe.de
www.phywe.de

Procedure

PHYWE



- Connect the light box to the power supply (12 V ~).
- Slide the red filter into the light well of the light box.
- Hold the colored objects side by side in the divergent light beam.
- Observe the white paper and the colored objects and note the change in colors.
- Repeat the experiment for all other color filters and note your observations.
- Turn off the power supply.

PHYWE

Report

PHYWE

Robert-Bosch-Breite 10
37079 Göttingen

Tel.: 0551 604 - 0
Fax: 0551 604 - 107

info@phywe.de
www.phywe.de

Task 1

10° PHYWE

Does the color of an object depend on the color of the incident light?

- [ ] Yes, the color of the object depends very much on the lighting.
- [ ] No, the color of the object does not depend on the lighting.
- [ ] Only when the illumination color matches the color of the object in white light, the color hardly changes.

Check

Task 2

10° PHYWE

What color do white objects take on when illuminated with colored light?

White objects always appear in the color white, regardless of the color of the lighting.

White objects always appear in the color of the illuminating light.

PHYWE

Robert-Bosch-Breite 10
37079 Göttingen

Tel.: 0551 604 - 0
Fax: 0551 604 - 107

info@phywe.de
www.phywe.de

Task 3

PHYWE

Compare your observations about the different color filters and fill in the blanks.

When illuminated by the red, green or blue filter, only the _____ object keeps its colour. The other two objects become _____ or _____ their color.

When illuminated by the yellow, cyan, or purple filter, one other color always becomes very dark or almost _____ (namely, the complementary color). The other two objects become only _____ or change their color _____.

change
perceptibly darker
black
slightly darker
same
slightly

Check

Task 4

PHYWE

Try to give an explanation for the emergence of body colors.

- ○ All bodies swallow (absorb) part of the spectrum. The color in which they appear is the mixed color of the transmitted light.
- ○ All bodies swallow (absorb) a part of the spectrum. The color in which they appear is the mixed color of the reflected light.
- ○ All bodies swallow (absorb) part of the spectrum. The color in which they appear is the mixed color of the absorbed and reflected light.

Check

PHYWE
Robert-Bosch-Breite 10
37079 Göttingen
Tel.: 0551 604 - 0
Fax: 0551 604 - 107
info@phywe.de
www.phywe.de

Task 5

PHYWE

green sprouts

Plants are green. Which colour components of white light do they therefore need for their growth?

- ○ Plants absorb mainly red and blue parts of the light they need for their growth.
- ○ Plants therefore absorb mainly green parts of the light they need for their growth.

Check

Slide	Score / Total
Slide 15: Dependence of the object color	0/2
Slide 16: white items	0/1
Slide 17: Observations on different color filters	0/6
Slide 18: Emergence of body colors	0/1
Slide 19: Plant growth	0/1

Total 0 / 11

Solutions Repeat

PHYWE

Robert-Bosch-Breite 10
37079 Göttingen

Tel.: 0551 604 - 0
Fax: 0551 604 - 107

info@phywe.de
www.phywe.de