

I. How bright?

Key Question: How bright are different light sources?



Student name:

Class:



<http://www.cma-science.nl>

Activity 1 – Light sources

- Light is all around us. How many ways of getting light can you think of?
Make a list of eight light sources.

| | |
|----|----|
| 1. | 5. |
| 2. | 6. |
| 3. | 7. |
| 4. | 8. |

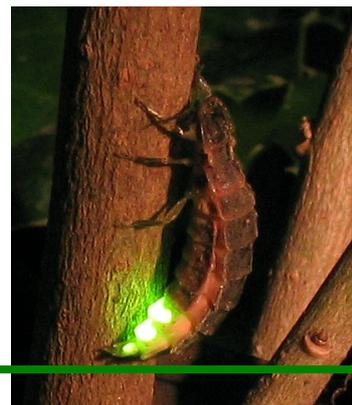
1. What do you think which of your light sources are natural light sources and which are man-made (artificial) light sources?

| NATURAL LIGHT SOURCES | ARTIFICIAL LIGHT SOURCES |
|-----------------------|--------------------------|
| | |

2. Which of these light sources is the brightest? How do you know?

3. Which of these light sources is the darkest? How do you know?

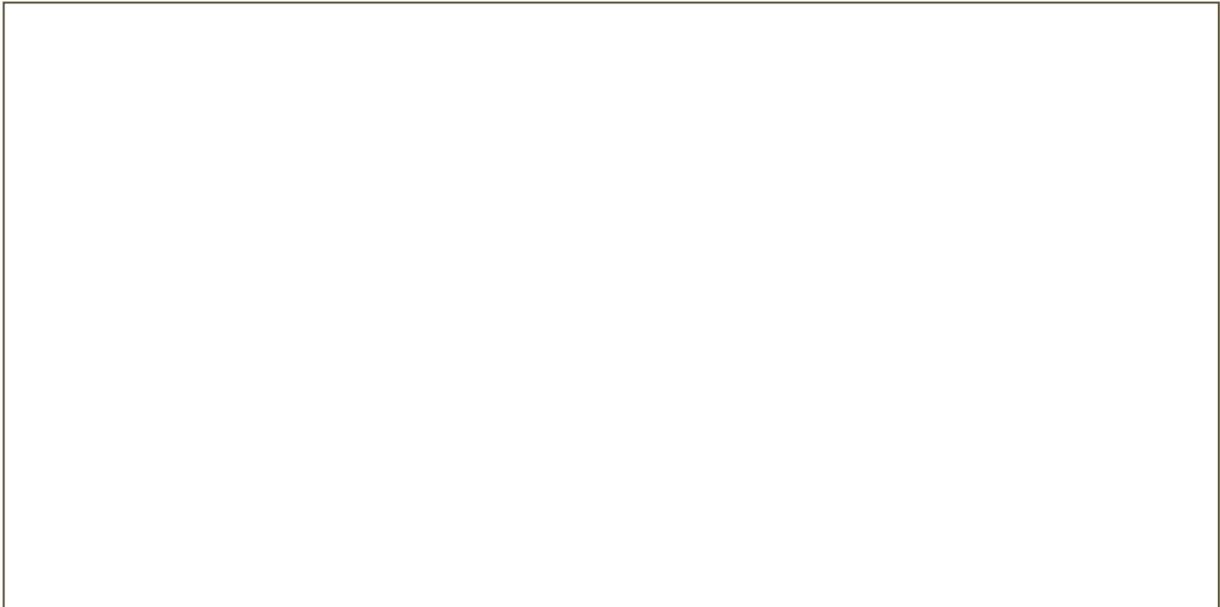
Do you know that living animals can produce light?
For example a family of insects called fireflies or lightning bugs produce light to attract mates or prey.



Activity 2 – The brightness of light sources

To measure the brightness of light you can use a light sensor. A light sensor is built-in in €Sense.

- Look at your €Sense, can you tell where the light sensor “eye” is located?
4. Draw a picture of €Sense. Label the “eye” of the light sensor and the direction it’s looking. How did you decide where the eye was?



5. €Sense measures the brightness, also called light intensity and shows it on the computer screen. In which unit is the light intensity measured?



6. Point the light sensor in different directions and watch the measurement reading. Finish the following sentences:

When I point the light sensor at a light source, the light intensity _____.

When I point the light sensor toward the floor, the light intensity _____.

Now you are going to measure the brightness of different light sources. First collect a few light source likes: a torch, a tungsten lamp, a LED lamp, etc.

7. List in the table below, which light sources you are going to use.
8. What do you think how bright they are? Write your prediction in the table. The brightest light source (giving the most light) gets number 1.
9. Now use the €Sense's light sensor and measure the brightness of your light sources. Try to keep €Sense always at the same distance from each light source.
10. Write the results of your measurements in the table.

| LIGHT SOURCE | PREDICTED BRIGHTNESS (1 FOR THE BRIGHTEST) | THE MEASURED LIGHT INTENSITY (LUX) |
|--------------|---|---------------------------------------|
| | | |
| | | |
| | | |
| | | |
| | | |

11. Was your prediction correct?

12. Which of your light sources gives the most light?

13. Why do you think you have to keep €Sense at the same distance from each of the light source?

Activity 3 – How much light can the light sensor measure?

- On a sunny day direct the light sensor at the sunlight. Read how strong the light is.

In bright sunlight I measure a light intensity of _____ lux.

You probably measure 15171 lux. This is the maximum light level the light sensor can measure in this measurement range. Actually the intensity of the sunlight is more than that. The Sun is the brightest light source and its brightness is more than 100 000 lux. Sunlight is so bright that looking directly at the Sun with the naked eye can be painful and dangerous. Always use a filter, for example sunglasses, to protect your eyes when you look at the Sun!

- Now try to find the minimum value the light sensor can measure. What is the lowest light level you can measure?

The lowest light level, which I can measure is _____ lx.

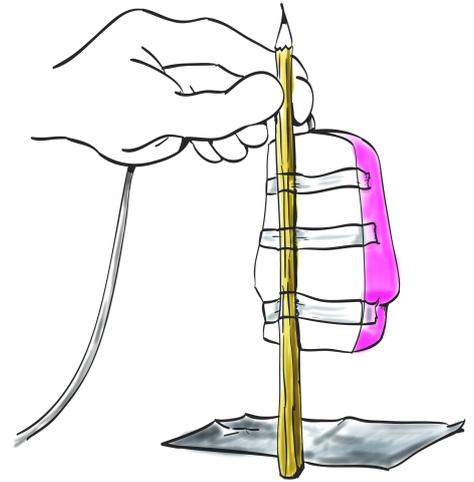
- 14.** What did you do to get such low light level?

Activity 4 – Which are the brightest and the darkest places in your classroom?

Now you are going to investigate the lighting of your classroom. To make this a fair test and to be able to compare your measured results, you need to do all measurements in the similar way.

Your measurement method is:

- Tape a pencil to €Sense to keep it a fixed distance to the paper - about 10 cm. Keep €Sense so that the light sensor points straight down.
 - Place a sheet of white paper on a place where you want to measure the light intensity.
 - Don't let the shadow of your hand fall on the paper where the sensor is pointing!
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- Now sketch a plan of your classroom on the next page. Mark all light sources on the plan.
 - Do the light measurements in a few places in your classroom and write the respective measured values on your plan.

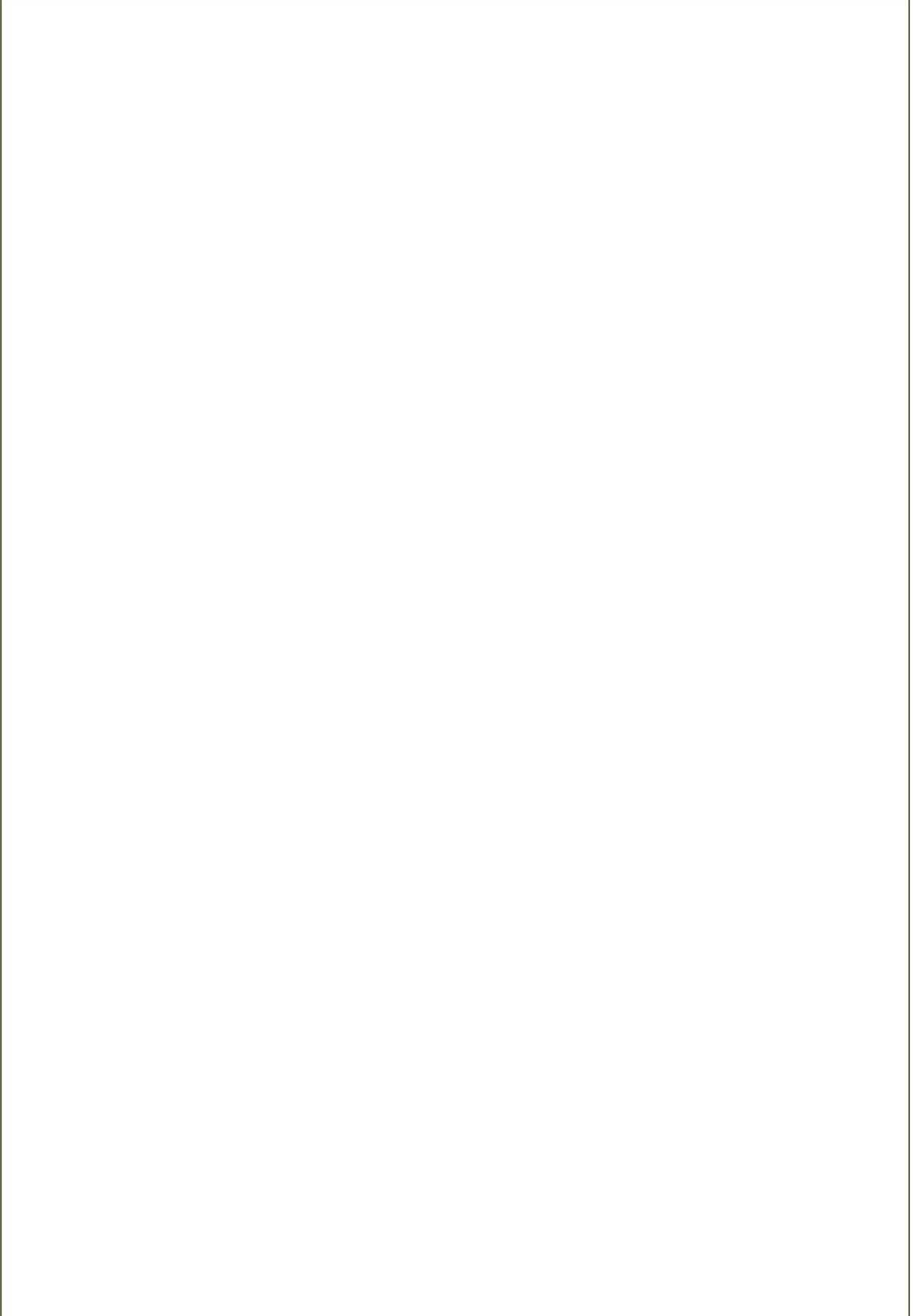


15. What are the sources of light in the classroom?

16. What are the brightest places in the classroom? Why are these places so bright?

17. What are the darkest places in the classroom? Why are these so dark?

My classroom

A large, empty rectangular box with a thin black border, intended for a drawing or description of a classroom.

Questions

A. Which of these is a source of light?

Firefly

Reflective jacket

Electric lamp

B. If you want to measure light brightness, which would be more reliable – your eyes or a light sensor? Explain.

C. To be able to read well you need at least light of 400 or 500 lux. Measure how much light falls on your desk. Use similar measurement method as the one described in activity 4. Is your desk properly lighted?

D. Investigate if an energy saving lamp gives as much light as a light bulb. Write below results of your investigation.