



ASTROEDU

Peer-reviewed Astronomy Education Activities

Build a Safe Sun Viewer

Build a safe Sun viewer using cheap household items and learn why it is dangerous to look directly at the Sun, even briefly.

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**AGE**

6 - 12

**LEVEL**

Primary

**TIME**

30min

**GROUP**

Group

**SUPERVISED**

Yes

**COST PER STUDENT**

Low Cost

**LOCATION**

Small Indoor Setting (e.g. classroom)

**CONTENT AREA FOCUS**

Astronomy

**ASTRONOMY CATEGORIES**

Astronomical instrumentation, The Sun

**CORE SKILLS**

Planning and carrying out investigations

**TYPE(S) OF LEARNING ACTIVITY**

Modelling, Direct Instruction, Observation based, Fun activity



KEYWORDS

Sun, Observation, Light, Safety



GOALS

- To build a safe Sun viewer to observe the Sun.
 - To understand why it's harmful to observe the Sun directly.
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LEARNING OBJECTIVES

- Students will be able to demonstrate building a safe Sun viewer.
 - Students will be able to describe why it is dangerous to look directly at the Sun, even briefly.
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EVALUATION

Ask students why the pinhole should be smaller and not bigger. (Answer: Smaller pinhole means the path of light is less diffuse so the image is more focussed and less blurry).

Ask students the importance of not looking directly at the Sun without proper filters. (If shown the video of the grape burning under additional information, can refer to this. The Sun's rays will burn the back of the eye and can cause blindness.)

Ask students which event they could observe through their safe sun viewer (Solar eclipse).



MATERIALS

- Cardboard box
 - White cardboard
 - Scissors
 - Tape
 - Aluminum foil
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BACKGROUND INFORMATION

Sun

The Sun is a powerhouse of energy, an enormous ball of gas, undergoing constant nuclear fusion. Even though the Earth is about 149 million kilometres away from the Sun, we still feel energy from the explosions that happen within it. In fact, all life on Earth depends on the heat and light coming from the Sun.

Observing Sun

Looking directly at the Sun, even for a brief moment, is a bad idea — our eyes are very sensitive to its light. Even in the darkness, at least when there is only the tiniest amount of light, your eyes still manage to detect things. So imagine what happens when you focus all that bright light from the Sun on a tiny area like the eye. The light detectors at the back of the eye get burned. Unfortunately, unlike a sunburn on your skin, your eye probably won't recover.

If you would like a very visual demonstration of how damaging the Sun can be, have a look at [Stuart Lowe's astronomy blog](#). He has made a video of what happens when a grape is put up to the eye piece of a telescope which is pointed directly at the Sun, with no filters. Very quickly the grape begins to blacken and burn. An eye is much more delicate than a grape so the demonstration is quite a powerful reminder to be careful when looking at the Sun.

So, please, no matter what, do not look directly at the Sun.



FULL ACTIVITY DESCRIPTION

Introducing the Sun

Ask students what in space allows us to see. Should we look at it directly? If it damages our eyes (and cameras) to look at it directly, then how can we look at it. Use filters so most of the light does not reach the eye/camera. Share the background information with students, emphasising not to look at the Sun directly.

Making the Sun Viewer

Step 1

Take a cardboard box and cut a window at one of the short ends. Cut the window as wide as the box and about 3 cm high.

Step 2

Cut another window directly above the first. This window needs to be bigger than the previous one, cut it about 5 cm high. The smaller hole is going to be your viewing window. The bigger hole is going to be your projection window.

Step 3

Cut a piece of white cardboard to the same size as the bottom of the box.

Step 4

Insert the white cardboard into the opposite end.

Step 5

This is going to be your projection screen.

Step 6

Cut a piece of aluminium foil large enough to completely cover the projection window.

Step 7

Hold it up to the light to make sure that there are no holes in the foil.

Step 8

Tape the foil over the projection window.

Step 9

Hold your box up to an electric light and look through the viewing window to make sure that there are no pinpricks of light sneaking in.

Step 10

Seal any extra holes in the box.

Step 11

Take a pin, nail, or some other small, sharp object, and make a small hole in the foil. (You can experiment with the size of the hole, but about 3 mm works well.)

Observing With the Safe Sun Viewer

Step 12

Remember not to look at the Sun directly. Go outside and stand with your back to the Sun. Hold the box pointed at the ground so that the Sun's light can pass through the pinhole in the foil and onto the screen.

Step 13

Look through the bottom window. The small circle of light that you will see is not just 'light' coming through the pinhole, it is an image of the Sun.

Warning: Don't look at the Sun directly without proper filtering.



CURRICULUM

Country | Level | Subject | Exam Board | Section
— | — | — | —
UK | KS3 | Physics | - | Space Physics: The Sun
UK | KS3 | Physics | - | Waves: Light Waves
UK | KS2: Year 5 | Science | - | Earth and Space
UK | KS2: Year 3 | Science | - | Light



ADDITIONAL INFORMATION

Daily Sun images through NASA SOHO website in real time, through different filters:

<http://sohowww.nascom.nasa.gov/data/realtime/realtime-update.html>

Sunspots from NASA SOHO:

<http://sohowww.nascom.nasa.gov/sunspots/>

Video about the effects of viewing the Sun through a telescope can have on a grape (which is very similar to an eye):

<http://www.strudel.org.uk/blog/astro/000347.shtml>



CONCLUSION

This activity teaches the importance of safe solar observation and how to build a cheap but effective pinhole camera from a cardboard box to observe the Sun.

CITATION

Roberts, S., 2014, *Build a Safe Sun Viewer*, [astroEDU](#), [doi:10.14586/astroedu.1409](https://doi.org/10.14586/astroedu.1409)

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