

10.SOLAR ASTRONOMY

Edexcel GCSE Astronomy Course

THE SOLAR WIND AND THE HELIOSPHERE

10.10 Understand the nature, composition and origin of the solar wind

10.11 Understand the principal effects of the solar wind, including:
a aurorae b cometary tails
c geomagnetic storms d the effects on satellites, aircraft travel and manned missions

10.12 Know the shape and position of the Earth's magnetosphere including the Van Allen Belts

<https://www.space.fm/astronomy/earthmoonsun/solarwind.html>

https://www.nasa.gov/mission_pages/sunearth/news/gallery/20130228-radiationbelts.html

10.2 Know the location and relative temperatures of the Sun's internal divisions, including:

a core b radiative zone c convective zone d photosphere

10.5 Know the location, temperature and relative density of components of the solar atmosphere, including: a chromosphere b corona

This site is designed to give information on these specific items in the GCSE Astronomy specification:

<https://www.space.fm/astronomy/earthmoonsun/structure.html>

10.3 Understand the role of the Sun's internal divisions in terms of energy production and transfer

10.4 Understand the principal nuclear fusion process in the Sun (the proton-proton cycle)

https://energyeducation.ca/encyclopedia/Nuclear_fusion_in_the_Sun

<https://phys.org/news/2015-12-sun-energy.html>

https://www.youtube.com/watch?v=W8cX0YbRLFo&ab_channel=It%27sJustAstronomical%21

10.6 Understand the structure, origin and evolution of sunspots

10.7 Be able to use sunspot data to determine the mean solar rotation period

What are they?

<https://www.schoolsobservatory.org/learn/astro/solsys/sun/sunspots>

CURRENT views of the Sun <https://sohowww.nascom.nasa.gov/sunspots/>

Carry out the NASA/ESA SOHO Solar rotation exercise:

<https://soho.nascom.nasa.gov/classroom/docs/Spotexerweb.pdf>

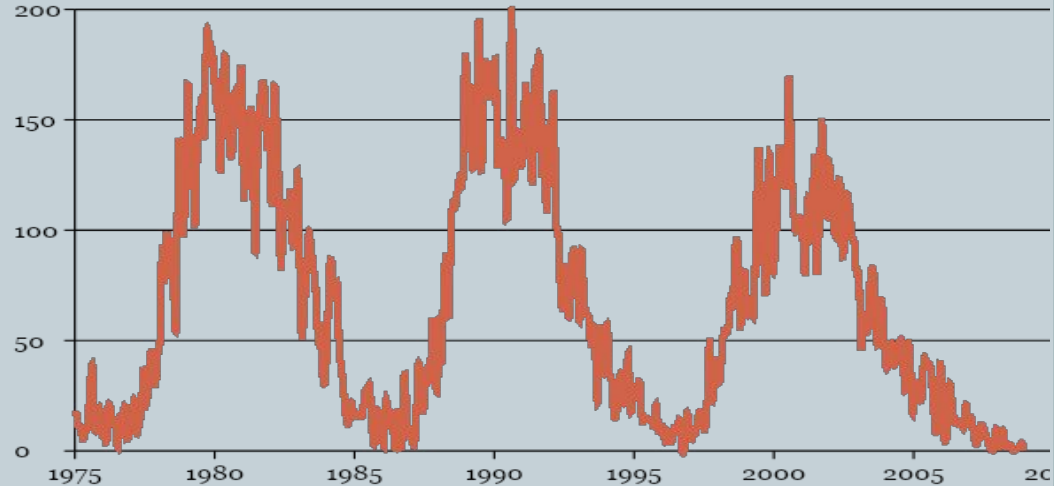
(Print a copy of the grid to plot sunspots

<https://www.abingdonsciencepartnership.org/wp-content/uploads/2021/01/Sunspot-Grid-1.pdf>)

The Sunspot Cycle



- For hundreds of years solar activity has been mapped by the observation of sunspots.
- It is clear from this data that over a number of years a cycle of activity occurs.
- By observing this, one may be able to predict when the next solar maximum will



https://www.schoolsobservatory.org/discover/activities/sunspots_workshop

10.9 Understand the different appearance of the Sun when observed using radiation from the different regions of the electromagnetic spectrum

The Sun gives out electromagnetic radiation across the whole spectrum of wavelengths. It looks very different according to the wavelength we choose to look at:

<https://www.space.fm/astronomy/earthmoonsun/solarwavelengths.html>

Information on observing the Sun.

The final slide discusses ways in which the Sun be observed safely.

Any practical work carried out would be best done during the summer months when the weather may be better, day length longer and when the Sun reaches a higher angle in the sky.

10.1 Understand methods of observing the Sun safely, including: a telescopic projection b H-alpha filter

Observing the Sun can be hazardous unless appropriate methods are used - here is an example of Sun safety information for the public ahead of a total eclipse:

<https://eclipse.aas.org/eye-safety>

Even when the eyes are appropriately protected, solar observers should also take precautions against overexposure of the skin to high UV levels, causing sunburn and leading to skin cancer.

Methods of solar projection are discussed here - the biggest problem is usually how to project the image into an area that is dark enough to provide good contrast when you are working in bright sunshine. Projection with a pair of binoculars or a simple refracting telescope usually provides the best results.

To observe the Sun directly you must be certain to use a safe and effective filter - home made versions will not be safe

<https://astronomy.com/great-american-eclipse-2017/articles/2016/06/how-to-choose-a-hydrogen-alpha-filter>

This site explains what Hydrogen alpha means <http://www.astronomyknowhow.com/hydrogen-alpha.htm>