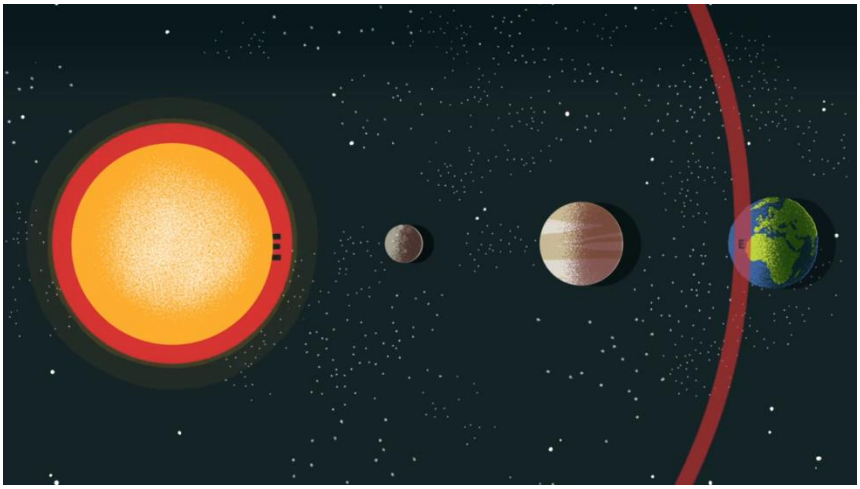
ROYAL OBSERVATORY GREENWICH

Calculating the energy output of the Sun

Key Stage 4

Topics covered: Energy, power, luminosity, intensity, surface area

Watch the video "How do we know how old the Sun is?"
https://vimeo.com/88978362



The power output or luminosity of the Sun is 3.8×10^{26} W, this is the total amount of energy released from the Sun every second. The Sun's energy is radiated outwards in all directions, consequently the Earth receives only a small fraction of this energy. This is measured as intensity - the power received per unit area.

1. The average distance between the Earth and the Sun is 150 million km, work out the intensity of sunlight reaching the Earth. The units of intensity are **W/m^2**, convert km into metres.

2. The average distance of Pluto from the Sun is 5874 million km. How does the intensity of sunlight reaching Pluto compare with that of the Earth?

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Calculating the energy output of the Sun: ANSWERS

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1. 1370 W/m^2
2. Intensity on Pluto = 0.876 W/m^2; it receives only 0.06% of the intensity of sunlight reaching Earth