



GCSE – **NEW**

3445U20-1A



S18-3445U20-1A

**APPLIED SCIENCE (Double Award)**

**UNIT 2: Space, Health and Life**

**Pre-Release Article for use in the following examinations on  
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GCSE Applied Science (D/A) Unit 2 Foundation Tier (3445U20-1)

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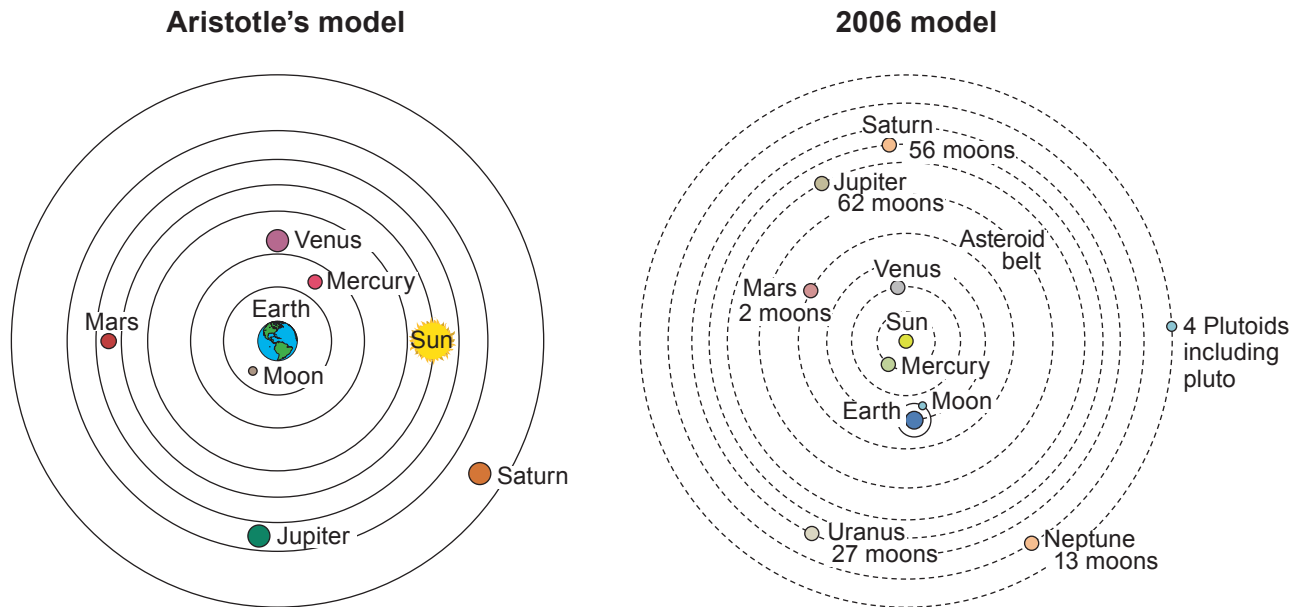
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## History of our Solar System

There are different models of the Solar System. An ancient model was suggested by Aristotle. Modern models of the Solar System have changed from Aristotle's model.

**Diagram 1: Models of the Solar System**



*Diagrams not drawn to scale*

Properties of some objects in the Solar System are described in Table 1.

**Table 1: Properties of objects in our Solar System**

	Mercury	Venus	Earth	Moon	Mars	Jupiter	Saturn	Pluto
Mass ( $10^{24}$ kg)	0.330	4.87	5.97	0.073	0.642	1898	568	0.015
Diameter (km)	4879	12104	12756	3475	6792	142984	120536	2370
Density ( $\text{kg/m}^3$ )	5427	5243	5514	3340	3933	1326	687	2095
Gravity ( $\text{m/s}^2$ )	3.7	8.9	9.8	1.6	3.7	23.1	9.0	0.7
Length of day (hours)	4222.6	2802.0	24.0	708.7	24.0	9.9	10.7	153.3
Distance from Sun (AU)	0.4	0.7	1	1	1.5	5.2	9.5	39.5
Orbital period (days)	88.0	224.7	365.2	27.3	687.0	4331	10747	90560
Orbital velocity ( $\text{km/s}$ )	47.4	35.0	29.8	1.0	24.1	13.1	9.7	4.7
Mean temperature ( $^{\circ}\text{C}$ )	167	464	15	-20	-65	-110	-140	-225
Ring system?	No	No	No	No	No	Yes	Yes	No
Atmosphere	None	$\text{CO}_2$	$\text{N}_2 + \text{O}_2$	None	$\text{CO}_2$	$\text{H}_2 + \text{He}$	$\text{H}_2 + \text{He}$	$\text{N}_2$

## The Sun's activity

The solar magnetic field changes on an eleven year cycle. Every solar cycle, the number of sunspots, flares, and solar storms increases to a peak, which is known as the solar maximum. Then, after a few years of high activity, the Sun will enter a few years of low activity, known as the solar minimum. This pattern is called the sunspot cycle. Sunspot cycles have been tracked since 1755.

**Graph 1** shows the number of sunspots during different sunspot cycles 18 to 23 since 1940.

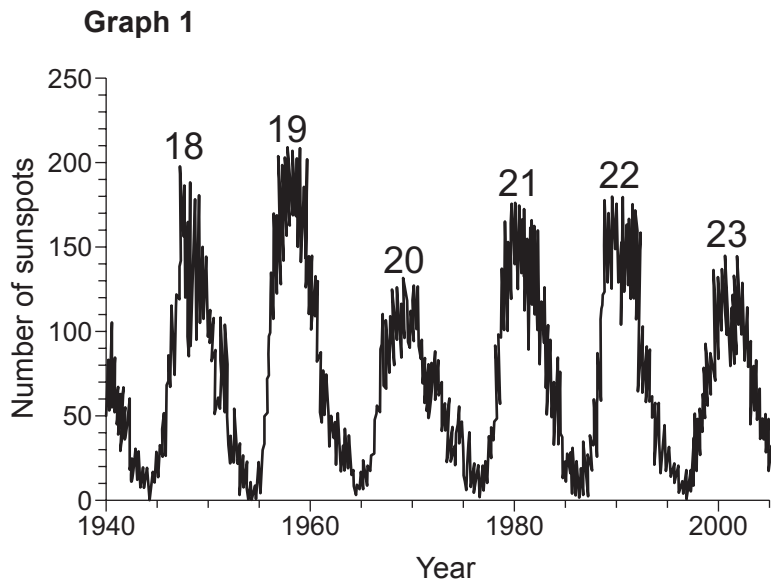
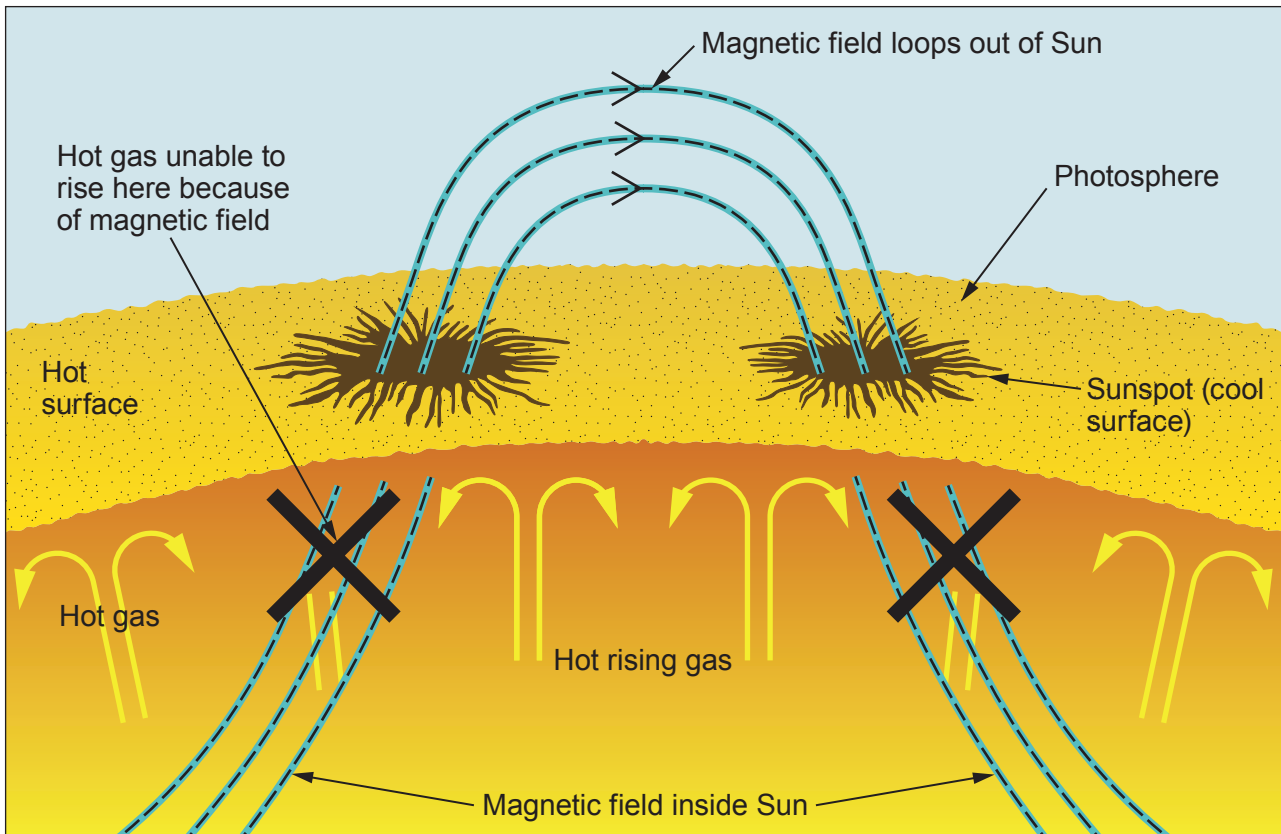


Diagram 2 shows the magnetic field near sunspots.

Diagram 2

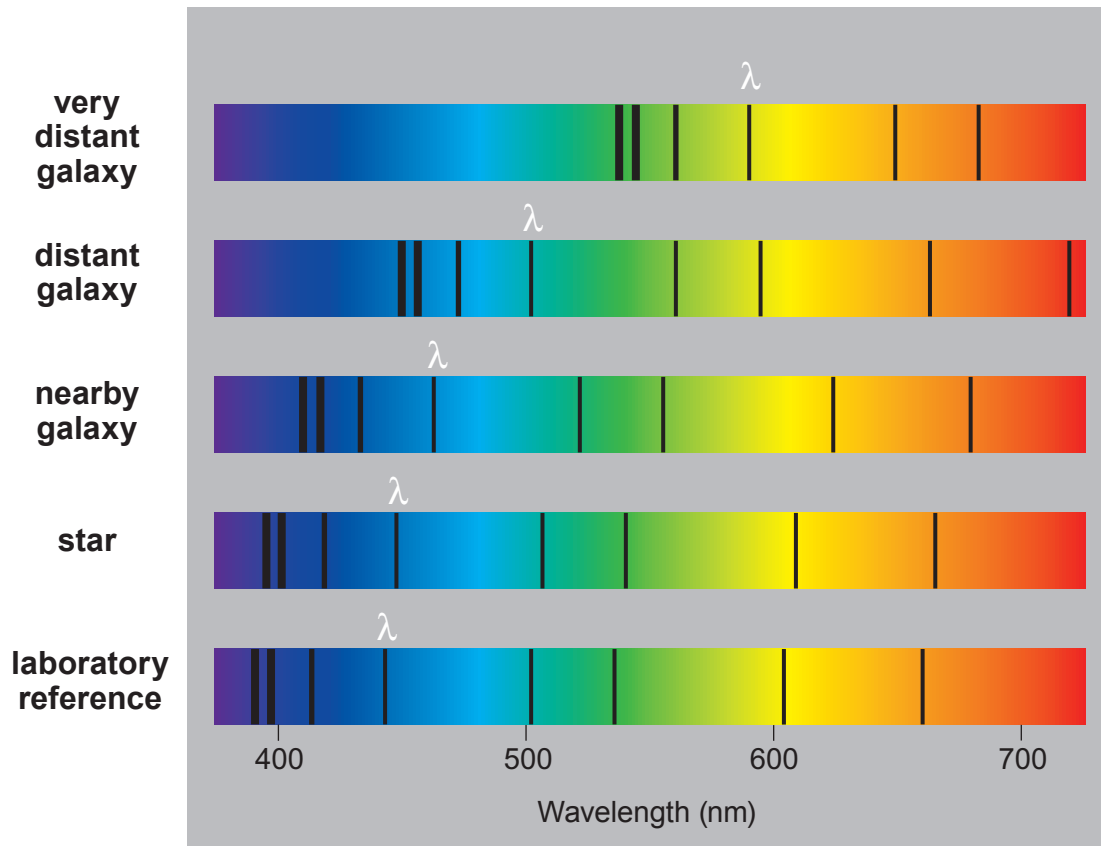


A solar flare is an intense burst of radiation coming from the release of magnetic energy associated with sunspots.

## Spectra

The light emitted from stars and galaxies is crossed by dark lines in a regular pattern. Some of these spectra are shown in **Diagram 3**.

**Diagram 3**



The speed of em waves (300 000 km/s) is related to frequency and wavelength by the equation:

$$\text{wave speed} = \text{frequency} \times \text{wavelength}$$

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