

# Formulae for GCSE Astronomy

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$$\frac{\lambda - \lambda_0}{\lambda_0} = \frac{v}{c}$$

All the formulae you will need for the exam



For the exam, you will need to familiarise yourself with the following formulas:

1. Declination > 90 – latitude

This is used to see if a star is circumpolar or not. If so, the stars Declination will be greater than 90 – the observers latitude

2.  $EOT = AST - GMT$  where: EOT represents the **equation of time**

AST represents the **apparent solar time**

GMT represents the **Mean Solar time**

3.  $T^2 = R^3$  where:

T is the **orbital period** of a planet around the sun in Earth **years**

R is its mean **distance from the sun** in **astronomical units**

4.  $F = \frac{GM_1M_2}{d^2}$  where:

$M_1$  and  $M_2$  represent the **masses of two different objects**

$d$  is the **distance between their centres**.

$G$  is the **gravitation constant** with the value of:

$$6.67 \times 10^{-11} \text{ N m}^2 \text{ kg}^{-2}$$

5.  $M = m + 5 - 5 \log(d)$  where:  $M$  is the absolute magnitude of a star

$m$  is the apparent magnitude of a star

$d$  is the distance to the star in parsecs.

**DON'T WORRY ABOUT THE LOG BIT!!! YOU WILL NEVER BE ASKED TO CALCULATE  $d$ . ALL YOU NEED TO KNOW IS WHERE THE LOG BUTTON IS ON YOUR CALCULATOR.**

6.  $\frac{\lambda - \lambda_0}{\lambda_0} = \frac{v}{c}$  where:  
spectral line

$\lambda$  is the observed wavelength of a

$\lambda_0$  is the measured wavelength of a spectral line

$v$  is the radial velocity of a star or galaxy

$c$  is the speed of light (3000 000 km/s)

7.  $V = Hd$  where:

$V$  is the r e c e s s i o n velocity of a galaxy  
in km/s

$H$  is the Hubble Constant (77km/s/Mpc)

$D$  is the distance to the galaxy.

Remember, you can work out the age of the universe if you convert the units of the Hubble constant into seconds and do 1 over  $H$ :  $\frac{1}{H}$