

Paper Reference(s) 1AS0/01
Pearson Edexcel Level 1/Level 2 GCSE (9–1)

Astronomy
PAPER 1: Naked-eye Astronomy

Wednesday 12 June 2024 – Morning

Time: 1 hour 45 minutes

Formulae and Data Booklet

**DO NOT RETURN THIS FORMULAE AND DATA
BOOKLET WITH THE QUESTION PAPER.**

Formulae

Equation of Time = Apparent Solar Time (AST) – Mean Solar Time (MST)

Kepler's 3rd law: $\frac{T^2}{r^3} = \text{a constant}$

Magnification of telescope: $\text{magnification} = \frac{f_o}{f_e}$

Distance modulus formula: $M = m + 5 - 5 \log d$

Redshift formula: $\frac{\lambda - \lambda_0}{\lambda_0} = \frac{v}{c}$

Hubble's law: $v = H_0 d$

Data

Mass of Earth	6.0×10^{24} kg
Mean diameter of Earth	13 000 km
Mean diameter of Moon	3500 km
Mean diameter of Sun	1.4×10^6 km
One Astronomical Unit (AU)	1.5×10^8 km
Mean Earth to Moon distance	380 000 km
One light year (l.y.)	9.5×10^{12} km
One parsec (pc)	3.1×10^{13} km = 3.26 l.y.
Sidereal day of Earth	23 h 56 min
Synodic day of Earth	24 h 00 min
Temperature of solar photosphere	5800 K
Hubble Constant	68 km/s/Mpc
Speed of light in vacuum	3.0×10^8 m/s

Name	Type of body	Mean distance from Sun / AU	Sidereal period / Earth year	Mean temperature / °C
Mercury	planet	0.38	0.24	170
Venus	planet	0.72	0.62	470
Earth	planet	1.0	1.0	15
Mars	planet	1.5	1.9	−50
Ceres	dwarf planet	2.8	4.6	−105
Jupiter	planet	5.2	11.9	−150
Saturn	planet	9.5	29.5	−180
Uranus	planet	19.1	84.0	−210
Neptune	planet	30.0	165	−220
Pluto	dwarf planet	39.5	248	−230
Haumea	dwarf planet	43.1	283	−241
Eris	dwarf planet	67.8	557	−230

(continued on the next page)

Turn over

continued.

Name	Diameter / 1000 km	Mass / Earth mass	Ring system	Moons
Mercury	4·9	0·055	no	none
Venus	12·1	0·82	no	none
Earth	12·8	1·00	no	1:the Moon
Mars	6·9	0·11	no	2 small moons: Deimos and Phobos
Ceres	0·95	$1·5 \times 10^{-4}$	no	none
Jupiter	143	318	yes	4 major moons: Ganymede, Callisto, Europa, Io >60 others
Saturn	121	95	yes	5 major moons: including Titan, Iapetus >55 others
Uranus	51	15	yes	5 major moons: including Titania, Oberon >20 others
Neptune	50	17	yes	1 major moon: Triton >12 others
Pluto	2·4	$2·2 \times 10^{-3}$	no	1 major moon: Charon >4 other moons
Haumea	1·4	$6·7 \times 10^{-4}$	no	2
Eris	2·3	$2·8 \times 10^{-3}$	no	at least 1