

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

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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

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Name	Type of body	Mean distance from Sun / AU	Sidereal period / Earth year	Mean temperature / °C
Pluto	dwarf planet	39·5	248	−230
Haumea	dwarf planet	43·1	283	−241
Eris	dwarf planet	67·8	557	−230

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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	1.5×10^{-4}	no	none
Jupiter	143	318	yes	4 major moons: Ganymede, Callisto, Europa, Io > 60 others

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Name	Diameter / 1000 km	Mass / Earth mass	Ring system	Moons
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

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Name	Diameter / 1000 km	Mass / Earth mass	Ring system	Moons
Pluto	2·4	$2\cdot2 \times 10^{-3}$	no	1 major moon: Charon >4 other moons
Haumea	1·4	$6\cdot7 \times 10^{-4}$	no	2
Eris	2·3	$2\cdot8 \times 10^{-3}$	no	at least 1