

Space physics

Cambridge IGCSE Physics

The syllabus introduces every one with the words “recall and use”, and 0625 provides no formula sheet in any paper. Compiled by GioPhysics from the published syllabus. This is an independent study aid, not a Cambridge document; the official syllabus is the authority.

6.1.1 The Earth

SUPP. Average orbital speed

$$v = 2\pi r / T$$

- v — average orbital speed (m/s)
 r — average radius of the orbit (m)
 T — orbital period (s)

6.1.2 The Solar System

CORE
DERIVED

Travel time of light

$$t = d / c$$

- t — time taken (s)
 d — distance (m)
 c — speed of light (m/s)

Not printed in the syllabus: it is $v = s/t$. The syllabus asks you to calculate the time light takes to cross Solar System distances.

6.2.2 Stars

SUPP. Light-year

$$1 \text{ light-year} = 9.5 \times 10^{15} \text{ m}$$

- ly — distance light travels in one year in a vacuum (m)

Core candidates define the light-year without being given the value.

6.2.3 The Universe

SUPP. Hubble constant

$$H_0 = v / d$$

$$v = H_0 d \quad \cdot \quad d = v / H_0$$

- H_0 — Hubble constant (s^{-1})
 v — speed the galaxy is receding at (m/s)
 d — distance of the galaxy from Earth (m)

SUPP. Estimated age of the Universe

$$d / v = 1 / H_0$$

- $1 / H_0$ — an estimate of the age of the Universe (s)

Evidence for all the matter in the Universe having once been at a single point.

M Maths you must recall

CORE **Circumference of a circle**

$$C = 2\pi r = \pi d$$

C — circumference (m, cm)

r — radius (m, cm)

d — diameter (m, cm)

CORE **Area of a rectangle**

$$A = l \times w$$

A — area (m², cm²)

l, w — length and width (m, cm)

CORE **Area of a triangle**

$$A = \frac{1}{2} \times b \times h$$

A — area (m², cm²)

b — base (m, cm)

h — perpendicular height (m, cm)

This is what the area under a speed–time graph usually comes down to.

CORE **Area of a circle**

$$A = \pi r^2$$

A — area (m², cm²)

r — radius (m, cm)

CORE **Volume of a rectangular block**

$$V = l \times w \times h$$

V — volume (m³, cm³)

l, w, h — length, width and height (m, cm)

CORE **Volume of a cylinder**

$$V = \pi r^2 h$$

V — volume (m³, cm³)

r — radius (m, cm)

h — height (m, cm)

CORE **Pythagoras' theorem**

$$c^2 = a^2 + b^2$$

c — hypotenuse of a right-angled triangle

a, b — the other two sides

How a resultant of two perpendicular vectors is calculated. The sine, cosine and tangent functions are Extended candidates only.

– **Values to know**

CORE	Acceleration of free fall near the Earth's surface, g	$\approx 9.8 \text{ m/s}^2$
CORE	Absolute zero	$-273 \text{ }^\circ\text{C} = 0 \text{ K}$
SUPP.	Speed of electromagnetic waves in a vacuum, c	$3.0 \times 10^8 \text{ m/s}$
CORE	Speed of sound in air	$\approx 330\text{--}350 \text{ m/s}$
CORE	Range of human hearing	$20 \text{ Hz to } 20\,000 \text{ Hz}$
CORE	Relative charges of proton, neutron, electron	$+1 \cdot 0 \cdot -1$
SUPP.	One light-year	$9.5 \times 10^{15} \text{ m}$
CORE	Diameter of the Milky Way	$\approx 100\,000 \text{ light-years}$
SUPP.	Current estimate of the Hubble constant, H ₀	$2.2 \times 10^{-18} \text{ s}^{-1}$