

Motion in a circle

Cambridge International AS & A Level Physics

Unlike IGCSE, 9702 gives you a data sheet: it is page 2 of Papers 1, 2 and 4, with more formulae on page 3 of Paper 4. Everything marked GIVEN is printed for you; everything else you must recall. Compiled by GioPhysics from the published syllabus. This is an independent study aid, not a Cambridge document; the official syllabus is the authority.

12.1 Kinematics of uniform circular motion

A LEVEL Angular speed

$$\omega = 2\pi / T$$

ω — angular speed (rad s^{-1})

T — period (s)

A LEVEL Linear and angular speed

$$v = r\omega$$

v — linear speed (m s^{-1})

r — radius (m)

ω — angular speed (rad s^{-1})

12.2 Centripetal acceleration and force

A LEVEL Centripetal acceleration

$$a = r\omega^2 = v^2/r$$

a — centripetal acceleration (m s^{-2})

r — radius (m)

v — linear speed (m s^{-1})

A LEVEL Centripetal force

$$F = mr\omega^2 = mv^2/r$$

F — centripetal force (N)

m — mass (kg)

Directed towards the centre. Note that IGCSE explicitly excludes this equation; A Level requires it.