



QUESTION WORKBOOK

Circular motion

Periodic motion · Year 13

AQA 3.6.1.1 · CIE 12.1, 12.2 · OCR A 5.2.1, 5.2.2

10 questions · 30 marks

NAVY SCREEN EDITION

SECTION A · Warm-up

A1 Explain why an object moving at constant speed in a circle is nevertheless accelerating. [2]

A2 An object rotates at a frequency of 5.0 Hz. Calculate its angular speed. [2]

A3 An object moves in a circle of radius 2.0 m at a speed of 10 m s^{-1} . Calculate its angular speed. [2]

SECTION B · Standard

B1 A 0.50 kg object moves in a circle of radius 4.0 m at 8.0 m s^{-1} . Calculate (a) its centripetal acceleration and (b) the centripetal force on it. [3]

- B2** A car of mass 1000 kg goes round a bend of radius 50 m at 15 m s^{-1} . Calculate the centripetal force required. [3]

- B3** An object moves in a circle of radius 0.30 m at a frequency of 2.0 Hz. Calculate (a) its angular speed, (b) its linear speed and (c) its centripetal acceleration. [4]

- B4** A 0.20 kg ball is whirled in a horizontal circle of radius 0.80 m at 4.0 m s^{-1} . Calculate the tension in the string providing the centripetal force. [3]

SECTION C · Stretch

- C1** A 0.10 kg object moves in a horizontal circle of radius 0.50 m with a period of 0.40 s. Calculate (a) its angular speed, (b) its centripetal acceleration and (c) the centripetal force on it. [4]

- C2** A 0.25 kg mass is whirled in a horizontal circle of radius 1.0 m on a string that breaks when the tension exceeds 50 N. Calculate the maximum speed at which it can be whirled. [4]

- C3** State the direction of the centripetal force on an object in circular motion, and describe what happens to the object if that force is suddenly removed. [3]