



QUESTION WORKBOOK

Angular speed and horizontal circular motion

Further Mechanics 2 · Year FM

6 questions · 25 marks

NAVY SCREEN EDITION

SECTION A · Warm-up

- A1** Explain why a particle moving at constant speed in a circle is accelerating, and state the direction of that acceleration. [2]

- A2** A particle moves in a circle of radius 1.5 m with angular speed 4 rad/s. Find its linear speed and its acceleration. [3]

SECTION B · Standard

- B1** A bob of mass 0.4 kg is attached to one end of a light inextensible string of length 1.2 m, and moves in a horizontal circle with the string at 40° to the vertical. Find the tension in the string and the period of the motion, taking $g = 9.8 \text{ m/s}^2$. [6]

- B2** A bend of radius 120 m is banked at 15° . Find the speed at which no sideways friction is needed. [4]

- B3** A car travels round a flat bend of radius 50 m on a road where the coefficient of friction is 0.6. Find the greatest speed at which it can do so without slipping, taking $g = 9.8 \text{ m/s}^2$. [4]

SECTION C · Stretch

- C1** A bend of radius 60 m is banked at 20° to the horizontal, and the coefficient of friction between the tyres and the road surface is 0.3. Find the greatest speed at which a car can go round the bend without slipping, taking $g = 9.8 \text{ m/s}^2$. [6]