



2023 Sec 3 Advanced Physics Assignment 2

Dynamics: Motion in a Circle

Name: \_\_\_\_\_ ( ) Class: 3/ \_\_\_\_ Date: \_\_\_\_\_

Given formulae:

$$v = r \omega ; \quad a = \frac{v^2}{r}$$

- 1 An object of mass 0.050 kg is moving in a circle of radius 0.10 m with a uniform angular velocity of 2.0 rad s<sup>-1</sup>.

Calculate

- (a) the speed of the object;

speed = .....

- (b) its acceleration towards the centre of the circle; and

acceleration = .....

- (c) its period of motion.

period = .....

- 2 The moon has a period of 27.5 days round the Earth. Calculate its speed in km per hour, assuming it moves uniformly in a circular orbit of radius 3.8 x 10<sup>8</sup> m.

speed = .....

- 3 A small object of mass 0.50 kg attached to the end of a string is whirled round in a horizontal circle of radius 2.0 m. The string breaks when the tension in it exceeds 100 N. Calculate the maximum angular velocity of the object.

maximum angular velocity = .....

- 4 A ball at the end of a string 1.0 m long is whirled round in a horizontal circle so that the string makes an angle of  $30^\circ$  to the vertical.

(a) Draw and label a free body diagram of the ball.

(b) Calculate the speed of the ball.

speed = .....

5 **H2 Physics 2014 Q12**

A car travels over a curved lump in the road at a speed of  $20 \text{ m s}^{-1}$ .



What is the minimum radius of curvature of the lump if the car is not to lose contact with the road?

radius = .....

<b>Answers:</b>	1(a) $0.20 \text{ m s}^{-1}$ (b) $0.40 \text{ m s}^{-2}$ (c) 3.1 s	2. $3600 \text{ km h}^{-1}$
	3. $10 \text{ rad s}^{-1}$	4(b) $1.7 \text{ m s}^{-1}$ 5. 40 m