AQA – Cicular motion – AS Further Mathematics Mechanics

1. June/2020/Paper_2/No.3

The time taken for the moon to make one complete orbit around Earth is approximately 27.3 days.

Model this orbit as circular, with a radius of 3.84×10^8 metres.

Find the approximate speed of the moon relative to Earth, in metres per second.

[3 marks]

2. June/2019/Paper_2/No.1

A turntable rotates at a constant speed of $33\frac{1}{3}$ revolutions per minute.

Find the angular speed in radians per second.

Circle your answer.

[1 mark]

$\frac{5\pi}{9}$ $\frac{10\pi}{9}$ $\frac{5\pi}{3}$ $\frac{20\pi}{9}$

3. June/2019/Paper_2/No.4

In this question use $g = 9.8\,\text{m}\,\text{s}^{-2}$

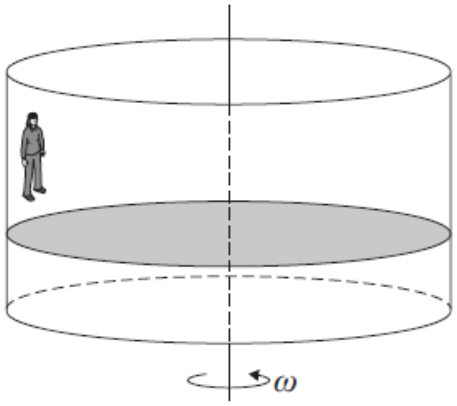
A ride in a fairground consists of a hollow vertical cylinder of radius 4.6 metres with a horizontal floor.

Stephi, who has mass 50 kilograms, stands inside the cylinder with her back against the curved surface.

The cylinder begins to rotate about a vertical axis through the centre of the cylinder.

When the cylinder is rotating at a constant angular speed of ω radians per second, the magnitude of the normal reaction between Stephi and the curved surface is 980 newtons.

The floor is lowered and Stephi remains against the curved surface with her feet above the floor, as shown in the diagram.



(a) Explain, with the aid of a force diagram, why the magnitude of the frictional force acting on Stephi is 490 newtons.

[2 marks]

(b) Find ω

[3 marks]

(c) State one modelling assumption that you have used in this question.

Explain the effect of this assumption.

[2 marks]