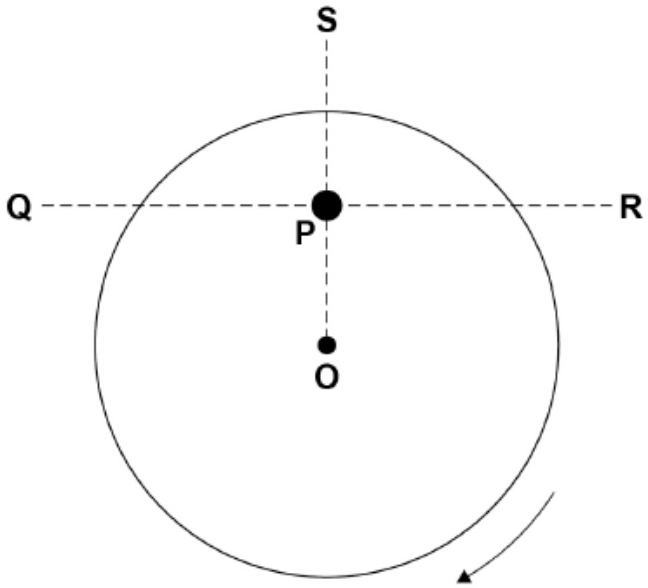
Periodic motion – A2 Physics P1

1. No.28

A small mass is placed at **P** on a horizontal turntable. The turntable rotates clockwise with a constant angular speed about a vertical axis through its centre **O**.

view of turntable from above



The mass remains at rest relative to the turntable.

What is the direction of the frictional force on the mass at the instant shown?

[1 mark]

A from **P** to **O** ⬭

B from **P** to **Q** ⬭

C from **P** to **R** ⬭

D from **P** to **S** ⬭

2. No.29

A particle of mass m moves in a circle of radius r. The number of revolutions completed per second is f.

What is the kinetic energy of the particle?

[1 mark]

A $4\pi^2 mf^2 r^2$ ⬭

B $2\pi^2 mf^2 r^2$ ⬭

C $\frac{mf^2r^2}{4\pi^2}$ ⬭

D $\frac{mf^2r^2}{2}$ ⬭

3. No.30

A body is in simple harmonic motion of amplitude 0.60 m and period 2π seconds.

What is its speed when its displacement is 0.20 m?

[1 mark]

A $0.32\ \text{m s}^{-1}$ ⬭

B $0.57\ \text{m s}^{-1}$ ⬭

C $0.63\ \text{m s}^{-1}$ ⬭

D $22\ \text{m s}^{-1}$ ⬭

4. No.31

When a mass **M** is suspended from a spring, the spring extends by a distance x.
M is displaced vertically and, when released, it oscillates with a period T.

M is removed and suspended from a different spring. The spring extends by a distance $\frac{x}{2}$.

M is again displaced vertically and released.

What is the new period of oscillations of **M**?

[1 mark]

A $\frac{T}{2}$ ⬭

B $\frac{T}{\sqrt{2}}$ ⬭

C $T\sqrt{2}$ ⬭

D $2T$ ⬭

5. No.32

A mass–spring system and a simple pendulum have identical periods of oscillation T when at the surface of the Earth.

Both are taken to planet **X** where the acceleration due to gravity is $\frac{g}{2}$.

What are the periods of the mass–spring system and the simple pendulum on **X**?

[1 mark]

	Period of mass–spring system	Period of simple pendulum	
A	$\frac{T}{2}$	$T\sqrt{2}$	⬭
B	T	$2T$	⬭
C	T	$T\sqrt{2}$	⬭
D	$T\sqrt{2}$	T	⬭