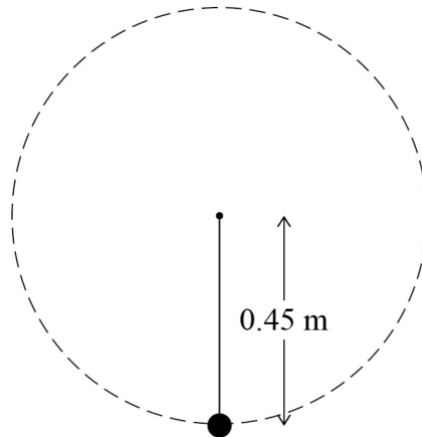


A bob of mass 0.50 kg is suspended from the end of a piece of string 0.45 m long.
The bob is rotated in a vertical circle at a constant rate of 120 revolutions per minute.



What is the tension in the string when the bob is at the bottom of the circle?

[1 mark]

A 5.8 N

B 31 N

C 36 N

D 40 N



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2

An object of mass m moves in a circle of radius r . It completes n revolutions every second.

What is the kinetic energy of the object?

[1 mark]

A $\frac{mn^2r^2}{8\pi^2}$



B $\frac{mn^2r^2}{4\pi^2}$



C $2m\pi^2n^2r^2$

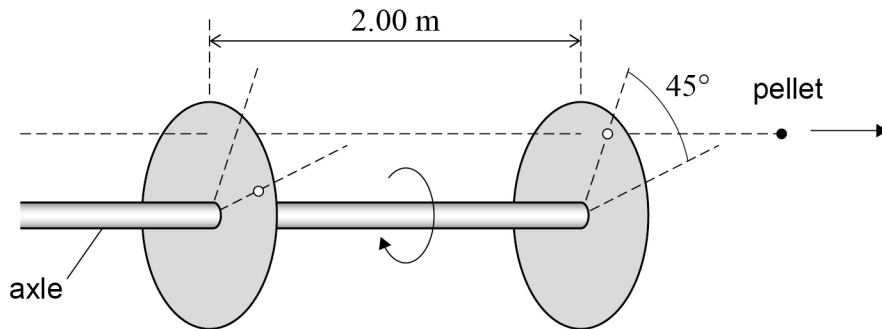


D $4m\pi^2n^2r^2$



3

Two circular discs made of card rotate at constant speed on a common axle.



The discs are 2.00 m apart.

An air-gun pellet is fired parallel to the axle. The pellet makes holes in the discs.

The holes are separated by an angle of 45° .

The speed of the pellet between the discs is 300 m s^{-1} .

How many revolutions does each disc complete in one second?

[1 mark]

A 19

B 118

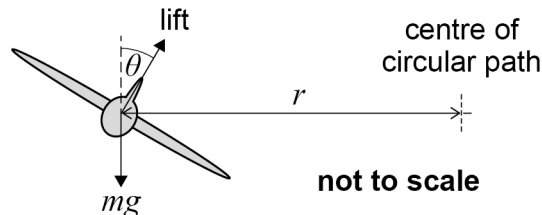
C 740

D 1074



4

When an aircraft turns in a horizontal circular path, it banks at an angle θ .



The aircraft has mass m and travels at constant speed v in a horizontal circular path of radius r . The lift force acts at the angle θ .

What is $\tan \theta$?

[1 mark]

A $\frac{gv^2}{r}$

☐

B $\frac{rv^2}{g}$

☐

C $\frac{rg}{v^2}$

☐
☐

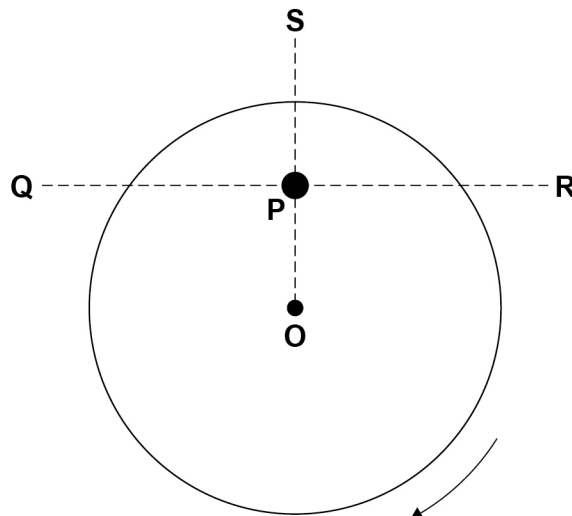
D $\frac{v^2}{rg}$

☐


5

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**

☐

6

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 $4\pi^2 m f^2 r^2$



B $2\pi^2 m f^2 r^2$



C $\frac{m f^2 r^2}{4\pi^2}$

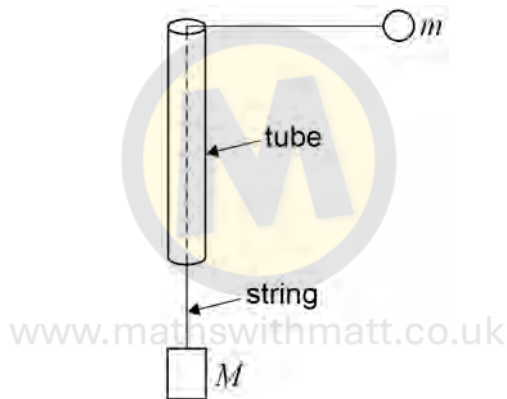


D $\frac{m f^2 r^2}{2}$



7

A string passes through a smooth thin tube. Masses m and M are attached to the ends of the string. The tube is moved so that the mass m travels in a horizontal circle of constant radius r and at constant speed v .



Which of the following expressions is equal to M ?

[1 mark]

A $\frac{mv^2}{2r}$ ☐

B mv^2rg ☐

C $\frac{mv^2}{rg}$ ☐

D $\frac{mv^2g}{r}$ ☐