OCR A A-Level Physics

5.2 Circular motion

Flashcards

What are radians a unit of?

What are radians a unit of?

Angle.

How do you convert degrees to radians?

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To convert an angle from degrees to radians, divide it by 360 and then multiply by 2π.

What is meant by the period of an object in circular motion?

What is meant by the period of an object in circular motion?

The time taken for one full rotation.

What is meant by angular velocity?

What is meant by angular velocity?

The angle travelled through divided by the time taken.

This is similar to linear speed, except we're interested in rate of rotation rather than distance/time.

What kind of force is required to keep an object moving in a circle at constant speed?

What kind of force is required to keep an object moving in a circle at constant speed?

A constant centripetal force (a force applied always towards the centre of that circle).

True or false: The centripetal force and velocity of an object moving in a circle are always in the same direction.

True or false: The centripetal force and velocity of an object moving in a circle are always in the same direction.

False.

Velocity is always at a tangent to the circle, force is always along a radius. They are perpendicular.

How are linear and angular velocity related?

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$$v = \omega r$$

Where v = linear velocity, ω = angular velocity, and r = radius.

An object moving in a circle at a constant speed is not accelerating. True or False?

An object moving in a circle at a constant speed is not accelerating. True or False?

False.

The direction is always changing hence the velocity always changing which means it is accelerating.

What equation gives acceleration in terms of angular velocity?

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$$a=\omega^2 r$$

What is acceleration in terms of linear velocity?

What is acceleration in terms of linear velocity?

$$a = v^2/r$$

What are the equations for centripetal force?

What are the equations for centripetal force?

$$F = mv^2/r$$

or

$$F = m\omega^2 r$$

Describe the steps how one can investigate circular motion via an experiment

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- Circular motion can be investigated experimentally by tying a bung, with mass *m*, to a piece of string, and threading it through a glass tube.
- The other end of the string has a weight, with mass *M*, suspended from it. This provides the centripetal force, F =*Mg*, as the tension throughout the string is constant.
- The string is whirled in a circle, and the time taken for a complete rotation is recorded.
- The mass of the weight is altered and the experiment repeated.
- We equate Mg and the centripetal force mv^2/r so $Mg=mv^2/r$
- By measuring the radius of the circle and using the time for one complete oscillation, the velocity can be determined. When *v*^2 is plotted against *M*, a straight line graph which passes through the origin should be produced.