



Physics. *You work it out.*

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Essential Pre-Uni Physics F3.1

A Level

How big is 3 rad, when expressed in degrees to the nearest whole number?

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Essential Pre-Uni Physics F3.8



A car travels 10 km. One of its wheels has a radius of 30 cm. Calculate the angle the wheel turns as the car travels this distance (answer in radians to 2 significant figures).

Gameboard:
[STEM SMART Physics 23 - Circular motion](#)

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Essential Pre-Uni Physics F3.3



Complete the questions in the table by converting the units.

Time period / s	Frequency / Hz	Angular velocity / rad s^{-1}	Revolutions per minute (rpm)
0.50	(a)	(b)	(c)

Part A Frequency

a) Frequency?

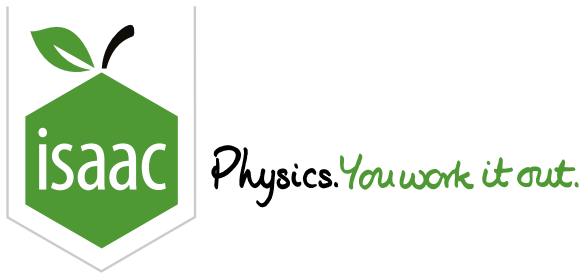
Part B Angular velocity

b) Angular velocity?

Part C Revolutions per minute

c) Revolutions per minute?

Gameboard:
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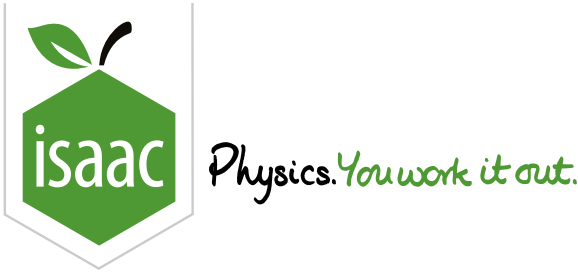
Essential Pre-Uni Physics F3.10



My washing machine has a spin speed of 1200 rpm, and a drum radius of 20 cm. Calculate how fast clothes go when up against the side of the drum when the machine is spinning. Give your answer to 2 significant figures.

Gameboard:
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Centripetal Acceleration 1

Essential Pre-Uni Physics F4.1

A Level

P

P

P

Complete the questions in the table.

Speed / m s^{-1}	Radius / m	Angular velocity / rad s^{-1}	Centripetal acceleration / m s^{-2}
	0.32	5.2	<input type="text"/>
2.1	0.070		<input type="text"/>
<input type="text"/>	30.0		9.8
	<input type="text"/>	0.20	9.8
60	1200		<input type="text"/>

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Essential Pre-Uni Physics F4.2

A Level

A car goes round a roundabout at 30.0 mph (13.4 m s^{-1}) on a circular path with a radius of 8.0 m. Calculate the centripetal acceleration.

Gameboard:

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Essential Pre-Uni Physics F4.5

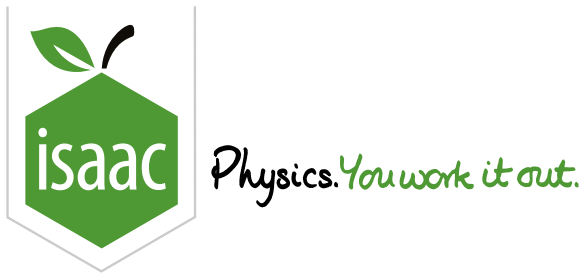
A Level



A space station with an 8.0 m radius is spun to give the astronauts something which feels like gravity. If the centripetal acceleration is 9.8 m s^{-2} , calculate the speed at which the walls rotate (in m s^{-1}).

Gameboard:
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Essential Pre-Uni Physics F4.6

A Level

C

C

C

Calculate the centripetal force experienced by a 500 g pair of wet trousers when in the spin cycle of a washing machine with a 20 cm drum radius if it rotates at 1200 rpm. Give your answer to 2 significant figures.

Gameboard:
[STEM SMART Physics 23 - Circular motion](#)

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Cornering on a Smooth Surface

A Level

C

C

C

A car of mass $m = 1000\text{ kg}$ is driven round a smooth circular track of radius $r = 250\text{ m}$ and takes a time $T = 30\text{ s}$ to complete one lap.

At what angle θ must the track be banked to counteract the tendency of the car to slip sideways?

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Gameboard:

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Physics. *You work it out.*

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Geostationary Orbit

A Level



A satellite is to be placed in a circular orbit around the Earth.

The gravitational force F_A between the satellite and the Earth is in the inward radial direction and its magnitude is given by the equation

$$F_A = \frac{GMm}{R^2}$$

where $G = 6.67 \times 10^{-11} \text{ m}^3 \text{ kg}^{-1} \text{ s}^{-2}$ is the gravitational constant; $M = 5.97 \times 10^{24} \text{ kg}$ and m are the masses of the Earth and the satellite respectively; and R is the radius of the orbit.

Use the information and data above to calculate the required radius of the orbit if the satellite is in a geostationary orbit (remains above the same point on the equator).

Used with permission from UCLES, A Level Physical Science, June 1989, Paper 2, Question 3.

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