FREE REVISION PACK

Circular Motion

Pearson Edexcel International Advanced Level Physics · Unit 4 (WPH14) · Specification points 87–91

Easy | Medium | Multiple choice · past-paper questions

5	5	≈ 10 min
QUESTIONS	TOTAL MARKS	SUGGESTED TIME*

Contents

Q	LEVEL	FOCUS	SOURCE	MARKS
1	Easy	Turntable angular velocity	Edexcel IAL October 2020 · Unit 4 · Q9	1 mark
2	Easy	Converting rev/min to rad/s	Edexcel IAL January 2023 · Unit 4 · Q2	1 mark
3	Easy	Angular velocity from revolutions	Edexcel IAL October 2023 · Unit 4 · Q8	1 mark
4	Easy	Moon's orbit: bigger radius, same period	Edexcel IAL January 2022 · Unit 4 · Q10	1 mark
5	Medium	Force from a humpback bridge	Edexcel IAL October 2023 · Unit 4 · Q10	1 mark

Key ideas to have ready

- Angular velocity $\omega = \Delta\theta/\Delta t = 2\pi/T = 2\pi f$ (rad s^{-1}); $v = \omega r$.
- Convert rev/min: ω = (rev per minute ÷ 60) × 2π.
- Centripetal force $F = mv^2/r = m\omega^2 r$, towards the centre.
- The centripetal force is a resultant: e.g. at the top of a hump, $mg - R = mv^2/r$.

How to use this pack

1. The questions are grouped into levels (Easy and Medium). Work through them in order, and check your answers at the end of each level before moving on.
2. Every question is multiple choice with one correct answer. Write down your working anyway; that is how you find mistakes.
3. The separate mark scheme uses the same numbers and explains every answer.

Levels are based on how students did in Pearson's examiner reports where that information exists, plus our own difficulty rating. *About 1.5 minutes per question.

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Easy

Definitions and one-step ideas. Most students get these right.

Questions 1–4

Choose **one** answer for each question and put a cross in the box next to it.

Edexcel IAL October 2020 · Unit 4 · Q9

1 A turntable for playing vinyl records rotates at 33 revolutions per minute.

What is the angular velocity in radian s^{-1}?

- ☒ **A** $33 \times 60 \times 2\pi$
- ☒ **B** $\dfrac{33}{(60 \times 2\pi)}$
- ☒ **C** $\left(\dfrac{33}{60}\right) \times 2\pi$
- ☒ **D** $33 \times 2\pi$

Edexcel IAL January 2023 · Unit 4 · Q2

2 A laboratory centrifuge rotates at 1500 revolutions per minute.

Which of the following expressions gives the angular velocity in radians per second?

- ☒ **A** $\dfrac{1500}{60 \times 2\pi}$
- ☒ **B** $\dfrac{60}{1500 \times 2\pi}$
- ☒ **C** $\dfrac{60 \times 2\pi}{1500}$
- ☒ **D** $\dfrac{1500 \times 2\pi}{60}$

Edexcel IAL October 2023 · Unit 4 · Q8

3 A toy aeroplane is travelling in a circular path. The toy aeroplane completes 12 revolutions in 6 s.

Which of the following gives the angular velocity, in rad s^{-1}, of the toy aeroplane?

- ☒ **A** $\dfrac{12 \times \pi}{6}$
- ☒ **B** $\dfrac{12 \times 2\pi}{6}$
- ☒ **C** $\dfrac{6 \times \pi}{12}$
- ☒ **D** $\dfrac{6 \times 2\pi}{12}$

Edexcel IAL January 2022 · Unit 4 · Q10

4 A website states: "The radius of the orbit of the Moon around the Earth is increasing by a small amount each year, however the time period of the orbit remains constant."

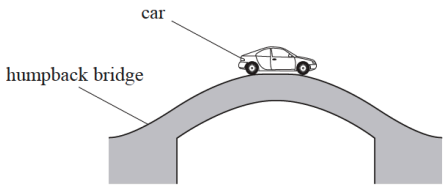
Which row of the table is correct if the statement is true?

		Angular velocity of Moon	Speed of Moon
☒	**A**	constant	constant
☒	**B**	constant	increasing
☒	**C**	increasing	constant
☒	**D**	increasing	increasing

Medium Two or three steps. Roughly a third to a half of students get these right. **Question 5**

Edexcel IAL October 2023 · Unit 4 · Q10

5 A car travels over a humpback bridge, as shown. The bridge forms part of a circle of radius r. The car has mass m and travels with constant speed v.



The car is at the top of the bridge.

Which of the following expressions gives the force, from the bridge, on the moving car?

☒ **A** mg

☒ **B** $mg + \frac{mv^2}{r}$

☒ **C** $mg - \frac{mv^2}{r}$

☒ **D** $\frac{mv^2}{r} - mg$

End of questions. Check your answers with the matching mark scheme. More free packs and 1-to-1 tuition: **www.getbetteratphysics.co.uk**