

APOLLO

Rotational and Circular Motion

FBISE Physics Class 11 (HSSC-I)

Domain B: Mechanics

41 questions | questions

Original FBISE question crops. National Curriculum 2022-23 topic.

18.	In angular motion, the angles are expressed in radians because:	Radians are easier to measure	Radians being a ratio are more natural and consistent	Radians are smaller than degrees	Radians were used in ancient maths
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55.	A skater is spinning rapidly on ice with angular speed ($\omega_1 = 5\text{rad/s}$) having her arms tucked. Her initial moment of inertia is ($I_1 = 2\text{kgm}^2$). If she suddenly extends her arms outward, her moment of inertia becomes ($I_2 = 5\text{kgm}^2$). What will be her new angular speed ω_2 ?	0.2 rad/s	5 rad/s	2 rad/s	0.5 rad/s
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56.	A centripetal force is a force required to change a body's:	Mass	Speed	K.E.	Direction of motion
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Scenario for MCQs # 61 to 64		A city installs a giant Ferris wheel of 1m radius in a new amusement park. The wheel starts from rest and is uniformly accelerated by an electric motor until it reaches its full operating speed. The time to complete one revolution is 20 seconds.			
					
61.	The angular velocity of the wheel will be expressed as:	$\frac{2\pi}{T}$	$\frac{T}{2\pi}$	$\frac{2\pi}{v}$	$\frac{2\pi}{f}$
		☐ ☐ ☐ ☐			

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62.	If the wheel turns through an angle $\theta = 2\text{rad}$, what is the tangential distance covered by it?	2 m	1 m	0.2 m	0.1m	☐ ☐ ☐ ☐
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63.	A boy sitting in the wheel moves at a constant speed along a curved path. What can be concluded about the net force acting on the boy?	it is zero.	it is perpendicular to the direction of motion of boy.	it is parallel to the direction of motion of boy.	it is opposite to direction of motion of boy.	☐ ☐ ☐ ☐
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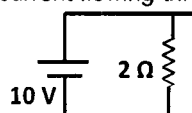
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64.	During first 10 seconds from rest, the wheel covers an angular displacement of 50 radians . What will be the angular acceleration of the wheel?	0.1 rad/s ²	1.0 rad/s ²	1.7 rad/s ²	1.5 rad/s ²	○ ○ ○ ○
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OR	What is moment of inertia? State and explain law of conservation of angular momentum.	2+1 +3
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Earth completes its one rotation about its axis in 24 hours. Calculate angular velocity of earth about its axis in radian per second.	1+2
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(xiv)	Derive the relation between torque, moment of inertia and angular acceleration.	1x3
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Q.6	Continuity derived: Why does an astronaut feel weightless in space? How can artificial gravity be produced in a satellite? For a satellite derive expression for angular velocity, time period and frequency of satellite.	1+1 +4	OR	Find the current flowing through circuit. 
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What is meant by Gyroscope? Explain briefly.	03
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A space ship has diameter of 8m rotates about its axis to produce artificial gravity of magnitude 17.47ms^{-2} in it. Calculate with which angular speed the satellite rotates?	03	OR	Differentiate between conservative and non-conservative forces. Give examples.	03
Derive the relation between torque moment of			Derive the formula for Kinetic Energy using the	

OR	What is centripetal acceleration? Derive an expression for centripetal acceleration in terms of angular velocity " ω ".	1+6
	Derive the following consequences of special	

(i)	Derive the relation for centripetal acceleration (a_c) of on a body moving in a circle of radius r with velocity v .	03
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Q.3	What is meant by angular momentum? Determine the angular momentum of a rigid body.	2+5
Q.4	Explain the origin of the forces between current	4+3

OR	The front wheel of a tractor travels 700 revolutions while the rear wheel 280 in a time interval of 40 seconds. Find their angular velocities.	
	Derive a relationship between torque and angular	

1.5 +1.5 1.5	OR	Derive a relationship between torque and angular acceleration.	03
		What is meant by potential gradient? Derive its	

OR	Determine the equivalent value of 1 radian in degrees.	03
	Derive the relation between Torque and angular	

2+1	OR	Derive the relation between Torque and angular acceleration.	03
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(xiii)	The orbit of an electron revolving around the nucleus of an atoms is considered to be circular of radius 50 pm and the period of motion is 0.2 fs. Find out angular velocity of electron (ω).	03	OR	The electric field at a point due to a point charge is 26 N/C and the electric potential at that point is 13 J/C. Calculate the distance of the point from the charge.
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xiv.	The force that acts on the body but it does no work is called:	Frictional force	Gravitational force	Centripetal force	Elastic force	☐	☐	☐	☐
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xvi.	Moment of inertia of a spinning body about its axis does not depend on the:	Angular velocity of body	Mass of body	Orientation of the axis	Distribution of the mass around axis	☐	☐	☐	☐
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(xii)	Two spheres A and B are of the same masses but the radius of A is greater than that of B. Which one will require more torque applied on it to bring into rotation about their axes of rotation?	03
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Q.4	State law of conservation of angular momentum. Show that $\Delta L/\Delta t = 0$ and angular momentum L is conserved for an isolated system.	01+03 +02
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	How many radians account for circumference of a circle? How many steradians account for
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	velocity of 0.000ms ⁻¹ . A string 1 m long is used to whirl a 100 g stone in a horizontal circle at a speed of 2 ms^{-1} . Find the tension in the string. Show that the relation between maximum height
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	between two vectors? Is it possible for a person to distinguish between a raw egg and a hard boiled one by spinning each on a table? Explain briefly. To what height can a 400 W engine lift a 100 kg
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	Calculate escape velocity at surface of the moon. Determine orbital speed of International Space Station (ISS), if its orbit is $4 \times 10^2 \text{ km}$ above surface of earth. The moon revolves around the earth in almost a
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	(ISS), if its orbit is $4 \times 10^2 \text{ km}$ above surface of earth. The moon revolves around the earth in almost a circle of radius 382400 km in 27.3 days. What is the centripetal acceleration?
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(vii)	Derive the expression for centripetal acceleration $a_r = \frac{v^2}{r}$.	03
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Second Annual 2025 | Section B Q2(viii) | 3 marks

(viii)	What is orbital velocity? Derive the mathematical for orbital velocity.	1+2
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Second Annual 2025 | Section B Q2(xi) OR | 3 marks

OR	Briefly explain the phenomenon of weightlessness experienced by astronauts in orbit.	03
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Second Annual 2025 | Section B Q2(xiv) OR | 3 marks

OR	How the horizontal component of the normal force provides the required centripetal acceleration?	03
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First Annual 2026 | Section B Q2(iv) OR | 3 marks

				of a projectile when launched horizontally.	
What is relation between linear and angular acceleration? Derive a mathematical expression.	03	OR	What is relation between Torque and Angular Momentum? Derive a mathematical expression.	1+2	
Derive the formula for kinetic energy	03	OR	Explain work-energy theorem in a resistive medium.	1+2	

First Annual 2026 | Section B Q2(iv) | 3 marks

				of a projectile when launched hor	
What is relation between linear and angular acceleration? Derive a mathematical expression.	03	OR	What is relation between Momentum? Derive a mathematical		

First Annual 2026 | Section B Q2(ix) OR | 3 marks

OR	Derive an expression of velocity of a Disc when it rolls down an inclined plane.	03
	With the help of one daily life example define damped	03

First Annual 2026 | Section B Q2(viii) OR | 3 marks

	example.	
OR	Briefly explain angular velocity and angular acceleration. Also their formulas.	1.5 + 1.5

First Annual 2026 | Section B Q2(x) | 3 marks

(x)	A body will be weightless when the elevator falls down just like a free falling body. Explain.	03
(xi)	Why the terminal speed of a parachutist after opening a	

First Annual 2026 | Section B Q2(xiii) | 3 marks

(xiii)	What is torque? Explain why it is equal to the vector product of force and moment arm.	03
(xiv)	Differentiate between free and forced oscillations with	

First Annual 2026 | Section C Q4 | 6 marks

Q.4	Define centripetal force and derive its relation.	06
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