Physics - Rotational Motion

Multiple Choice

Identify the letter of the choice that best completes the statement or answers the question.

1. A helicopter has 3.0 m long rotor blades that are rotating at an angular speed of 63 rad/s. What is the tangential speed of each blade tip?

a. 99 m/s c. 66 m/s

21 m/s

190 m/s

The gravitational force between two masses is 36 N. What is the gravitational force if the distance between them is tripled? ($G = 6.673 \times 10^{-11} \text{ N} \cdot \text{m}^2/\text{kg}^2$)

4.0 N

27 N

b. 9.0 N d. 18 N

3. A cave dweller rotates a pebble in a sling with a radius of 0.30 m counterclockwise through an arc length of 0.96 m. What is the angular displacement of the pebble?

a. 3.2 rad

c. 1.6 rad

-1.6 rad

d. -3.2 rad

4. A wheel with a radius of 1.2 m rotates at a constant angular speed of 10.5 rad/s. What is the tangential speed of a point 0.55 m from the wheel's axis?

13 m/s

5.8 m/sC.

19 m/s b.

d. $8.7 \, \text{m/s}$ 5. A contestant in a game show spins a stationary wheel with a radius of 0.50 m so that it has a constant angular

acceleration of 0.40 rad/s². What is the tangential acceleration of a point on the edge of the wheel?

 0.20 m/s^2

 0.73 m/s^2 C.

0.60 m/s²

1.3 m/s² d.

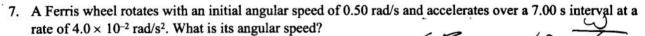
What is the gravitational force between two trucks, each with a mass of 2.0×10^4 kg, that are 2.0 m apart? (G $= 6.673 \times 10^{-11} \text{ N} \cdot \text{m}^2/\text{kg}^2$

 $1.2 \times 10^{-7} \text{ N}$ a.

 $1.3 \times 10^{-2} \text{ N}$

 $5.7 \times 10^{-2} \text{ N}$

 $6.7 \times 10^{-3} \text{ N}$ d.

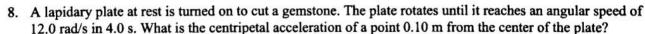


0.20 rad/s

0.78 rad/s c.

0.46 rad/s b.

0.30 rad/s d.

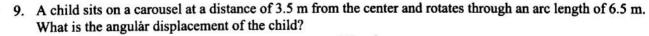


14 m/s² a.

 7.2 m/s^2

29 m/s²

d. 0.45 m/s²



a. 5.0 rad

1.9 rad

b. 3.0 rad

d. 0.93 rad

10. A 0.40 kg ball on a 0.50 m string rotates in a circular path in a vertical plane. If the angular speed of the ball at the bottom of the circle is 8.0 rad/s, what is the force that maintains circular motion?

5.6 N a.

C. 11 N

13 N b.

20.0 N

	A	11	A L		1 4	and an are length of 19 m. If the radius of the wheel is 4.1	
14	$\overline{}$	11.	A bucket on the circumference of a water wheel travels an arc length of 18 m. If the radius of the wheel is 4.1				
				what is the angular displacement of the buck	cet?	0.2 1	
			a.	4.4 rad	c.	2.3 rad	
			b.	1.0 rad	d.	3.7 rad	
	<u>_</u>	12.				rest and accelerates at a constant angular acceleration of	
	~	X .	2.0	rad/s2 for 5.0 s. What is the angular displace	emer	at of the tire? 25 rad 0.50 rad 0.50 rad 0.50 rad 0.50 rad 0.50 rad 0.50 rad	
			a.	12 rad 🗲 🔾	c.	25 rad	
	Λ		b.	2.0 rad	d.	$0.50 \text{rad} \qquad \triangle \Theta = \bigcirc + \underbrace{2} (2) (5)$	
	H	13.	A 8	0.0 kg passenger is seated 12 m from the ce	nter	of the loop of a roller coaster. What centripetal force does	
			the	passenger experience when the roller coaste	r rea	aches an angular speed of 3.14 rad/s?	
			a.	$9.5 \times 10^{3} \mathrm{N}$	c.	$6.9 \times 10^{3} \mathrm{N}$	
			Ъ.	$7.2 \times 10^3 \mathrm{N}$	d.	$1.7 \times 10^{3} \mathrm{N}$	
	15	14	Ar		37 m	radius has a centripetal acceleration of 19.0 m/s ² . What	
	-	•		he angular speed of the wheel?	7	n and a sound point of the sound	
			a.	1.6 rad/s ()	c.	0.89 m/s	
	_		22.7	7.2 rad/s	d.	3.2 rad/s	
	2	15.	W/F	nich of the following angles equals 2π rad?			
		15.	a.	180°	c.	0°	
			a. b.	3.14°	d.	360°	
	1	10			u.	300	
	1	16.		e radian is equal to			
	\sim		a.	58°.	c.	60°.	
			b.		d.	57.3°.	
		17.	_		spee	ed of 0.54 rad/s in 30.0 s. What is the angular acceleration	
4			of t	the wheel?			
	Λ		a.	0.042 rad/s ²	c.	0.018 rad/s ²	
			b.	1.3 rad/s ²	d.	16 rad/s ²	
	1					es from rest at a constant 2 rad/s ² over a 5 s interval. What	
			is the tangential component of acceleration for a point on the outer edge of the tire?				
			a.	0.6 m/s^2	c.	30 m/s ²	
			b.	7 m/s ²	d.	0.3 m/s^2	