**PHYSICS 2021 - 22 November 8, 2021**

**Today’s Agenda (Day 52)**

1. HOUSEKEEPING ITEMS

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1. HOMEWORK CHECK:

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1. CLASS ACTIVITY

🡪CONT’D: Chapter 8 PPT Review

1. **Section 8.2 – Rotational Dynamics**
2. Section 8.3 - Equilibrium

HOMEWORK:

* READ: Chapter 8 – Rotational Motion
* STUDY: Chapter 8 Test

<http://glencoe.mheducation.com/sites/0078807220/student_view0/self-check_quizzes.html>

Chapter 7 & 8 Vocabulary

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| --- | --- | --- | --- | --- | --- |
| Kepler’s first law | Kepler’s second law | Kepler’s third law | Gravitational force | Law of universal gravitation | Inertial mass |
| Gravitational mass | Radian | Angular displacement | Angular velocity | Angular acceleration | Lever arm |
| Torque | Moment of inertia | Newton’s second law of rotational motion | Center of mass | Centrifugal “force” | Coriolis “force” |

REMINDERS:

* **TEST: Chapter 8 🡪 Nov. 9**
* **QUIZ: Chapter 7 & 8 Vocabulary 🡪 Nov. 10**

**PHYSICS 2021 - 22** CHAPTER REVIEW

**8.1 PRACTICE PROBLEMS**

1. What is the angular displacement of each of the following hands of a clock in 1.00 h? State your answer in three significant digits.

**a.** the second hand

**b.**the minute hand

**c.** the hour hand

1. A rotating toy above a baby’s crib makes one complete counter clockwise rotation in 1 min.

**a.**What is its angular displacement in 3 min?

**b.** What is the toy’s angular velocity in rad/min?

**c.**  If the toy is turned off, does it have positive or negative angular acceleration? Explain.

1. If a truck has a linear acceleration of 1.85 m/s2 and the wheels have an angular acceleration of 523 rad/s2, what is the diameter of the truck’s wheels?
2. The truck in the previous problem is towing a trailer with wheels that have a diameter of 48 cm.

**a.**How does the linear acceleration of the trailer compare with that of the truck?

**b.** How do the angular accelerations of the wheels of the trailer and the wheels of the truck compare?

1. You replace the tires on your car with tires of larger diameter. After you change the tires, how will the angular velocity and number of revolutions be different, for trips at the same speed and over the same distance?
2. The Moon rotates once on its axis in 27.3 days. Its radius is 1.74×106 m.

a. What is the period of the Moon’s rotation in seconds?

b. What is the frequency of the Moon’s rotation in rad/s?

c. A rock sits on the surface at the Moon’s equator. What is its linear speed due to the Moon’s rotation?

d. Compare this speed with the speed of a person on Earth’s equator due to Earth’s rotation.

1. A movie lasts 2 h. During that time, what is the angular displacement of each of the following?

a. the hour hand

b. the minute hand

c. the second hand

1. In the spin cycle of a clothes washer, the drum turns at 635 rev/min. If the lid of the washer is opened, the motor is turned off. If the drum requires 8.0 s to slow to a stop, what is the angular acceleration of the drum?
2. A CD-ROM has a spiral track that starts 2.7 cm from the center of the disk and ends 5.5 cm from the center. The disk drive must turn the disk so that the linear velocity of the track is a constant 1.4 m/s. Find the following:

a. the angular velocity of the disk (in rad/s and rev/min) for the start of the track

b. the disk’s angular velocity at the end of the track

c. the disk’s angular acceleration if the disk is played for 76 min

**8.2 PRACTICE PROBLEMS**

1. Consider the wrench in Example Problem 1. What force is needed if it is applied to the wrench pointing perpendicular to the wrench?
2. If a torque of 55.0 N◦m is required to turn a bolt and the largest force that you can exert is 135 N, how long a lever arm must you use to turn the bolt?
3. If you have a 0.234 m long wrench. A job requires a torque of 32.4 N◦m, and you can exert a force of 232 N.

a. What is the smallest angle, with respect to the handle of the wrench, at which you can pull on the wrench and get the job done? b. A friend can exert 275 N. What is the smallest angle she can use to accomplish the job?

1. If you stand a bicycle pedal, as shown in Figure 7. Your mass is 65 kg. If the pedal makes an angle of 35⁰ above the horizontal, and the pedal is 18 cm from the center of the change ring, how much torque would you exert?
2. If the pedal in the previous problem is horizontal, how much torque would you exert? How much torque would you exert when the pedal is vertical?
3. Ashok, whose mass is 43 kg, sits 1.8 m from a pivot at the center of a seesaw. Steve, whose mass is 52 kg, wants to seesaw with Ashok. How far from the center of the seesaw should Steve sit?
4. A bicycle-chain wheel has a radius of 7.70 cm. If the chain exerts a 35.0 N force on the wheel in the clockwise direction, what torque is needed to keep the wheel from turning?
5. Two people are pulling on ropes wrapped around the edge of a large wheel. The wheel has mass of 12 kg and a diameter of 2.4 m. One person pulls in a clockwise direction with a 43 N force, while the other pulls in a counterclockwise direction with a 67 N force. What the net torque on the wheel?
	1. **PRACTICE PROBLEMS**
6. What would be the forces exerted by the two sawhorses if the ladder in Example Problem 5 had a mass of 11.4 kg?
7. A 4.5 m long wooden plank with a 24 kg mass is supported in two places. One support is directly under the center of the board, and the other is at the end. What are the forces exerted by the two supports?
8. A 85 kg diver walks to the end of a diving board. The board, which is 3.5 m long with a mass of 14 kg, is supported at the center of mass of the board and at one end. What are the forces on the two supports?
9. Give an example of an object for each of the following conditions.
10. rotational equilibrium, but not translational equilibrium
11. translational equilibrium, but not rotational equilibrium
12. Can the center of mass of an object be located in an area where the object has no mass? Explain.
13. Why is a modified vehicle with its body raised high on risers less stable than a similar vehicle with its body at normal height?
14. Where is the center of mass on a roll of masking tape?
15. Why does a gymnast appear to be floating on air when she raises her arms above her head in a leap?