PHYS-2010 Exam 3 Review Questions
Dr. Luttermoser's Class

1. What is **torque**? What is meant by **lever arm**?
2. What are the 2 conditions of equilibrium?
3. What is the **center of gravity**? How is it related to the **center of mass**?
4. Define **moment of inertia** (don't confuse this with "regular" inertia). How are force and mass related to torque and moment of inertia?
5. Discuss how the conservation of energy is modified with angular motion.
6. What is the conservation of angular momentum? [Note: ignore the formation of the solar system section.]
7. Review the summary of Chapter 8 in the textbook and learn the definition of all important terms in this chapter.
8. Solve Example X-2 (static equilibrium), Example X-3 (SV 8.39: angular dynamics), Example X-4, (SV 8.43: rotational kinetic energy), and Example X-5 (moment of inertia and angular momentum) from the notes.
9. Go over Supplemental Homework Problems 3.3 (SV 8.58, angular momentum). Go over Problem 2 (static equilibrium) in CAPA Problem Set 3.

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10. What are the 3 states of matter? What is a **plasma**?
11. What the difference between atoms and molecules? What is the internal structure of atoms. What defines the identity of an atom? Is H III possible?
12. Define **elasticity**, **stress**, and **strain**. What is the **elastic modulus**? Compare and contrast **Young's, shear**, and **bulk** moduli. How is **compressibility** measured?
13. Relate density to pressure. Define Archimedes' and Pascal's principles. How does a barometer work and what does it measure? What does Bernoulli's equation describe?
14. What is meant by **specific gravity** of a fluid? In what unit is pressured measured?
15. When is a fluid ideal (*i.e.*, list the 4 conditions which must be true about the fluid)? Discuss the **equation of continuity**.
16. What is a **streamline**? What is the difference between **laminar** and **turbulent** flow?
17. Describe **Bernoulli's equation**. What conservation law does it describe?
18. Define **viscosity**? What is **Poiseuille's law**? What is the significance of the Reynolds number?

19. Review the summary of Chapter 9 in the textbook and learn the definition of all important terms in this chapter.

20. Solve Example XI-1 (Young's modulus), Example XI-2 (Pascal's Principle), Example XI-4 (SV 9.42: Archimedes's Principle), and Example XI-6 (SV 9.65: Poiseuille's law) from the notes.

21. Go over Supplemental Homework Problems 3.4 (Pascal's Principle), 3.5 (SV 9.23, Pascal's principle), 3.6 (SV 9.41, Archimedes' principle), 3.7 (SV 9.45, mass flux), 3.8 (SV 9.66, Poiseuille's law), and 3.9 (SV 9.71, Reynolds number and turbulence). Go over Problems 3 (Pascal's Principle), and 4 (Poiseuille's law) from CAPA Problem Set 3.

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22. What are the 3 temperature scales? Make sure you can carry out conversions from one temperature scale to another. What is meant by **thermal equilibrium**? What is the 0th Law of Thermodynamics?

23. Review the physics of thermal expansion.

24. Compare the similarities and differences of internal energy and thermal energy. How are each defined? What is the unit of heat energy in the cgs system? What is the difference between **calorie** and **Calorie**? What is meant by the **mechanical equivalent of heat**?

25. Define **calorimetry**, **heat capacity**, **specific heat**, **heat of fusion**, and **heat of vaporization**. What is **latent heat**? When is this concept important?

26. What are the 3 methods of heat energy transfer and describe each in detail? What does the **mixing length theory** describe?

27. Review the summary of Chapters 10 and 11 in the textbook and learn the definition of all important terms in these chapters.

28. Solve Example XII-1 (SV 10.8: temperature conversion), Example XII-2 (SV 10.11: thermal expansion), Example XII-4 (calorimetry), Example XII-6 (SV 11.41: conduction), and Example XII-7 (radiative transport) from the notes.

29. Go over Supplemental Homework Problems 3.10 (SV 10.13, thermal expansion), 3.11 (SV 11.16, calorimetry), 3.13 (conduction), 3.14 (SV 11.49, radiation transport), and 3.15 (SV 11.52, heat flow). Go over Problems 5 (thermal expansion), 6 (temperature conversion), 7 (calorimetry), and 8 (radiation transport) from CAPA Problem Set 3.