

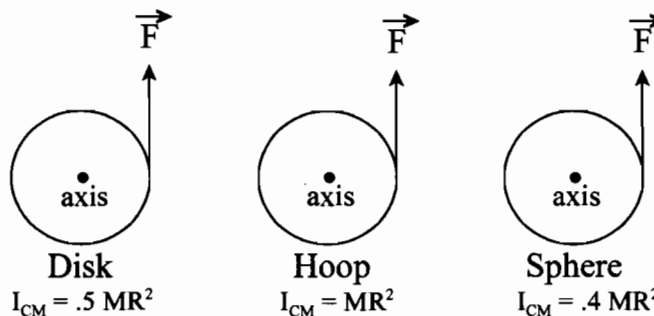
EXAM 4

Name: _____

Student ID #: _____

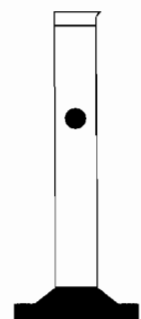
TA (circle one): Golda Kamdem Matthew Michael Paul

A. [14 pts.] A uniform disk (D), hoop (H), and sphere (S), all with the same mass and radius, can freely rotate about an axis through the center of mass (CM) of each. A massless string is wrapped around each item. The string is used to apply a constant and equal tangential force to each object. See figure. For the statements below, enter D, H, S, none or the same. Assume all objects start from rest at the same instant.



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|----|-------------|---|
| 1. | <u>S</u> | The one with the smallest moment of inertia about the shown axis. |
| 2. | <u>SAME</u> | The object experiencing the largest <u>net</u> torque. |
| 3. | <u>H</u> | The object undergoing the smallest angular acceleration. |
| 4. | <u>S</u> | The object with the largest angular speed after an elapsed time of 5.0 s. |
| 5. | <u>S</u> | The object for which the largest amount of string has unraveled in 5.0 s. |
| 6. | <u>H</u> | The object with the smallest KE_{rot} after 5.0 s. |
| 7. | <u>S</u> | The object that undergoes the most rotations in 5.0 s. |

B. [14 pts.] A spherical object is completely immersed in a liquid of density ρ_{liq} some distance above the bottom of the vessel. See figure. The upper surface is initially open to the earth's atmosphere at sea level. Assume the liquid and object are both incompressible. For the items below, indicate whether the object sinks to the bottom (B), rises to the surface (T), or does nothing (N).



- | | | |
|----|----------|---|
| 1. | <u>N</u> | The vessel is brought to Salt Lake City. |
| 2. | <u>T</u> | Salt is dissolved in the liquid in the same way fresh water is turned into salt water. |
| 3. | <u>N</u> | The top 50 cm ³ of the liquid is removed from the vessel. |
| 4. | <u>N</u> | The entire apparatus is transported to the surface of the moon. |
| 5. | <u>T</u> | The volume of the spherical object is increased by heating it without heating the liquid. |
| 6. | <u>N</u> | The spherical object is moved 10 cm farther down in the vessel and released. |
| 7. | <u>N</u> | A mass is placed on the top surface of the liquid in the vessel increasing the pressure at the surface. No fluid leaks. |