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Hydraulics Worksheet

Part I. Volumes/Distances

Diameter of force apparatus plunger	 mm
Diameter of load stand plunger	 mm
Volume forced out of small syringe	 cc
Volume forced into the large syringe	 cc
Distance traveled by small syringe	 mm
Distance traveled by large syringe	 mm

Calculation

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1. (Area of circle = πr^2)
Area of small plunger = mm ²
Area of large plunger = mm ²
Ratio of small plunger area : large plunger area =
Ratio of distance traveled by small syringe : large syringe =
2. (Volume of cylinder = $\pi r^2 h$)
Volume displaced by small plunger = mm ³
Volume displaced by large plunger = mm ³

Part II. Lifting Power

Spring-scale force to operate system (overcoming friction)	 g
Spring-scale force to lift 1000 g	 g
Actual force needed to lift 1000 g (minus friction)	 g
1. <i>a</i> . What is the ratio of the lifting force to the mass lifted?	

- *b*. How does this ratio compare to the ratio of the plunger areas?
- c. What does the ratio mean in terms of the amount of force needed to lift a load?
- d. In an ideal system, how should the ratios compare? Explain any possible sources of error.
- 2. You have operated an exact model of a hydraulic jack or car lift. How could this model be used to show how car brakes work? Which part of the model would represent the brake pedal? The brakes at the wheel? What does the beaker of water represent?

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