FLINN SCIENTIFIC

Name____

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

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. *a*. 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?