Name: _____ Block: _____

Hydrostatics & Hydraulics

1. A diver dives into a swimming pool and descends to a maximum depth of 3.0 m. What is the pressure on the diver due to the water at this depth? Give your answer in both pascals (Pa) and in bar.

   Assume the density of the water in the pool is $997\,\frac{\text{kg}}{\text{m}^3}$ at 25°C.

29 312 Pa

2. The average atmospheric pressure at sea level is approximately 101 000 Pa. If the density of air at 0°C is approximately $1.3\,\frac{\text{kg}}{\text{m}^3}$, how high does the atmosphere extend?

7 928 m

3. A student who weighs 700 N stands on a hydraulic lift. The lift has a lever, which you push down in order to lift the student. The cross-sectional area of the fluid under the student is 1 m³, and the cross-sectional area of fluid under the lever is 0.1 m³. How much force is needed to lift the student?

70 N

4. A wet/dry vacuum cleaner is capable of creating enough of a pressure difference to lift a column of water to a height of 1.5 m at 20°C. Mr. Bigler wants to use this vacuum cleaner to power a hovercraft.

   (a) How much pressure can the vacuum cleaner apply? (The density of water at 20°C is $998 \frac{\text{kg}}{\text{m}^3}$.)

$\boxed{14\,671 \text{ Pa}}$

   (b) The bottom of the hovercraft is a circle with a radius of 0.61 m. How much weight (in newtons) can the hovercraft theoretically lift? How much is that in pounds? (1 lb. = 4.45 N)

$\boxed{17\,150 \text{ N}}$
$\boxed{3\,854 \text{ lb.}}$