Name: _____

Calculating Pressure Lab Activity

SPH4C

Purpose: To calculate the pressure you exert on the floor and to calculate the pressure exerted by water at different depths.

Part 1: Calculating Your Pressure

Materials: you, scale (if necessary), graph paper

Procedure:

1. Determine your mass in kilograms: m = _____

   Multiply by $9.8\frac{m}{s^2}$ to determine your weight in Newtons: $F_g = mg$ = _____

2. Sketch the outline of your foot on a sheet of graph paper. (If your foot is too large to fit on a single sheet of paper, tape two sheets together.)

   Determine the area of your foot in square metres. In the space below, describe the method you used to determine the area.

   A = _____

   Method: _____

   _____

3. Calculate the pressure you exert on the floor in kilopascals when standing on one foot:

   $P = \frac{F}{A}$ =

   Calculate the pressure you exert on the floor in kilopascals when standing on *both* feet:

   $P = \frac{F}{A}$ =

Extension: Using an electronic mass balance, determine the *typical* pressure exerted by your fingertip when pressing on an object like a keyboard:

$F = mg$ = _____

Given that the area of your fingertip is approximately, 1 cm^2 = 0.0001 m^2, calculate the pressure you exert when pressuring on an object like a keyboard.

$P = \frac{F}{A}$ =

Part 2: Calculating Water Pressure

Materials: 2L pop bottle, nail, tape, metre stick

Procedure:

1. Take a 2L pop bottle. Using a nail, poke 3 holes of equal size in the side of the bottle at different heights. Cover these holes with tape.

2. Fill the bottle with water and, outside or over a sink, uncover the holes. Observe the path of the water as it exits each hole and sketch a picture of the bottle and water paths in the space below:

3. Calculate the pressure exerted by the water at the depth of each hole, given:

$$P = \frac{F}{A} = \frac{m\,g}{A} = \frac{(D \times V)\,g}{A} = \frac{(D \times (A \times h))\,g}{A} = D\,h\,g$$

where D is the density of water ($D = 1000\,\frac{kg}{m^3}$),

h is the height of the water above the hole, and $g = 9.8\,\frac{m}{s^2}$.

$P_{highest} = D\,h\,g$ =

$P_{middle} = D\,h\,g$ =

$P_{lowest} = D\,h\,g$ =

Explain how this difference in pressure results in the different paths of the water:

_____

_____