Name(s): _____ Date: _____

Pascal's Law Worksheet Answers

1. In your own words, what did you just learn about Pascal's law?
   Write your **definition** of Pascal's law below:

Example answer: "Water pressure increases with depth. The more water on top of something, the more pressure there will be."

2. There are two holes at different heights: Hole A and Hole B.
   What do you expect to happen when you remove the tape from one of the holes?
   What will happen as soon as the tape is removed?
   What will happen over time, as the water level drops in the bottle?
   Write your **hypothesis** below.

Example answer: "As the tape is removed, I expect the water to shoot from the hole. The water jet will shoot less far as time goes by and less water is pushing down from above the hole. Since Hole B is higher than Hole A, I expect the water to shoot further from Hole A at the start."

3. Let's find out what really happens… It is time to experiment! Make sure each person knows his/her task (have extra people help with measuring). As you conduct the experiment, have the "recorders" fill in the table below. Once your group is finished with the experiments, have the recorders share your results with the rest of the class.

Table 1: Hole A height and distance measurements			
Time (sec)	**Horizontal distance (cm)**	**Water level (cm)**	**Water height above hole (cm)**
0*	**19**	**21**	**= 21 – 6 = 15.0**
30	**17**	**18.25**	**= 18.25 - 6 = 12.25**
60	**15**	**16**	**= 10.0**
90	**13**	**13.75**	**= 7.75**
120	**11**	**11.75**	**= 5.75**
150	**9.25**	**10.5**	**= 4.5**
180	**7**	**9**	**= 3.0**
210	**4.5**	**8**	**= 2.0**

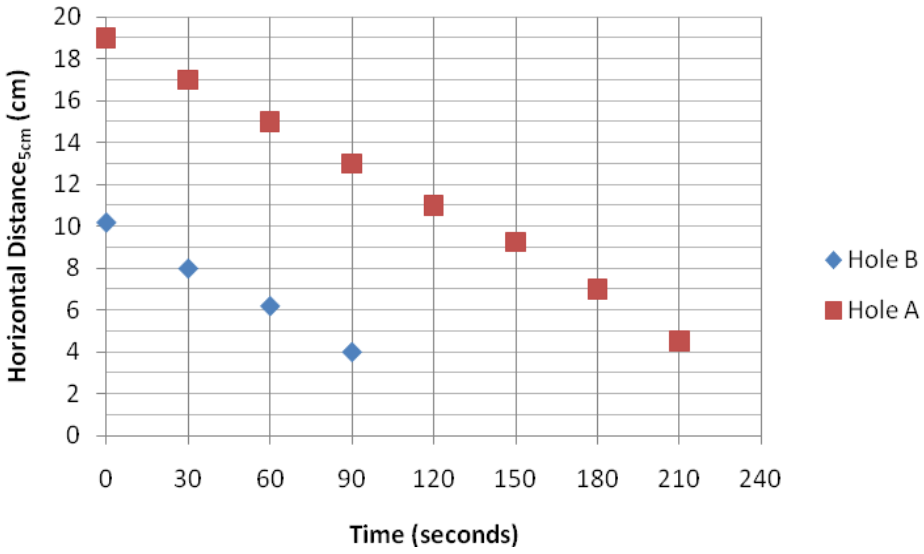
NOTE: On the tables, the starting times are shown as 0* since the jet distances are measured as soon as the tape is removed (it won't be 0 cm!). It is okay if it takes a second or two to take your first measurement.

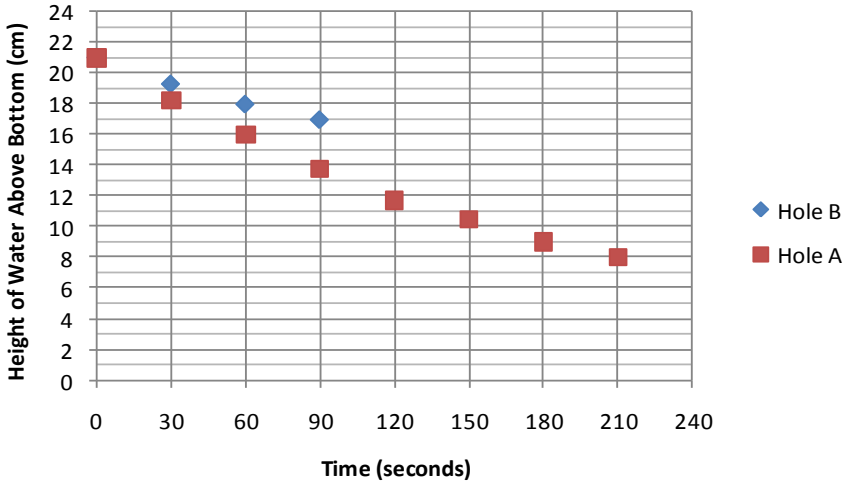
Table 2: Hole B height and distance measurements			
Time (sec)	**Horizontal distance (cm)**	**Water level (cm)**	**Water height above hole (cm)**
0*	**10.2**	**21**	**= 21 – 15 = 6**
30	**8**	**19.3**	**= 19.25 – 15 = 4.3**
60	**6.2**	**18**	**= 3**
90	**4**	**17**	**= 2**
120?	**—**	**—**	**—**

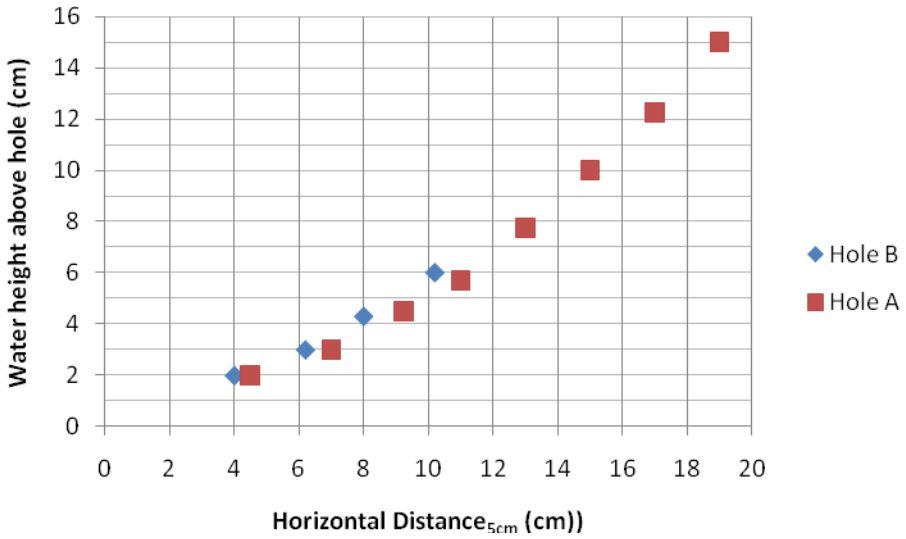
4. Write all your **observations** below.
   Hint: What happened? How fast and far did water come through the holes? What happened over time?

Example answer: "Water jet from Hole A went further than jet from Hole B. Over time, both jets slowed and didn't go as far."

5. Graph the data from Table 1 and Table 2 on the blank graphs provided below.







6. What do the graphs tell you about the relationships between (a) water height above hole and time, (b) jet distance and time, and (c) water height above hole and jet distance? How are the graphs for the two different holes similar?
   Write your **analysis** below.

Example answer: "(a) The water height above the hole went down over time. (b) The jet distance decreased over time. (c) The water height above the hole and jet distance graphs for both holes should almost overlap, showing that the distance of the jet is dependent on the water height above the hole.

7. Use a calculator to answer the following questions. Show your work.
   A. What is the volume of a waterbed that is 7-feet long, 6-feet wide, and 2-feet high. What are the units of your answer?

      (7 ft) x (6 ft) x (2 ft) = **84 cubic feet (ft^3)**

   B. A cubic foot of water weighs 62.4 lbs. How much does the waterbed weigh?

      (84 cubic feet) x (62.4 pounds/cubic foot) = **5,242 pounds**

   C. How do engineers use Pascal's law when designing locks and dams?

Example answer: "When designing locks and dams, engineers must consider the force from all directions. Because the water pressure is the same at a certain depth, engineers design a dam to withstand a certain amount of pressure at any point at that depth. They also know that pressure increases with depth, and so the dam must be stronger at the bottom. If engineers did not consider forces in all directions, the lock or dam structure could fail."