LESSON PLAN

John Santangelo – Central Junior High, Melbourne, FL

Lesson Title: How much is an inch of rainfall if you're a river?

Grade Level: 5-12

Topic: Math, Science

Time Required:
1 day for construction
1 day for calculation
Collection dependent upon weather

Objectives:
1. Students will make a rain gauge and use it to measure precipitation on the school grounds for a predetermined period of time.
2. Students will determine the area of the school grounds and calculate the volume of precipitation that falls on the grounds during that time.

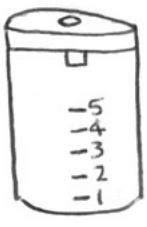
Materials:
Clear cylindrical plastic squeeze bottle
Knife, scissors or other cutting instrument
Permanent marker
Ruler
Writing materials
Meter or yard stick
Calculator (optional)

Procedure:
1. Cut the top of the clear cylindrical bottle so the bottom piece has straight sides (figure 1) and invert the top of the bottle in the bottom portion (figure 2). Use the ruler and marker to measure and mark increments of one centimeter (or inch) from the bottom of the gauge (figure 3). Place the rain gauge in an open space away from trees or buildings. (Make several rain gauges and place them at locations around the school grounds. Calculate the average rainfall on the school grounds.)

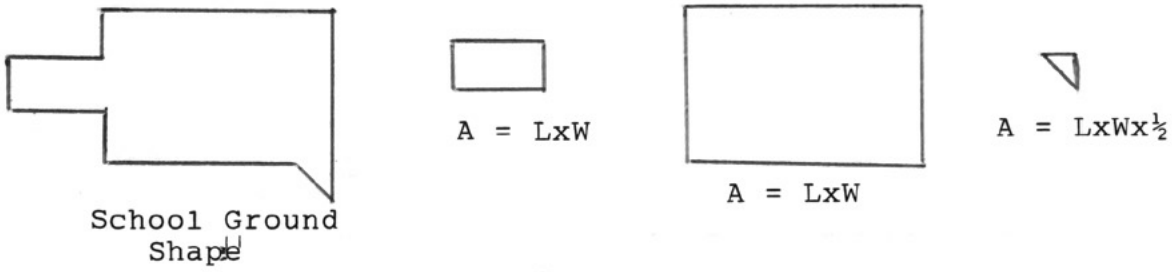
Figure 1

Figure 2

Figure 3



2. **To calculate the area of the school grounds measure the length and width (students may use a length of twine marked in meter or one-foot increments, or a tape measure, to speed this process). If your school grounds have an irregular shape, students can measure a rectangular approximation or measure segments and calculate the total area shown in the following diagrams.**



3. **To determine the volume of rainfall, convert the amount of rainfall to meters or feet:**

   1 cm = .01 m; number of cm/100 = number of meters
   1 inch = 1/12 foot; number of inches/12 = number of feet

4. **The students should then multiply the area of the school grounds (m^2 or ft^2) times the amount of rainfall. This will give you the volume of rain in cubic meters (m^3) or cubic feet (ft^3).**

   1 cubic meter = 1000liters = 1000kg
   1 cubic foot = 7.5gallons = 62.5 pounds

Data: **The following data is to be collected:**

1. **The amount of rain collected in the rain gauge**
2. **The area of the school grounds in m^2 or ft^2**
3. **The volume of rain that fell on the school grounds in m^3 or ft^3**

Questions: **For grades 5-12**

1. **If 1 cubic foot of water weighs 62.5 pounds, what is the weight of the water that fell on the school grounds during our collection period?**
2. **What happened to the water that fell to the ground? Where did it go when it left the school site?**
3. **How much water was absorbed in different areas of the**

school site (i.e. concrete, grass, bare soil, gravel)?

4. **What are potential pollutants the water may have picked up as it ran off the school site?**
5. **How might the pollutants affect the waterway and/or lake they ran into?**
6. **How could the pollutants that may have entered the waterway be reduced?**

For grades 9-12

1. **Calculate the force of water if it all entered a stream at once and accelerated at 5 meters per second per second (m/s/s), 10 m/s/s, or 15 m/s/s { Force = mass (kg) x acceleration (m/s/s) }.**
2. **Write a brief essay explaining why it is important to slow the rate at which runoff water enters waterways.**