

Impervious Surfaces Around School

Name _____

Pervious Surfaces: a surface that allows for the passage of water; pervious materials permit water to enter the ground by virtue of their porous nature (i.e., garden, forested areas, loosely packed soil or gravel)

Impervious Surfaces: a surface that does not allow water to soak into or pass through it (i.e., concrete, asphalt, packed soil, packed gravel, roofs)

Draw the impervious surfaces from your region. Mark the shapes you will break your surfaces into to help create your calculations:

Measure the length and width of each shape that makes up your impervious surface. Record the measurements in inches in your drawing above.



Student Handout 1

1. Find the total area of your impervious surfaces (be sure to add all of your surfaces together to get the total of all the impervious surfaces in your region):

Area of a square or rectangle: $L \times W = \text{area in in}^2$;

Area of a right triangle: $L \times W \times \frac{1}{2} = \text{area in in}^2$

2. Convert the total area of your impervious surfaces from in^2 to ft^2 :

$$\frac{\text{area in}^2}{1} \times \frac{1 \text{ ft}^2}{144 \text{ in}^2} = \text{area in ft}^2$$

3. Find the volume of your impervious surfaces after 1 inch of rain:

$$1 \text{ in} = 1/12 \text{ ft} = 0.083 \text{ ft}$$

$$\text{area in ft}^2 \times 0.083 \text{ ft} = \text{volume in ft}^3$$



Student Handout 1

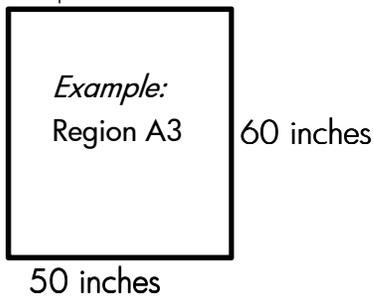
4. Convert ft^3 to gallons:

$$1 \text{ ft}^3 = 7.48 \text{ gal}$$

volume in $\text{ft}^3 \times 7.48 \text{ gal} =$ gallons of water that fell on your impervious surfaces

5. Compare gallons of runoff from your region to other familiar water containers. You must show your work on a separate piece of paper.

Example: Runoff from a 1-inch rainfall from the impervious surfaces in region A3 is equivalent to about 3.69 toilet flushes. See work below.



$$\text{Area} = 60 \text{ in} \times 50 \text{ in} = 3000 \text{ in}^2$$

$$\text{Convert in}^2 \text{ to ft}^2 = \frac{3000 \text{ in}^2}{144 \text{ in}^2} \times \frac{1 \text{ ft}^2}{1} = 20.83 \text{ ft}^2$$

Find the volume after 1 inch (1 inch = 0.083 ft) of rain:

$$20.83 \text{ ft}^2 \times 0.083 \text{ ft} = 1.73 \text{ ft}^3$$

Convert ft^3 to gallons:

$$1.73 \text{ ft}^3 \times 7.48 \text{ gal} = 12.93 \text{ gal}$$

Compare to familiar water source (3.5 gallons in one toilet flush):

$$12.93 \text{ gal} / 3.5 \text{ gal} = 3.69 \text{ toilet flushes}$$