

## Does Media Matter? Worksheet **Answer Key**

### 1. Vocabulary and Definitions

<b>permeability</b>	<b>The ability of water to pass through media, typically dependent on the porosity and connectivity of open space within the media.</b>
<b>capillary action</b>	<b>Movement of water within the open spaces of a material due to surface tension, adhesion and cohesion forces.</b>
<b>porosity</b>	<b>The amount of open space within media.</b>
<b>percolation</b>	<b>The movement of water within the media layer.</b>
<b>media</b>	<b>A combination of organic and/or inorganic earth materials.</b>
<b>storage capacity</b>	<b>The volume of water that can be absorbed within a media layer.</b>
<b>field capacity</b>	<b>The amount of water remaining in the soil after all gravitational water is drained.</b>

2. What do we call the movement of water INTO media layers? **Infiltration**
3. How does the size of media affect the infiltration rate? **The larger the particle size, the greater the infiltration rate.**
4. What media would best maximize below-ground storage? **Media with a high infiltration and permeability rate.**
5. What media would assure healthy plants and bacteria community? **A media layer with high organic content and above-average field capacity.**

### 6. Field Capacity and Observations Data (complete as a class)

Media type in bucket	Media volume (l)	Storage capacity (ml)	Drained volume (ml)	Field capacity (l)	Observations
Bucket 1 sand	4 liters	2600 ml	2000 ml	600 ml	Field capacity between soil and gravel, may be suitable for some plants and microbial community
Bucket 2 soil	4 liters	2500 ml	1000 ml	1500 ml	Highest field capacity, supports health plants and microbial community
Bucket 3 gravel	4 liters	3200 ml	3000 ml	200 ml	Lowest infiltration rate, good for maximizing below ground storage
Bucket 4 mulch	4 liters	3000 ml	2700 ml	300 ml	The mulch layer provides additional runoff storage prior to infiltrating into below-ground media layers.

### 7. Infiltration Rate of Selected Media (complete as a class)

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Class: \_\_\_\_\_

Media type in bucket	Fully saturate media	Water volume added (ml)	Time to drain (s)	Drained volume (ml)	Infiltration rate (ml/s)	Observations
Bucket 1 sand	✓	2000 ml	40 sec	1800	50 ml/s	Average infiltration rate, high porosity and high permeability
Bucket 2 soil	✓	2000 ml	90 sec	1700	22 ml/s	Lowest infiltration rate due to fines and clays in soil media
Bucket 3 gravel	✓	2000 ml	15 sec	1900	133 ml/s	High infiltration rate due to large particle size
Bucket 4 mulch	✓	2000 ml	25 sec	1850	80 ml/s	Infiltration rate between sand and gravel

8. **Media Mix Challenge:** Create your own media mix combination based on previous test results and observations, so that it meets the design requirements. Make 2-3 liters of this mix and place in planter. Record the type of media, volumes or ratio of each material added. Test to determine the infiltration rate for your mix. Run each experiment (at three different water volumes) three times.

**Design requirements:** Create a media layer that promotes infiltration, maximizes below-ground water storage and provides an environment for healthy plants and microbial communities.

**Answer note:** Many different types of media mix combinations meet the criteria of increasing infiltration and below-ground storage while creating an environment conducive to successful plant establishment and growth. One popular media mix recommended for rain gardens consist of topsoil, sand and mulch in a 2:2:1 ratio. This media mix ratio has produced successful growth and storage results for several rain gardens in East Tampa, FL and Prince George County, MD

Material 1	Material 2	Material 3	Material 4
sand	soil	gravel	mulch
Volume/ratio of Material 1	Volume/ratio of Material 2	Volume/ratio of Material 3	Volume/ratio of Material 4
2 parts	2 parts	0 parts	1 part

EXP #1	Volume of water (ml)	Time (sec)	Infiltration rate (ml/sec)
Trial 1	1000 ml	30 sec	33 ml/sec
Trial 2		32 sec	31 ml/sec
Trial 3		31 sec	32 ml/sec
Average:			33 ml/sec

EXP #2	Volume of water (ml)	Time (sec)	Infiltration rate (ml/sec)
Trial 1	2000 ml	64 sec	31 ml/sec

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Class: \_\_\_\_\_

Trial 2		60 sec	33 ml/sec
Trial 3		57 sec	35 ml/sec
Average:			33 ml/sec

EXP #3	Volume of water (ml)	Time (sec)	Infiltration rate (ml/sec)
Trial 1	3000 ml	89 sec	33 ml/sec
Trial 2		93 sec	32 ml/sec
Trial 3		95 sec	31 ml/sec
Average:			32 ml/sec

9. Plot volume of water vs. time and calculate the slope of the line.  
(Slope of the line is the average infiltration rate.)

