

This booklet belongs to: _____

The Spring Creek Stormwater Activity Book



An activity booklet designed to teach children about water resources
and stormwater pollution

Created by the
Penn State Office of Physical Plant
for the MS4 Partners

What is Stormwater?

When rain falls or snow melts, where does the water go? Some is soaked into the ground, some sits in puddles, and some disappears. Water that flows over the land surface, downhill to the nearest stream or ditch; we call stormwater runoff.



When storm drains or inlets are free of debris, water can easily drain from roadways. When storm drains are clogged, this causes the potential of flooding on roadway surfaces, which can also cause contamination. Never put anything down a storm drain.

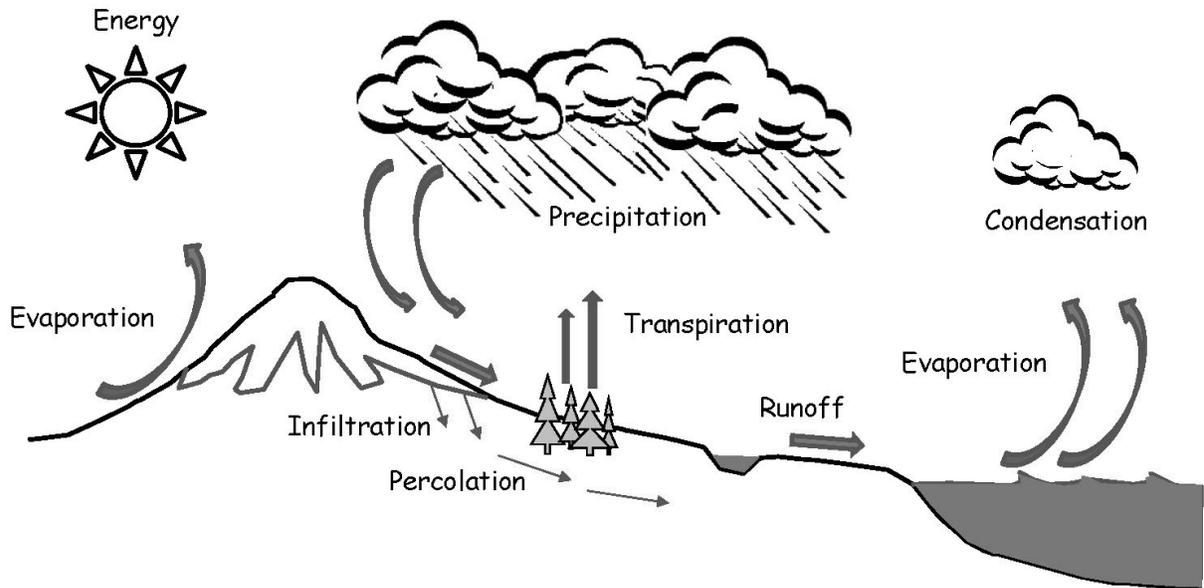
Solve the hidden message. Use the clues below.

- A = B = C = D = E = F = G =
- H = I = J = K = L = M = N =
- O = P = Q = R = S = T = U =
- V = W = X = Y = Z =



Activity Challenge: What secret messages can you make using the above code letters or your own symbols?

The Water Cycle



Evaporation: When water is heated by the sun, it causes the water to turn into vapor and rise into the air.

Transpiration: Water that plants give off as vapor.

Condensation: When water vapor cools, it turns into tiny drops of water. These combine to make clouds.

Precipitation: The water in the clouds falls to the earth as raindrops or snow. Precipitation even includes fog drip, or when it's sprinkling or drizzling.

Runoff: The water falling to the ground through precipitation runs back into the lakes, rivers and oceans over the surface of the ground.

Infiltration: When water enters the soil surface.

Percolation: What the process is called after water is infiltrated into the ground and then moves through the soils.

Hydrology: The study of how water moves through the environment.

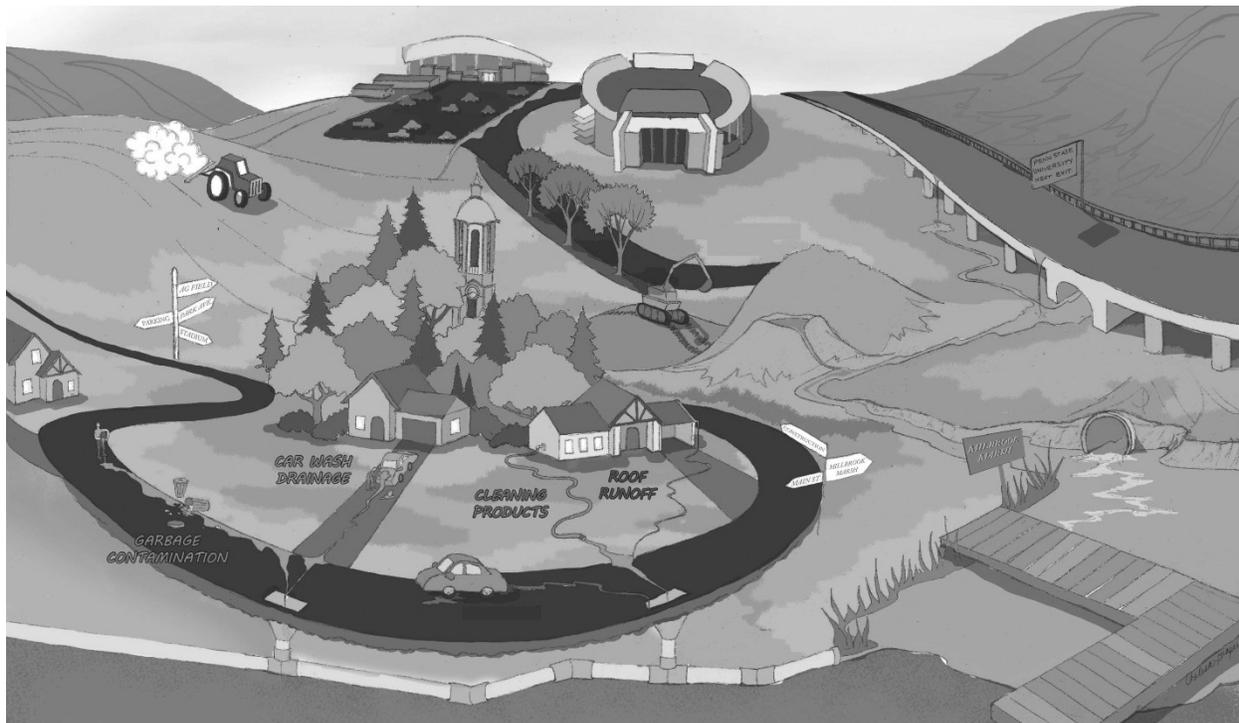
Karst: A landscape term in a carbonate watershed like Spring Creek where sinkholes, closed depressions and blind valleys (valley with an abrupt ending) have developed over geologic time.

Impervious Surfaces: Are mainly artificial surfaces like roofs, roads, sidewalks, and parking lots that are impenetrable to water, which makes water runoff.

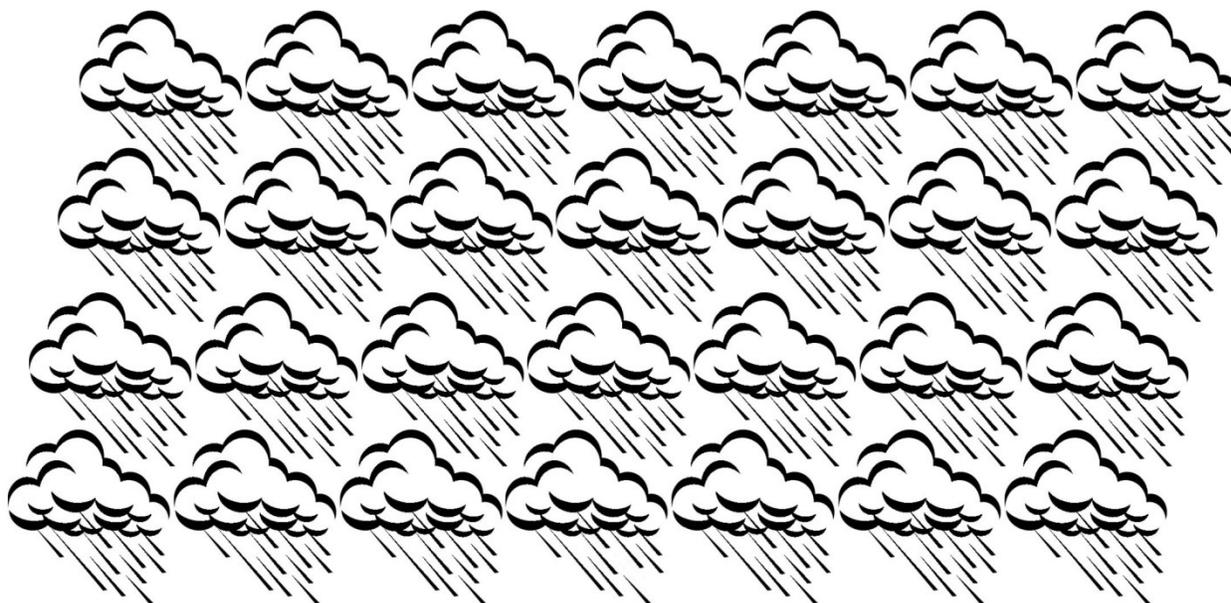
Did you know that the water you drink is as old as the earth itself? Dinosaurs may have swum in the water from your kitchen sink. The earth's water supply is about the same as it was millions of years ago. That's because every molecule of water is recycled over and over through the water cycle. More than 99% of the earth's water is salt water in the ocean or trapped in the ice caps or deep underground. That leaves only 1% of the earth's water available for us to use. Let's make sure we protect that water and keep it clean.

Stormwater Pollution Picture Search

Cities and towns have more stormwater runoff than areas in the country because they have more hard surfaces so the water can't soak into the ground. Impervious surfaces like roads and parking lots can contribute lots of pollutants to our streams such as salt or oil. Looking at the picture below, can you see any other sources of potential pollution other than those labeled? You may find at least 5 things.



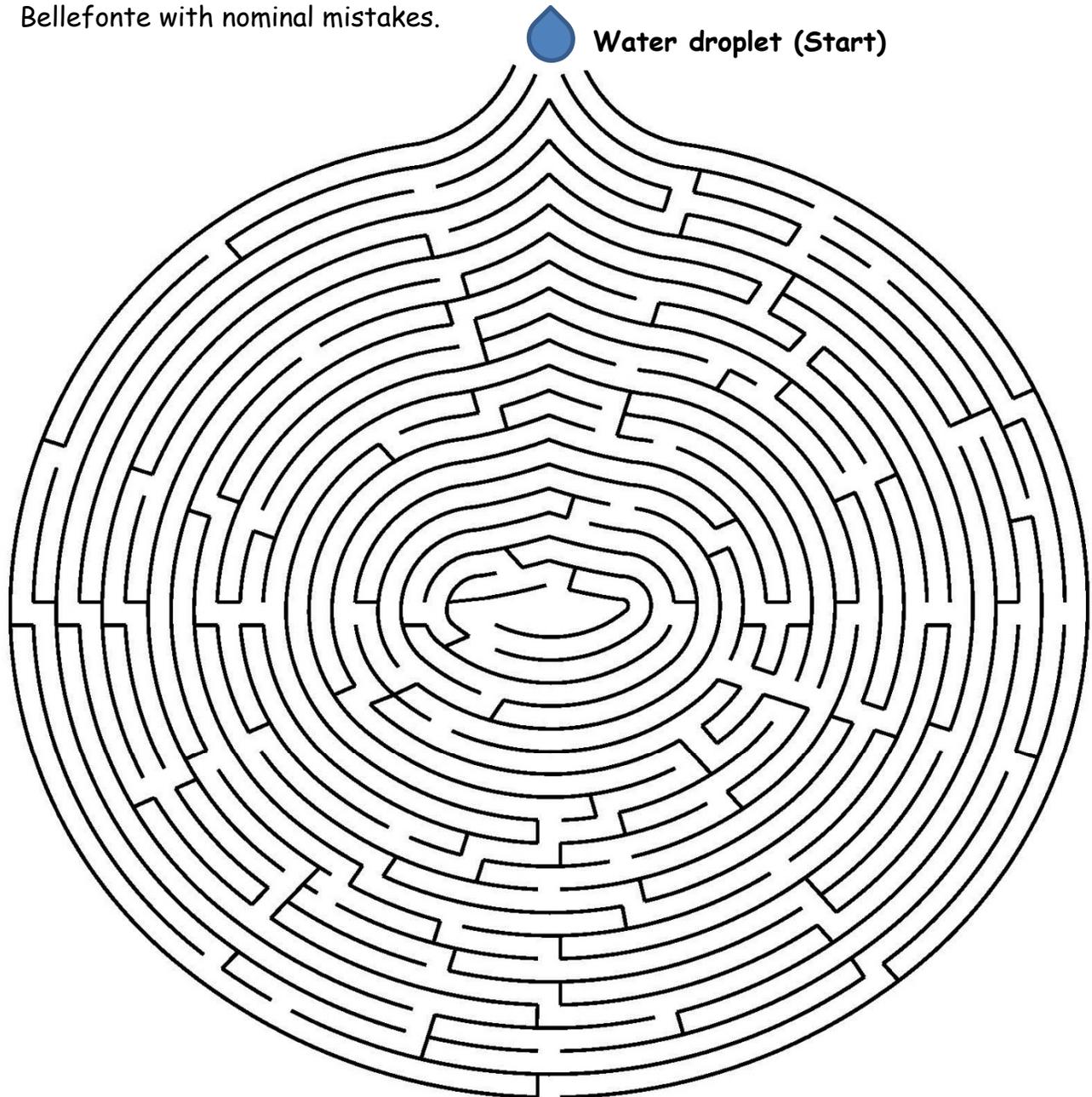
A storm is brewing. Can you tell which two clouds are different from the others?



Activity Challenge: Ask your teacher or a friend how clouds can move pollution around the environment.

Water Maze

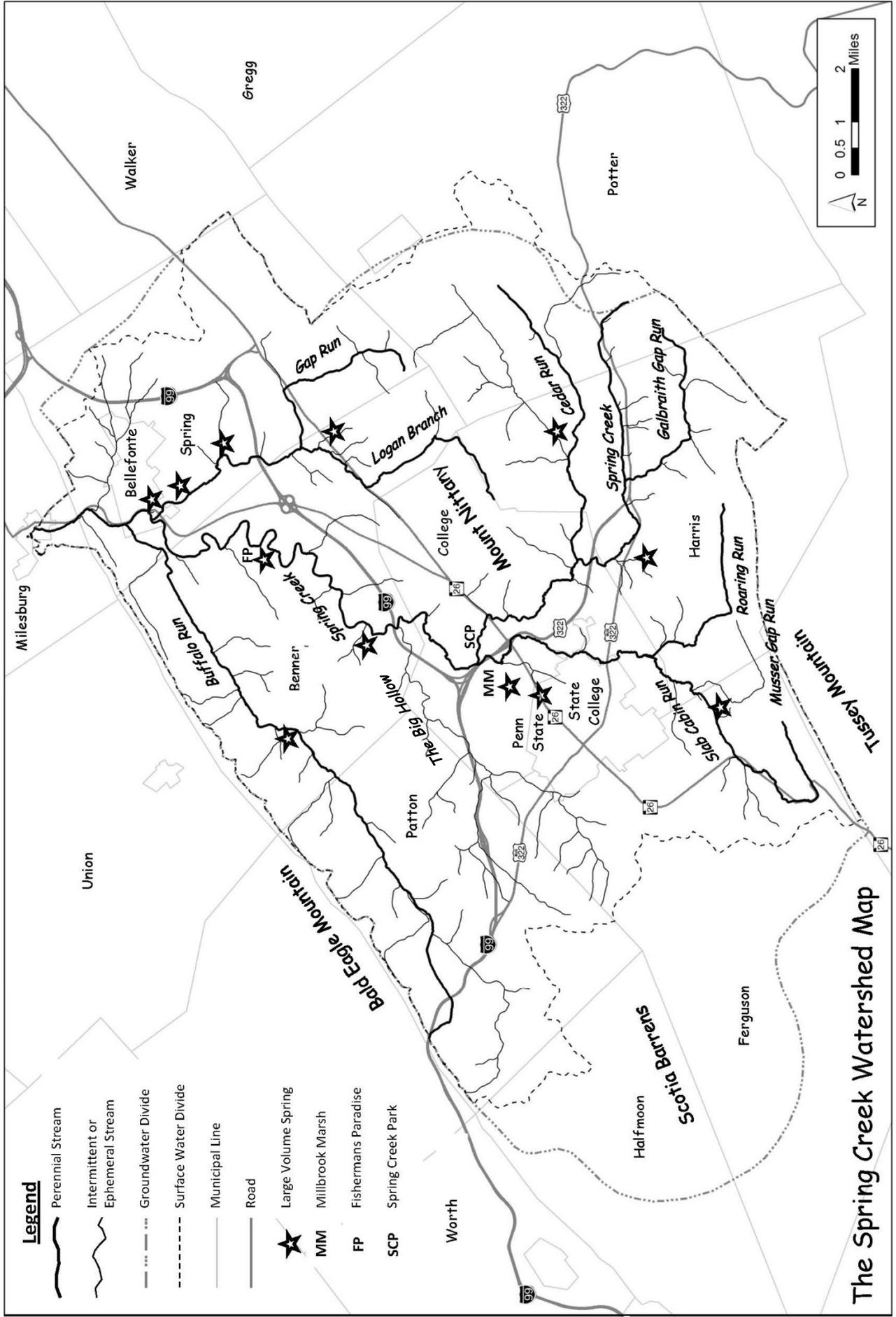
How water moves in and around the Spring Creek Watershed can be very complex due to the carbonate geology. Lead the water droplet through the maze from where it landed in the upper reaches of the Scotia Barrens to the Big Spring in Bellefonte with nominal mistakes.



Big Spring (Finish)

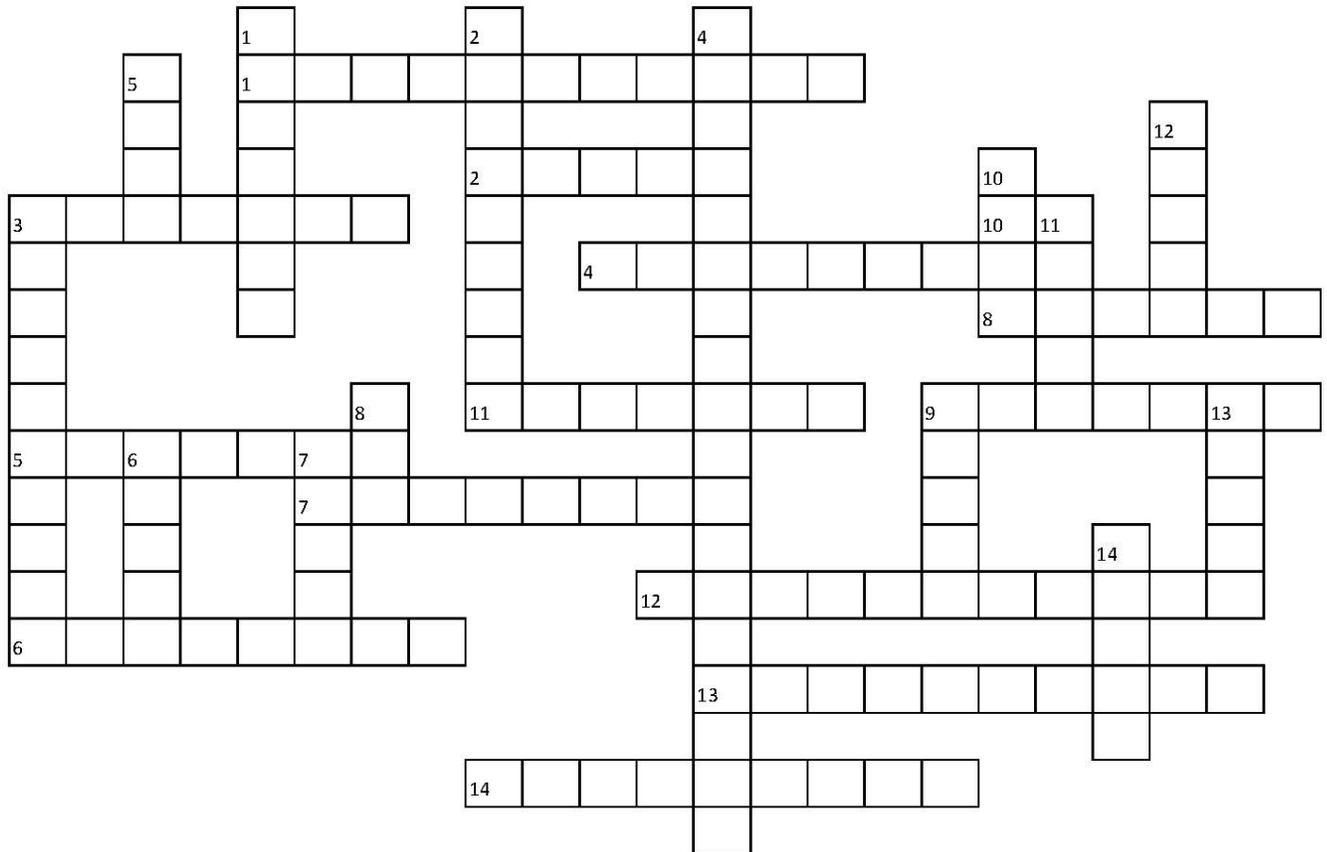
Did you know that a cistern is a tank for storing rainwater and rain barrels are a type of cistern? Many older homes and farms in the region had cisterns.

Activity Challenge: Create your own maze with multiple exits. Is there any shape that works best?



Crossword Puzzle

Everything we do is interconnected and can affect something else. Complete the crossword puzzle below. Hint, many of the words can be found in this activity book.



Across

- 1) The process of water turning into vapor (2)
- 2) Walk your dog with one of these
- 3) Wetland plant (think pet)
- 4) A stream that flows year round (10)
- 5) Tiny thing found in water (9)
- 6) A light form of precipitation (2)
- 7) Falls from clouds (2)
- 8) Someone who makes you well
- 9) A type of fish (7)
- 10) A common preposition
- 11) Something minor or trivial (4)
- 12) Supplies wells and springs (8)
- 13) Land of fantasy when sleeping
- 14) A local University

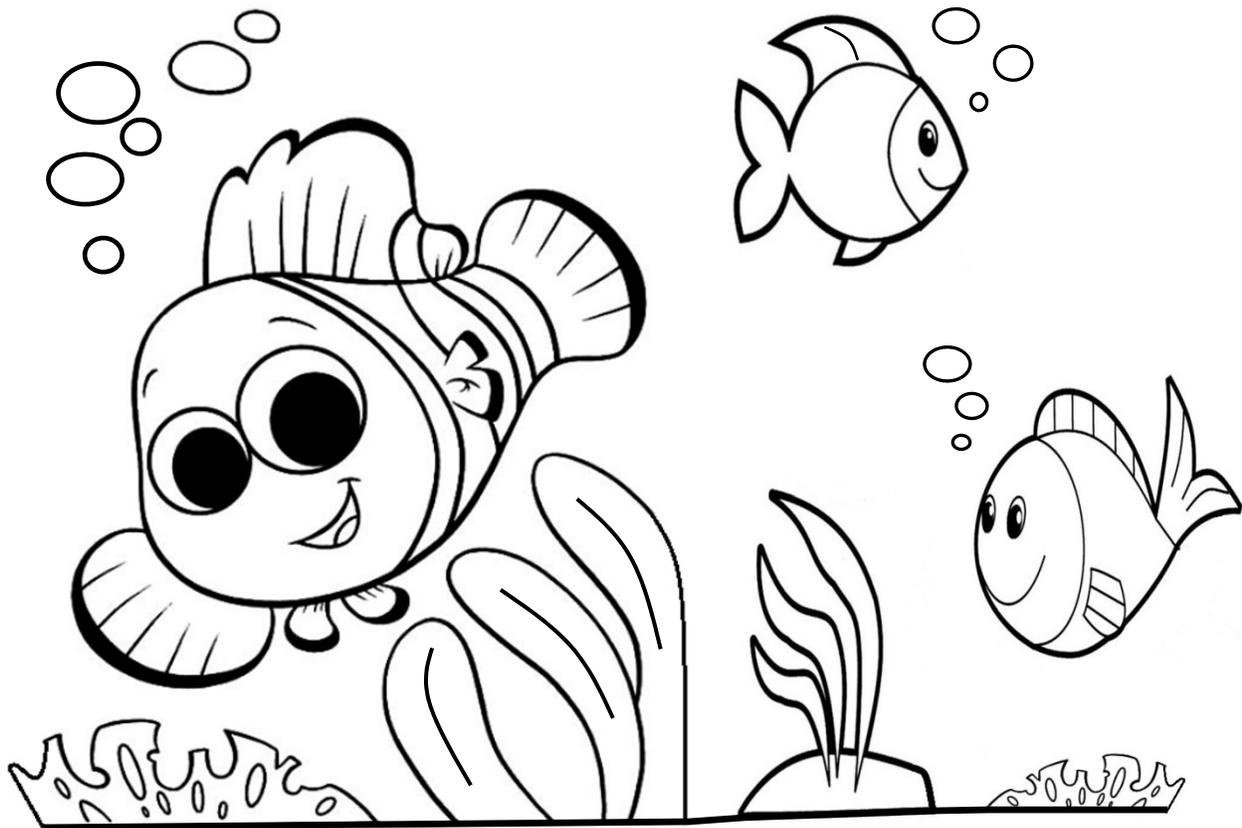
Down

- 1) What Millbrook Marsh is (6)
- 2) Bad stuff for our drinking water (3)
- 3) Another word for watersheds (10)
- 4) A great local place to fish (5)
- 5) A chemical put on roads that's bad for our water in high concentrations (3)
- 6) A type of tree with a fragrant smell
- 7) Another name for a small creek (10)
- 8) An affirmative word
- 9) Mentioned in seven across
- 10) A large quantity of something
- 11) Too much water at one time (1)
- 12) Where water in the street goes (1)
- 13) A male cow or what you do in a car
- 14) Lyrics "riding the _____ out" (3)

Hint: numbers in parenthesis (#) indicate on what page the word can be found.

Color the Fish

Carla the Clownfish loves to play puzzles. Here's a Sudoku type puzzle with a twist.



The rules of the game are simple: each of the nine blocks has to contain all the letters in CLOWNFISH. Each letter can only appear once in a row, column or box.

C								
N	H		C					
		W		L	H		O	N
	C	L		I			F	W
W			S	C		N	H	L
	O		F			S		C
							L	
	F			S				
			L	F			C	O

Can you solve Carla's puzzle using the same rules as Sudoku except with the letters: "CLOWNFISH" instead of the numbers 1 through 9?

Carla says please don't confuse a clownfish with a codfish.

Activity Challenge: Can you make your own Sudoku puzzle using a word with nine different letters?

Word Search

Water that comes out of our faucets can take many different paths to reach our homes. See if you can find the different words related to water listed below.



Aqueduct

Basin

Bog

Channel

Condensation

Creek

Dam

Drizzle

Evaporation

Humidity

Hydrology

Iceberg

Lagoon

Lake

Ocean

Precipitation

Puddle

Rapids

River

Runoff

Stormwater

Swamp

Tide

Trickle

Waterfall

Hydrogeology is a branch of geology that studies of the movement of groundwater.

Activity Challenge: Make your own word search with words you think are important.

Word Scramble

See if you can unscramble the following words. If you get stuck, look at the hints for suggestions. Another hint is that many of these words can be found somewhere in this activity book. Good Luck!

□ □ □ □
W O S N

□ □ □ □ □ □
T U M N O

□ □ □ □ □ □ □ □
T N A I T Y N

□ □ □ □ □ □ □ □
Q U F A I R E

□ □ □ □ □
L S A B

□ □ □ □ □ □ □ □
A N B C I

□ □ □ □
U N R

□ □ □ □ □ □ □ □ □ □ □ □
A E E T A H W D S R

□ □ □ □ □ □ □ □
T E S A R M

□ □ □ □ □ □ □ □ □ □ □ □
A S B W O I L E

□ □ □ □ □ □ □ □
G S R P N I

□ □ □ □ □ □ □ □
A T T E S

□ □ □ □ □ □ □ □ □ □ □ □
L E C L O E G

□ □ □ □ □ □ □ □ □ □
U I S N T A M

□ □ □ □ □ □ □ □ □ □ □ □ □ □
E A S W T O R T U P

□ □ □ □ □ □ □ □ □ □ □ □ □ □
I O H L R O W P L

□ □ □ □ □ □ □ □ □ □ □ □
A L R G I C E

□ □ □ □ □ □ □ □
A H R M S

□ □ □ □ □ □ □ □ □ □ □ □
T S Y E U R A

□ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □
T F I N A I R I T L N O

Hints

A form of water

A local hill

Stored water underground

An intermittent stream

The type of watershed Spring Creek is

Where water flows

A type of stormwater practice

Where water comes out of the ground

A local municipality

A big wave

From whirling winds over a lake

Swirling water

Where you can find lots of ice

Soft wet land

At the mouth of a river

Water entering the ground

Microorganisms, also called microbes, are present everywhere in our environment including water.

Activity Challenge: Create scrambled words you've learned about protecting our water for your friends to solve.

Final Stream Facts

Perennial Stream - Are streams that flow year round like Spring Creek.

Intermittent Streams - Are streams that flow part of the year or seasonally.

Many tributaries to Spring Creek are intermittent.

Ephemeral Stream - Are streams that only flow in direct response to precipitation.

The Big Hollow is an ephemeral stream because it's an under drained valley.

Many of the small drainageways without any bed or banks in the watershed (or another name for a watershed is a catchment) are some of the most important in protecting the watershed and are highly infiltrative. Help protect our rivers, streams, creeks, or brooks no matter what size they are!

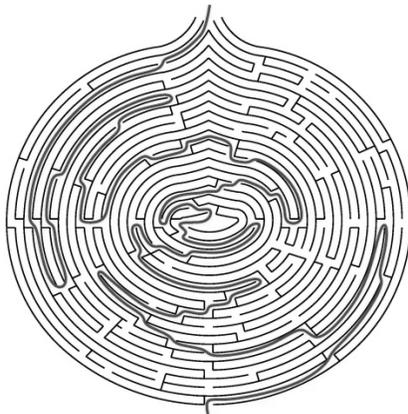
Answer Key

Hidden Message: Did you know that Spring Creek is a world class trout stream fishery?

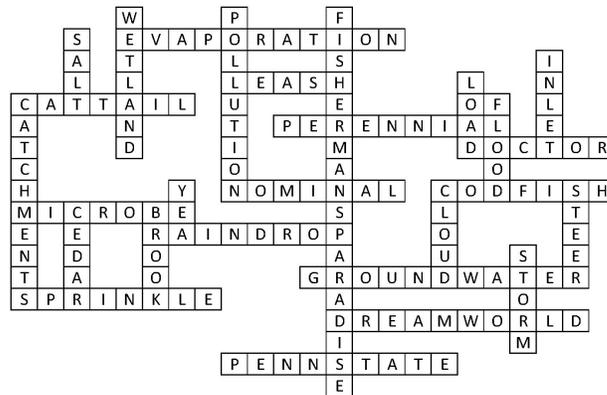
Pollution Picture Search: 1) car oil leak, 2) highway runoff, 3) construction erosion, 4) parking lot runoff, 5) fertilizer and pesticide runoff, 6) litter.

Different clouds: 6th cloud in row 2 and 4th cloud in row 4.

Maze:



Crossword Puzzle:



Sudoku:

C	L	O	W	N	F	I	S	H
N	H	I	C	O	S	L	W	F
F	S	W	I	L	H	C	O	N
S	C	L	H	I	N	O	F	W
W	I	F	S	C	O	N	H	L
H	O	N	F	W	L	S	I	C
O	W	C	N	H	I	F	L	S
L	F	H	O	S	C	W	N	I
I	N	S	L	F	W	H	C	O

Word Search:

A	O	D	Q	G	Z	N	O	I	T	A	T	I	P	I	C	E	R	P	N
W	G	Y	R	A	D	O	X	V	C	J	B	M	W	H	E	S	H	G	X
K	P	J	U	I	B	O	F	E	C	Y	R	S	B	V	C	J	E	P	B
U	M	O	R	F	Z	G	N	P	A	I	U	A	A	B	Q	E	W	U	O
H	A	G	A	Q	U	A	D	U	C	T	N	P	E	A	R	T	K	D	H
I	W	T	P	E	Q	L	T	D	I	L	O	S	B	C	I	R	E	D	U
C	S	F	I	U	J	C	L	N	A	R	F	H	A	L	O	D	S	L	M
G	O	B	D	K	D	S	W	R	A	T	F	X	M	B	I	D	N	E	I
R	G	N	S	I	C	D	S	T	O	R	M	W	A	T	E	R	T	N	D
X	E	G	D	R	Y	M	I	D	V	J	U	S	W	Z	G	I	A	K	I
I	N	L	F	E	L	O	E	B	E	C	I	F	A	B	D	Z	R	U	T
T	R	C	E	P	N	A	E	C	O	X	C	A	T	S	E	Z	O	N	Y
A	J	S	T	D	O	S	W	A	M	T	L	O	E	R	Y	L	M	U	D
S	B	R	K	P	M	B	A	K	F	D	A	M	R	J	I	E	J	O	Z
L	A	K	R	E	D	H	U	T	G	P	K	Q	F	E	C	C	I	G	P
S	S	L	H	J	E	K	K	R	I	V	E	R	A	G	E	L	K	A	V
F	I	I	P	S	I	R	D	W	V	O	M	H	L	Z	B	M	P	L	N
R	N	D	X	H	Z	P	C	H	A	N	N	E	L	K	E	Y	C	O	E
B	L	E	T	Q	P	R	E	C	I	P	I	T	Z	V	R	A	P	I	Z
Y	G	O	L	O	R	D	Y	H	A	C	M	F	O	D	G	E	E	N	F

Word Scramble:

- Snow
- Mount Nittant
- Aquifer
- Slab Cabin Run
- Headwaters
- Stream
- Bioswale
- Spring
- State College
- Tsunami
- Waterspout
- Whirlpool
- Glacier
- Marsh
- Estuary
- Infiltration



STORMY

The raincloud
doesn't like
getting blamed
for polluted
runoff, do your
part to keep
stormy happy.



www.ms4partners.org

The acronym MS4 is short for "Municipal Separate Storm Sewer System."
All of the MS4 Partners have a MS4 stormwater permit that helps protect the environment.