



DIG DEEPER

GET INVOLVED

- Soils make our lives possible. We:
- build on soil
- play on soil
- drive on soil
- eat food grown in or raised on soil
- medicines come from soil
- wear clothes we wouldn't have without soil
- drink water that wouldn't be clean without soil
- breathe clean air we wouldn't have without the plants and trees growing in soil

The entire Earth...every ecosystem...every living organism...is dependent upon soils. Every day you make choices that affect soils. Take a close look at your own back yard or playground. Write down what you will do to protect or improve your soils.



Ask Maxine

Q: Does it matter what kind of soil you build a house on?

A: Yes! There are many different soils. You need to be sure that you build a home, office, school or even paths in a park on the right soil. You can find out what type of soil and which soil is best for your project by visiting your local conservation district office.

Maxine is a 47-year employee of NACD.

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National Association of Conservation Districts (NACD)
<http://nacdn.org>

Soil Science Society of America
<http://soils.org>

Smithsonian Institution
<http://forces.si.edu/soils>

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Booklet designed for use with ages 9-11

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DIG IT!

The Secrets of Soil



advanced

Answers to "We All Dig Soils": 1D, 2B, 3F, 4C, 5A, 6E

- Franklin Delano Roosevelt
"The Nation that destroys its soil destroys itself"

Answer to FDR Speaks Out:

"Dig It The Secrets of Soil"
Answer to CLORPT secret code puzzle:

YOU ARE SOIL!
NO I'M NOT!
YES I AM!



You don't think **you** are soil? Guess again! We **are** soil! Almost all of the minerals and nutrients we need for life, to nurture us, to help us grow, to give us energy and keep us healthy come from fields, gardens, trees and pastures. **Every** plant, vegetable, or fruit that we eat gets its nutrients from the soil in which it grows. We are **soil**! Every animal gets its nutrients from the plants it eats, which get their nutrients from the soil they grow in...so **animals** and the ecosystems they live in are soil! Only a small part of the Earth's soil can be used for growing food, and we are already farming most of it. To avoid the threat of world-wide hunger in the future we **must** keep our soils **healthy**. So remember, don't treat your soil like dirt!

WHAT
DOES IT
HAVE TO
DO WITH
ME?

Ways I Depend on Soils

1. _____

2. _____

3. _____

4. _____

FDR Speaks Out on Soil

Former United States President Franklin Roosevelt felt very strongly about soils. Solve this puzzle to find out what he had to say.

FILL IN THE BOX BY:

- Put each group of letters in a column of squares going downward from top to bottom. Keep the letters in the group in the same order they are given. The first column has been done for you.
- The groups of letters are not given in the correct order. You will have to decide what column each group should go into.
- No letters go in the squares that are blacked out. The blacked out squares are spaces between words.
- When you are finished write the quote you have found on the lines below the box.

NTSILOE ENDSOTT
TITOE TARSDSF
AHTTYL EIRS
HOYSSI

T						
I						
T						
O						
E						



1882-1945
Franklin Delano Roosevelt

Can you think of three ways you depend on soils every day?

Think about where you live. If you live in a house or an apartment building, what is it built on? **SOIL**.

Is your house or apartment building made of brick? Where does brick come from? Clay in the **SOIL**.

What have you had to eat today? What was it grown in or raised on? **SOIL**.

Are you wearing blue jeans or a tee shirt made of cotton today? That cotton was grown in the **SOIL**!

Did you drink any water today? Water is cleaned and filtered through **SOIL**.

Have you walked in the woods lately? Where do ecosystems like forests and wetlands get their water and nutrients? **SOIL**!

"Dirt's a lot more fun when you add water!"

-Hank Ketcham, Dennis the Menace (2004)

-Franklin Delano Roosevelt
Thirty-second President of the United States
1933-1945



C L O R P T Secret Code Puzzle

Place the answers to the clues into the blanks to the right of each clue. Next, put each letter into the box in the puzzle using the number and letter under each blank. When the puzzle is finished you will be able to read a message.

	A	B	C	D	E	F	G	H	I	J
1										
2										
3										

- A soil's parents are the _____ rocks and minerals that it came from.
A3 R F3 C1 E1 G3
- _____ can speed up or slow down weathering.
H1 P D2 F1 J1
- A lot of these live in the soil. You might call them bugs.
B1 D3 C H2 I2
- Breaking _____ rocks and minerals takes a long time.
A1 E3 N
- Relief is what direction the land _____.
B3 A E2 C2
W
- Any organism that lives in it _____ the soil.
G2 I1 F2



C L O R P T is a mnemonic (a special word used to help a person remember something) for Hans Jenny's famous state equation for soil formation.



SOIL =

A mixture of minerals, air, water, dead and rotting remains of plants and animals (organic matter) and LOTS of living organisms! Soil is alive ...it has parents, it gets old, it breathes!

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SECRET CODE NAME:

C L O R P T



C L i m a t e

Soil is formed when rocks and minerals are weathered and broken down. Temperature and the amount of rain that falls can either speed up or slow down chemical reactions. Warmer temperatures usually speed reactions up, cooler temperatures slow them down. For example, let's start with a piece of limestone, throw it in a nice warm spot with lots of rain, wait a few years and let some weathering occur. Next grow some corn, which you eat on the cob at a county fair and end up providing your body with calcium from the limestone! DIG IT!

- Plant roots produce carbon dioxide and release it into the soil.
- When it rains, there is a chemical reaction between the carbon dioxide in the soil and the rain water, forming carbonic acid.
- Limestone has a mineral called calcite in it. The carbonic acid dissolves the calcite into calcium.
- The calcium is absorbed by the roots of the corn as it grows.
- You eat the corn. DIG IT!

C L O R P T is an equation for soil formation. By solving the equation, you will discover what hidden things in your neighborhood make soils. It all begins when rocks are broken down into very small pieces over a period of a few hundred years or sediments are carried in and deposited by wind, water, glaciers, or even gravity. Add some air, water, minerals, living and non-living organic matter, and you have soil!

O r g a n i s m

Animals that dig burrows, plant roots, worms, insects and microorganisms all physically and chemically weather soil.

R e l i e f

Relief is the slope of the land or how steep the hill is. Relief is also what direction the land faces. The relief of the land influences how many hours of sunlight the soil gets, its temperature, how much water runs off of it and how many plants live in it.

P a r e n t M a t e r i a l

Yes its true, soil has parents. A soil's parents are the original rocks or sediments that it came from. The rocks could have been huge boulders that were right there all the time, or smaller rocks or sediments of sand, silt and clay that were carried in by wind or water.

T i m e

Breaking down rocks and minerals takes a looooooong time! But it does happen. If you give it plenty of time, "weathering" will turn solid rock into soil.

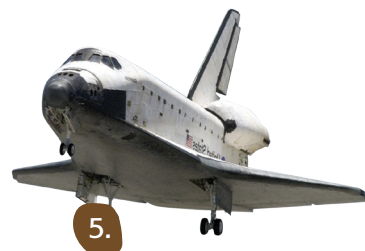
There are more organisms in one shovel full of soil than all of the people living on planet Earth.



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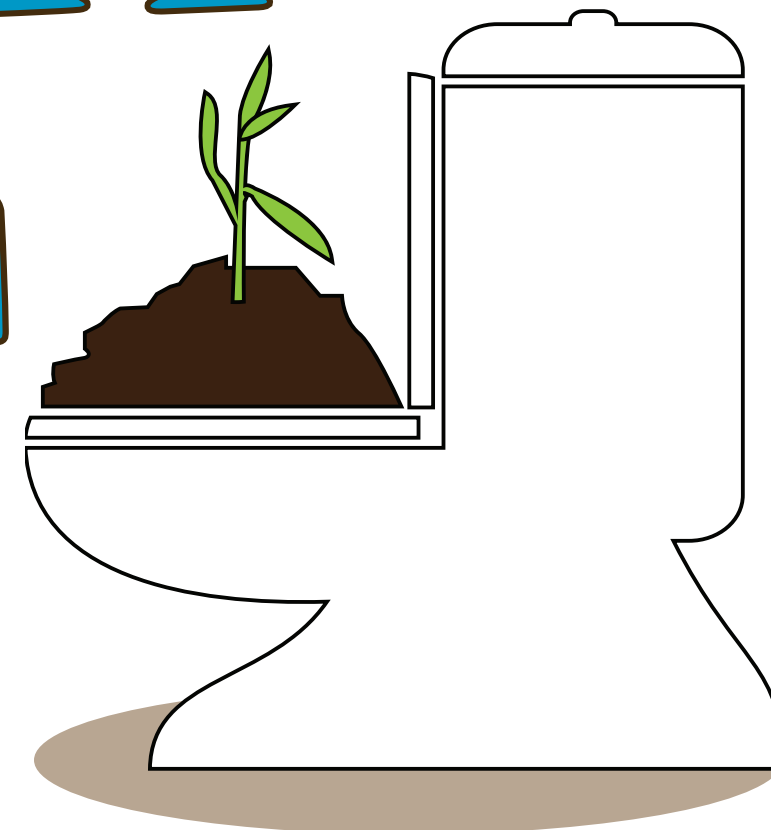
ME...SOILS...YOU...SOILS WE ALL DIG SOILS!

Below are pictures of some ways you might use soils without even knowing it. Draw a line to connect the picture on the left to the description on the right that tells how soils are used by YOU!



- A. The tiles that protect this from intense heat are made from sand that comes from soil.
- B. This is made from cotton fibre that comes from a plant grown in soil.
- C. Soils control the movement of this, they make it available to plants, they filter and clean it before it reaches streams, lakes, and you.
- D. These can make you feel better or even save your life and many of them come from microorganisms that live in the soils.
- E. This is made from clay which is a part of soil.
- F. Soils grow this before it ends up in a box on a store shelf, and a cow ate crops grown in soil to produce milk so you could enjoy it!

POTTY SOIL



A toilet is definitely something you use every day. Now, what does it have to do with soils? Take a close look at your “potty” and then check out these facts:

Potty Soil Fact #1

Most of the toilet is made of ceramic. Ceramic is made from clay which comes from the soils.

Potty Soil Fact #2

The toilet seat is made from wood. Wood comes from trees grown in the soils.

Potty Soil Fact #3

The toilet tank and bowl are filled with water. Water is filtered and cleaned by soils before we use it.

DIG DEEPER

AFTER THE FLUSH

What happens to the water in the toilet bowl after it is flushed? What does it have to do with SOIL? You might consider SOIL as a large water filter. Many septic systems use soil to filter wastewater. Become a junior soil scientist, do some investigating, find out why soil and soil type is important when you flush! Ask your family or local health department what type of septic system you have and how it interacts with soil. Check with local developers or go online and research alternative ways to deal with wastewater in your location. Remember the type of soil where septic systems are located is important. You will find out how to locate your soil type in the Ask Maxine section.