

# Escape Box

# Soil

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Ag in the Classroom

Likable Louie was recently hired to take care of the grounds at Hill Valley Grade School. His jobs include taking care of the lawn and landscape, keeping the playground equipment safe and in good condition and removing snow in the winter time. His first task is to reseed a hill behind the school that had become overgrown with invasive weeds. He has sprayed the weeds with weed killer and tilled the soil. He added fertilizer and is now ready to spread the grass seed. Rain is in the forecast for the following week so he must get the seed planted immediately. But alas, he discovers that he has forgotten the combination to the lock on the tool shed. This is where the grass seed is stored. He is not able to buy more seed as it is not in the budget. Please help Likeable Louie rediscover the combination so he can plant the grass before it rains. You will need to unlock all the locks to open the tool shed door. You have 40 minutes.

**Instructions:**

1. Read out loud the introduction passage from Soil Terra Nova.
2. After 10 minutes have passed you may ask for a hint. Only two hints are allowed for the entire activity.
3. One combination will open the small box, which holds the clue needed to solve another combination.
4. You must have all combinations solved before attempting to open the main box.
5. No chrome books or smartphones are allowed.

**Materials Needed:**

1. Small box with lock
2. Large box with three locks
3. Resources: Soil Ag Mag, Soil Terra Nova , Soil Profile Diagram, NRCD Soils of Illinois poster; NRCD bookmarks; additional soil books
4. Clue Pages
5. Discussion Questions (see intro story for ideas)

**Each Group needs:**

1. 1 envelope of clues
2. 1 table on which to spread out other clues & red herrings
3. 1 blank answer key

### **Which Resources Go with Which Clues:**

3 Digit Lock: Soil Profile picture, words cut apart: ( Topsoil, Subsoil, Parent Material ) Math value page

Directional Lock: Coordinates for directional graph (placed in small lock box)

Word Lock: Riddle Page

4 Digit Lock: UV Flashlight, Soil Terra Nova – Highlight the following numbers with invisible ink on page 2 timeline: **8** in Morrow Plot 1876; **1** in Fritz Haber 1918; **3** in Dust Bowl Begins 1931; **2** in Half people fed 2010s

**Answer Key for Locks:** 3 digit = 953 4 digit = 8132 Word = SAND Directional = down, down, right, left

### **What to Include in clue envelope:**

- What is Soil and Why is Soil Important? Reading page
- Math Value Table
- Directional Plant Graph
- Soil Ag Mag – highlight various facts
- Any other soil related papers that will serve as red herrings

### **Lay on work table:**

- Blank lock page
- Envelope of clues
- Soil Profile picture
- Riddle page
- Words (Topsoil, Subsoil, Parent material) cut apart and placed in small envelope
- Additional red herrings: soil resources/books with pages tagged or passages highlighted

### **Lay on extra table:**

- Soil Terra Nova with numbers mentioned above marked in invisible ink
- UV Flashlight
- Additional books to serve as red herrings
- Riddle page
- Additional Soil Ag Mags

### **Breaking down the clues:**

#### **3# Lock**

- Students will need the soil profile picture, math value page and organize the words, topsoil, subsoil and parent material in order from top to bottom

#### **Directional Lock**

- Students will need directional tree graph and coordinates found in small lock box

#### **Letter Lock**

- Students will need riddle on extra table (optional clue could be answer letters scrambled)

#### **4# Lock**

- Students will need UV flashlight and invisibly highlighted Soil Terra Nova on extra table

## **What is Soil and Why is Soil Important?**

One of Earth's most important natural resources is soil. There are many different soil types. It takes, on average 500 years to form one inch of topsoil. Although soil takes a long time to form, it can be destroyed very easily. Most life on Earth depends upon the soil for food. Plants are rooted in the soil and get nutrients (nourishing substances) from it. Animals also get nutrients from eating the plants that grow in the soil. Soil is home to many organisms such as seeds, spores, insects, and worms. We build sidewalks, roadways, and homes on the soil. Soils also help filter out pollutants that could contaminate our drinking water. Everyone must take an active role in improving and preserving our Earth's soil.

<b><i>Soil Horizons or Layers</i></b>	<b>Corresponding Math Equation</b>
<i>O</i> <i>Organic Layer</i>	$27 - 19 =$
<i>A</i> <i>Topsoil</i>	$71 - 62 =$
<i>E</i> <i>Eluriated Horizon</i>	$83 - 9 =$
<i>B</i> <i>Subsoil</i>	$36 - 31 =$
<i>C</i> <i>Parent Material</i>	$35 - 32 =$
<i>R</i> <i>Bedrock</i>	$55 - 46 =$

**Topsoil**

**Subsoil**

**Parent Material**

I'm found in a box  
I'm found by the sea  
I'm found in the soil  
As one of three.

What am I?

— — — —

## Discussion Questions

1. Do you think Likable Louie prepared the ground before planting in the best way i.e. weed spraying, tilling, and fertilizer?
2. How could Likable Louie protect the ground while the grass gets started growing?
3. What other plants could Likeable Louie have chosen besides grass?



Optional clue help: Cut apart letters as clue to be unscrambled; Print each word on different color of paper

<b>S</b>	<b>A</b>	<b>N</b>	<b>D</b>
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<b>S</b>	<b>I</b>	<b>L</b>	<b>T</b>
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<b>C</b>	<b>L</b>	<b>A</b>	<b>Y</b>
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# Soil Profile



**O (humus or organic)**  
**A (topsoil)**

**E (eluviated horizon)**

**B (subsoil)**

**C (parent material)**

**R (bedrock)**

**O HORIZON**  
Surface litter:  
Partially decomposed  
organic matter

**A HORIZON**  
Topsoil: Humus, living  
creatures, inorganic  
minerals


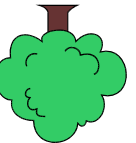
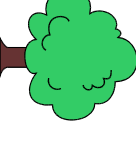
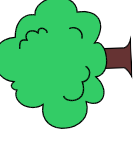
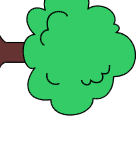
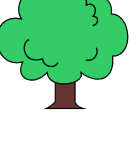







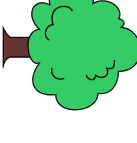
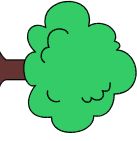



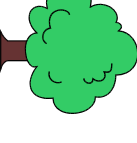
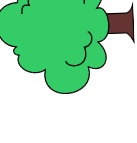

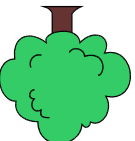


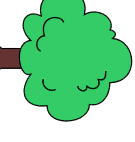






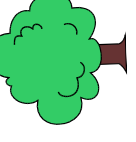



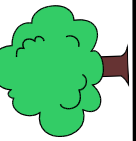

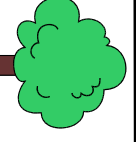

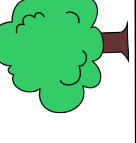

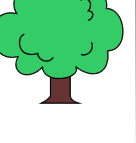
**E HORIZON**  
Zone of leaching, mate-  
rials move downward

**B HORIZON**  
Subsoil: iron, aluminium  
humic compounds are  
accumulated and clay  
leached down from A  
and E horizons

**C HORIZON**  
Weathered parent  
material: Partial break-  
down of inorganic  
minerals

**R HORIZON**  
Bedrock

# Directional Tree Graph

6							
5							
4							
3							
2							
1							
	1	2	3	4	5	6	7

**(2,5) (6,2) (1,3) (7,4)**

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**(2,5) (6,2) (1,3) (7,4)**

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**(2,5) (6,2) (1,3) (7,4)**

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**(2,5) (6,2) (1,3) (7,4)**



9

5

3



DOWN

DOWN

RIGHT

LEFT

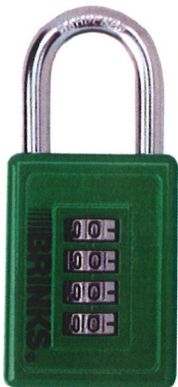


S

A

N

D



8

1

3

2



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