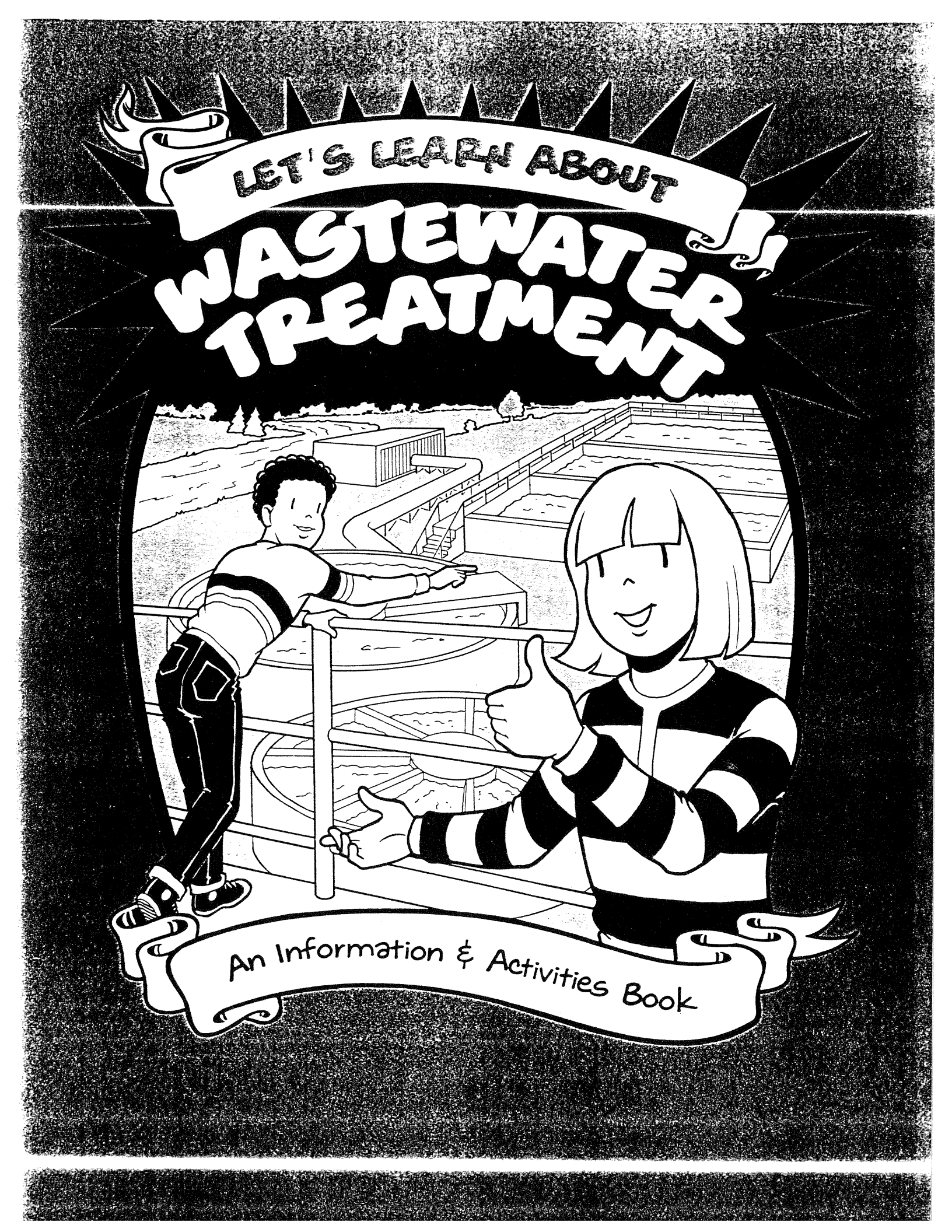

LET'S LEARN ABOUT
WASTEWATER TREATMENT
An Information & Activities Book

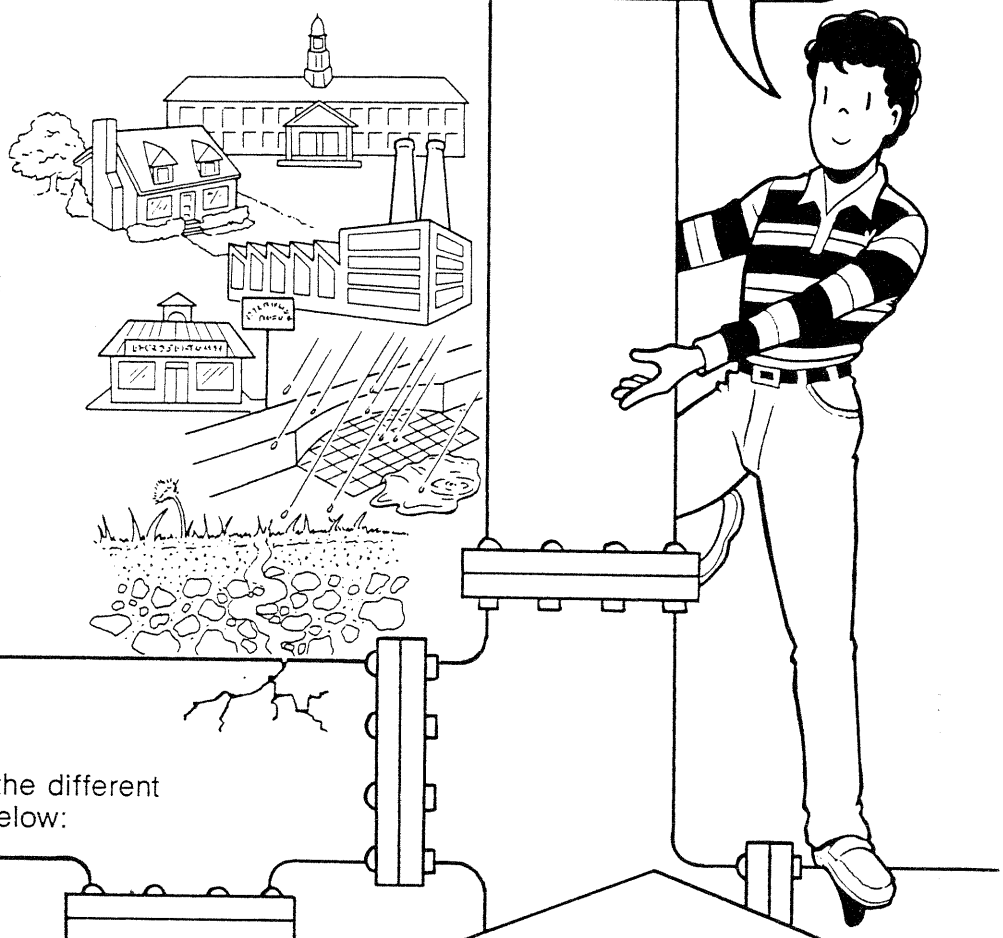
The Curiosity Kids in . . .

TREATMENT HAS ITS BENEFITS

A SCRIPTOGRAPHIC BOOKLET by CHANNING L. BETE CO., INC., South Deerfield, MA 01373 U.S.A.
© 1990 All rights reserved.
Lithographed in U.S.A. 1993 Edition 56655B-10-90
This booklet may not be reproduced in whole or in part by any means.

IN ONE PIPE AND OUT ANOTHER

WATER -- we use 50 to 100 gallons per person per day! And, all of the clean water that comes in one pipe goes out another -- as wastewater.



Wastewater comes from:

HOMES AND SCHOOLS
It includes water and wastes that go down sinks, shower drains and toilets.

INDUSTRY AND BUSINESSES
Factories, shopping centers, airports, restaurants, etc., all use water that must be cleaned.

STORM RUNOFF
Water that collects in street drains during a storm is also wastewater.

GROUNDWATER
Water beneath the earth's surface may seep through cracks and joints in sewer pipes. It then travels with other wastewater to the treatment plant.

SEWER SYSTEMS GIVE WASTEWATER A "RIDE"

to the treatment plant. To find out what the different systems are called, decode the words below:

1. PBLSABHG

_ _ _ _ _ _ _ _

sewers carry wastewater from homes, factories and other buildings.

2. PARHC

_ _ _ _ _

sewers carry storm runoff.

3. KRCFSLMT

_ _ _ _ _ _ _ _

sewers carry both storm runoff and wastewater from buildings.

CODE

A	=	T
B	=	A
C	=	M
F	=	B
G	=	Y
H	=	R
K	=	C
L	=	N
M	=	E
P	=	S
R	=	O
S	=	I
T	=	D

SOME HOMES USE SEPTIC SYSTEMS,
instead of public sewer systems:

- Wastewater goes to a large, underground tank.
- Solid matter in the wastewater settles to the bottom where bacteria (tiny one-celled organisms) help most of it decompose (break down) into a gas and a substance called "humus." (The humus is periodically pumped out and taken to a sewage treatment plant.)
- Water passes out of the tank and into the soil, where other bacteria help clean the water.

AT THE TREATMENT PLANT

When wastewater arrives at the treatment plant, the cleanup action begins.

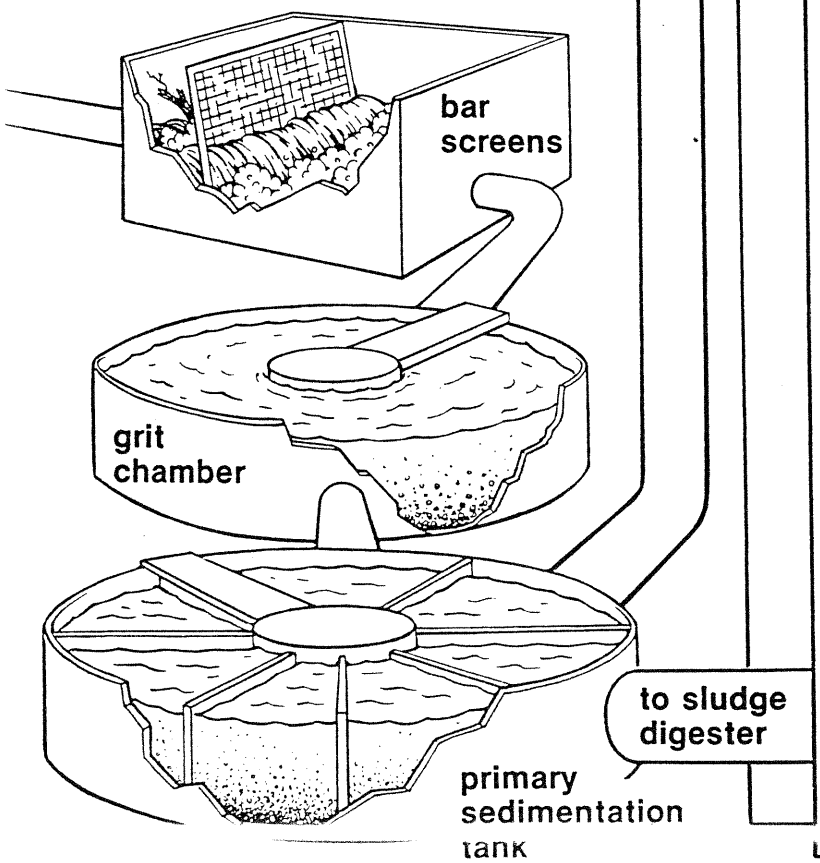
To find out what happens, fill in the blanks on these 2 pages with words from the list below.

grounds	crops	grow
plastic	bottom	tank
chlorine	skimmed	sink
decompose		

PRIMARY TREATMENT

helps remove solids in wastewater. Here's how it works:

1. Bar screens catch rags, sticks, _ _ _ _ _ _ _ _ containers and other objects floating in the wastewater.
2. In the grit chamber, heavy particles, such as small stones and coffee _ _ _ _ _ _ _ _, settle to the bottom and are removed.
3. In the primary sedimentation (or "settling") tank, lighter solids are given time to _ _ _ _ to the bottom. These solids, called "primary sludge," are sucked out the bottom of the _ _ _ _ _. They're sent to a sludge digester for further treatment. Any oil and other scum that has been _ _ _ _ _ _ _ _ off the top of the wastewater may be sent to the digester, incinerated (burned) or buried in an approved landfill.



MATH FUN!

Use your math skills to solve these 2 problems. Then use your answers to fill in the blanks in the sentence at the bottom of the page.

A. If you wash your hands with the tap running, you use about 2 gallons of water. If you wash your hands twice a day for 10 days, how much water will you use?

B. Tracey took a bath 5 times this week and used about 35 gallons each time. Cindy took a 5-minute shower 5 times this week, using a low-flow showerhead. Cindy used about 25 gallons per shower. How much water did Cindy save by taking showers instead of baths?

Primary treatment removes

_____ (answer to "A") **to** _____ (answer to "B") **%**

of the solids in wastewater.

SECONDARY TREATMENT

uses bacteria to clean wastewater even more. At the end of secondary treatment, 85 to 90% (or more) of the pollutants have been removed!

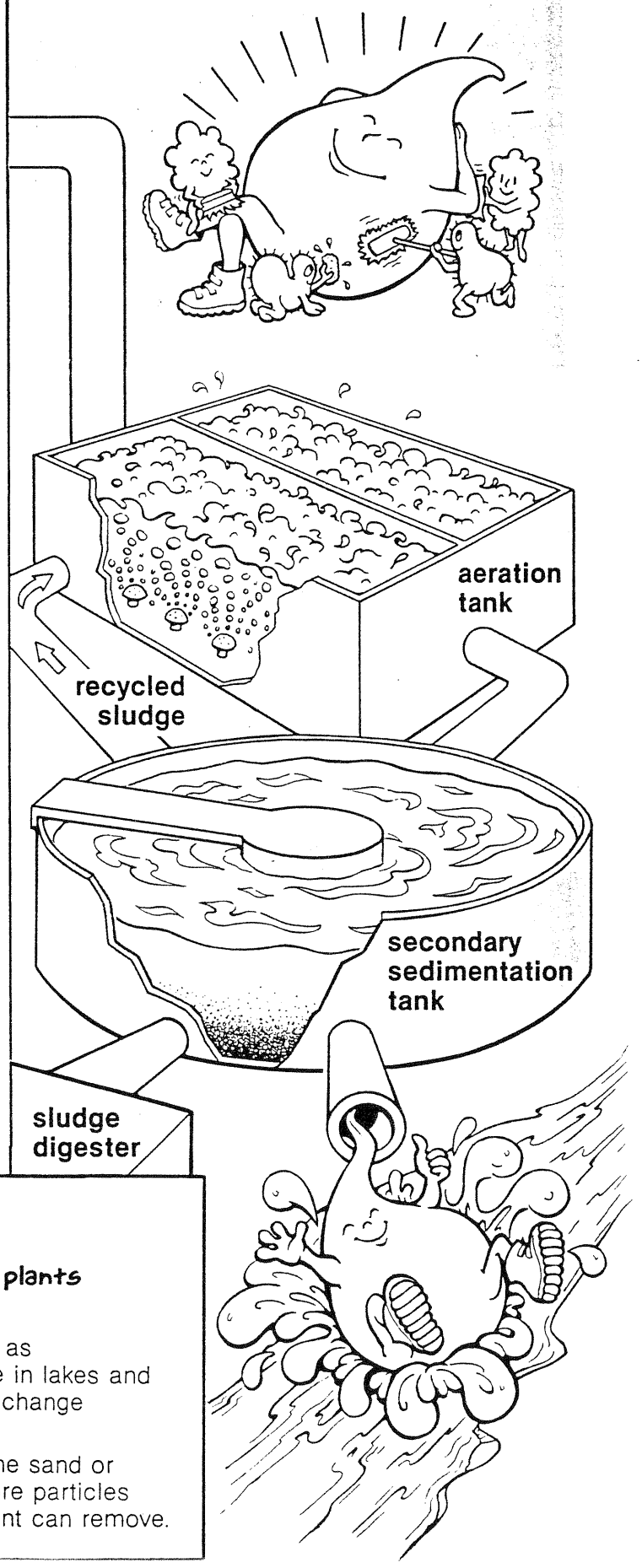
MANY TREATMENT PLANTS USE THE "ACTIVATED SLUDGE" PROCESS

for secondary treatment. Here's how it works:

4. In the aeration tank, air is added to a mixture of wastewater and bacteria. The air helps the bacteria _ _ _ _. The bacteria help _ _ _ _ _ _ _ _ _ _ the wastes in the water.
5. In the secondary sedimentation tank, the wastes and bacteria sink to the _ _ _ _ _ _. Some of this sludge (now called "activated sludge") is sent to the sludge digester for treatment. The rest is reused in the aeration tank.
6. _ _ _ _ _ _ _ _ may be added to the water to help kill any harmful organisms that are left.
7. The water is released into streams, rivers, etc., or used to water _ _ _ _ _.

SOME COMMUNITIES USE TRICKLING FILTERS

for secondary treatment. Wastewater is sprayed over a bed of crushed rock or gravel. Bacteria on the rock or gravel change the wastes in the water into less harmful substances. The water then goes to a sedimentation tank, where solids settle and are pumped to a sludge digester.

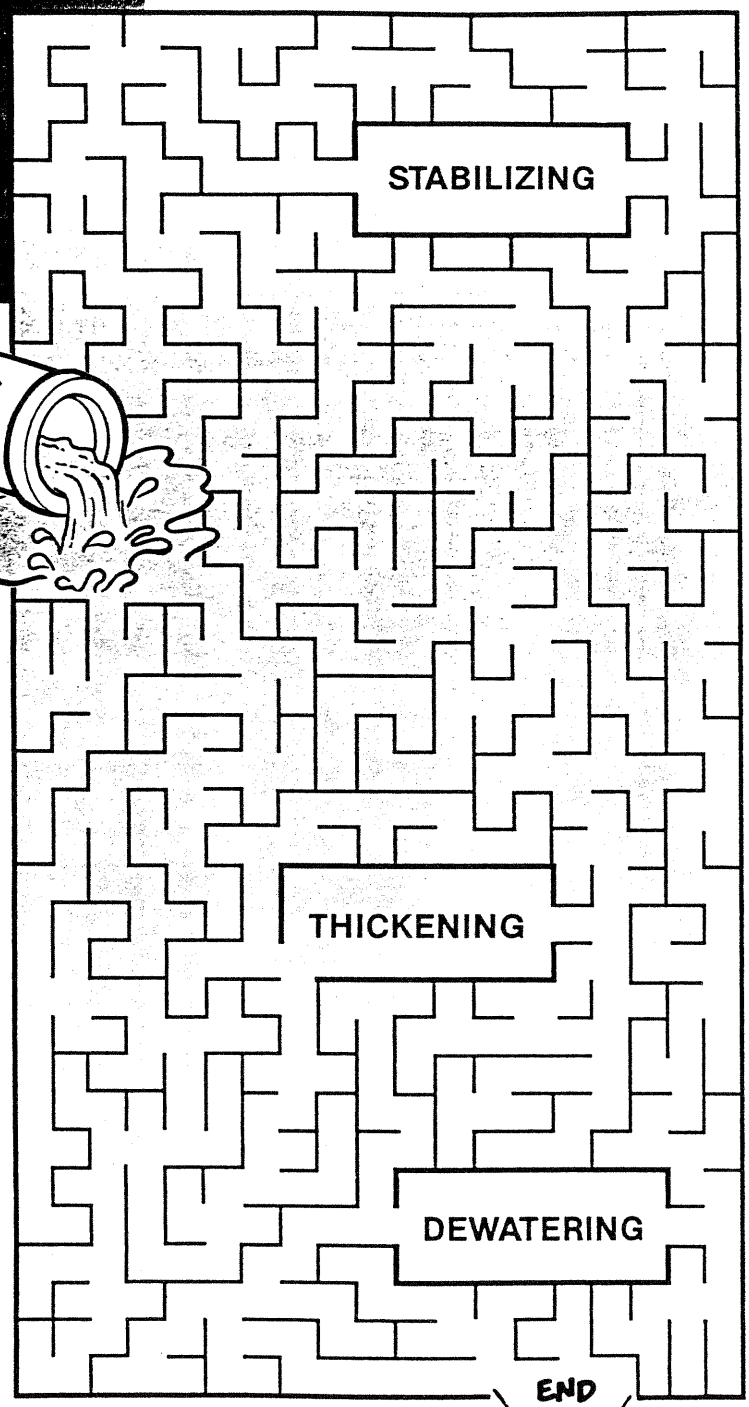


ADVANCED TREATMENT METHODS MAY ALSO BE NEEDED

For example, after secondary treatment, some plants also remove:

- NUTRIENTS – large amounts of some nutrients (such as phosphorus and nitrogen) can harm fish and other life in lakes and streams. Special methods may be used to remove or change nutrients into less harmful substances.
- SUSPENDED SOLIDS – filtering materials, such as fine sand or coal, may be used when it's necessary to remove more particles from wastewater than primary and secondary treatment can remove.

SLUDGE NEEDS SPECIAL TREATMENT.



Before sludge is used or disposed of, it goes through several treatment steps.

Complete the maze to discover the order in which these steps often occur. Write the name of the step in the blank, then read the description that goes with it.

1. _____

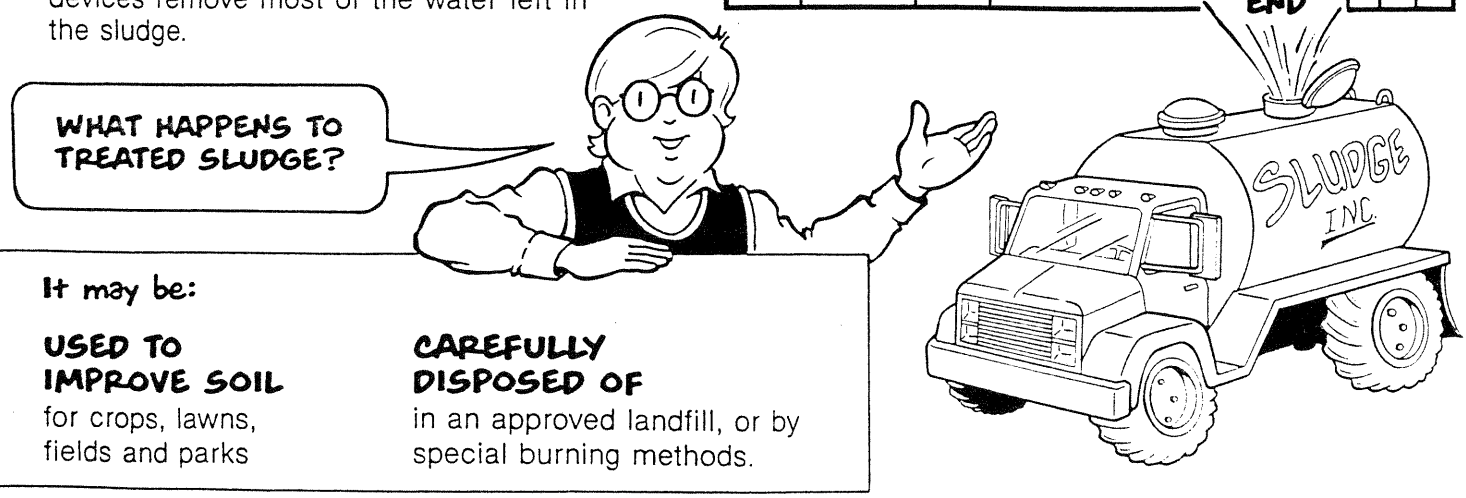
Raw sludge contains a lot of water. Some of the water is removed from the sludge by using heat, gravity, flotation or other methods.

2. _____

In a special digester tank, sludge decomposes into substances that can be used safely. (One of these substances is a gas called "methane," which can be burned to supply energy.) Lime or certain chemicals may be added to the sludge. Unlike raw sludge, stabilized sludge has no bad odor.

3. _____

Filters, drying beds, presses and other devices remove most of the water left in the sludge.



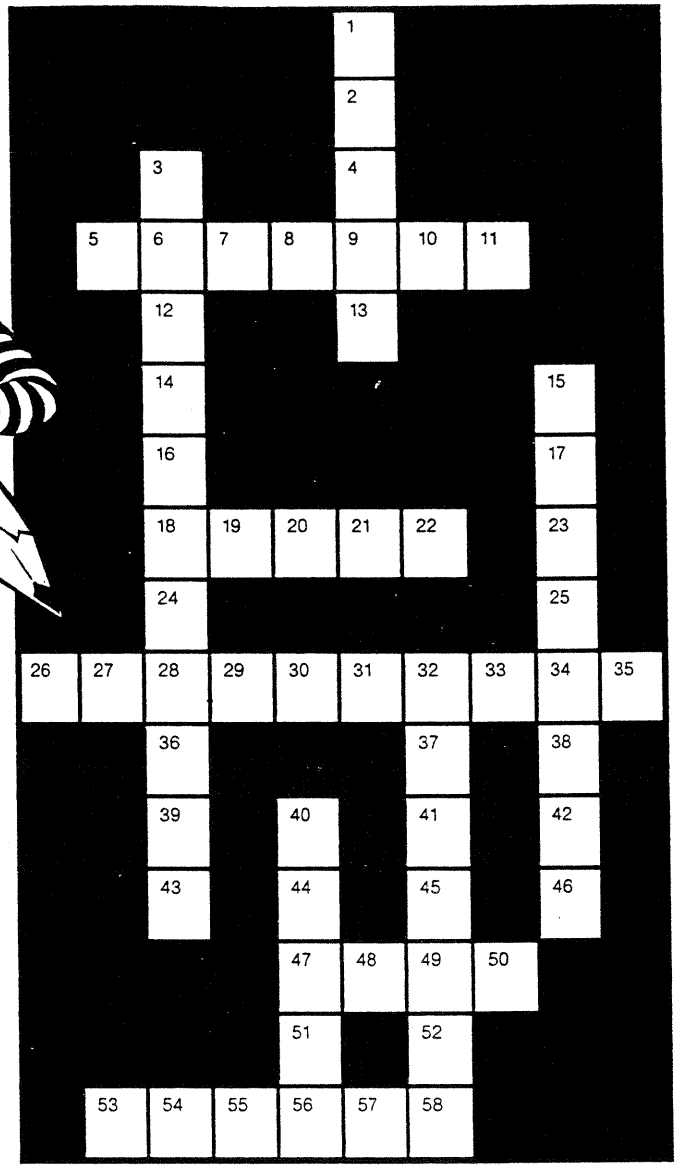
It may be:

USED TO IMPROVE SOIL
for crops, lawns, fields and parks

CAREFULLY DISPOSED OF
in an approved landfill, or by special burning methods.

CLEAN WATER DEPENDS ON YOU, TOO!

- ✓ **USE WATER WISELY.** The less you use, the less that needs to be cleaned.
- ✓ **DISPOSE OF HOUSEHOLD CHEMICALS SAFELY.** This can make treatment easier.



CROSSWORD PUZZLE

Learn about some specific things you can do. Finish the sentences by choosing the correct words from the list. Then fit the words into the crossword puzzle.

showers	**area**	**driveway**
faucets	**water**	**paints**
broom	**drain**	**dishwasher**
		wastebasket

ACROSS

5. Ask parents to check _____ and toilets for leaks.

18. Clean the driveway with a _____ – not a hose.

26. Make sure the _____ is full before running it.

47. Find out if there's a hazardous waste collection site in your _____.

53. Follow directions on container labels for safe disposal of household cleaning products and _____.

DOWN

1. Keep a container of water in the refrigerator so you don't have to run _____ every time you want a drink.

3. Don't use the toilet as a _____.

15. Water the lawn – not the sidewalk, _____ or street.

32. Take short _____.

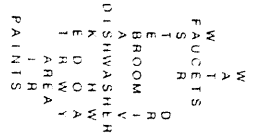
40. Don't pour oil or other hazardous substances down the _____ or onto the ground.

A SPECIAL MESSAGE

After you complete the crossword puzzle, find the box that has the same number as the one below each blank. Fill in the blank with the letter from the box.

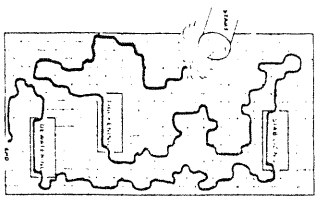
___	___	___	___	___		___	___	___	,
3	2	28	43	49		56	41	14	
___	___	___	___		___	___	___	.	
1	42	56	10		56	20	57		

ANSWERS



Page 7

Waste not,
want not!



Page 6

Pages 4-5
1. plastic 2. grounds 3. sink, tank, skimmed 4. grow, decompose 5. bottom 6. chlorine 7. crops

Page 6
1. Thickening 2. Stabilizing 3. Dewatering

Page 4
Math Fun
A. 40 B. 50

Page 3
1. Sanitary 2. Storm 3. Combined

Soo--

WASTEWATER TREATMENT IS A KEY TO CLEAN WATER.

ENJOY ALL THAT CLEAN WATER HAS TO OFFER!