

welcome, maker!

what's in this booklet?

In this crate, you'll mix up a crystal-making solution to create a colorful *chemis-tree* and garden!



what you get in this crate

We've included **everything you need** to make a crystal-growing garden.



garden set



beaker



gloves



bluing



3% ammonia



salt



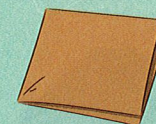
pipette



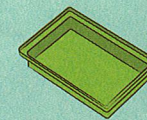
liquid watercolors



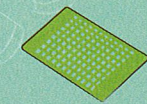
stir stick



mess mat



tray



garden base



grass mat

from home you'll need:



scissors



scrap paper



cup of water

crystal-clear science

This project was inspired by the chemistry of crystals and how they appear in nature!

What do salt, snow, and sapphires all have in common? They're all made of **crystals**.

A crystal is a special sort of solid that's made up of flat sides — shaped like squares, triangles, hexagons, and more — all arranged into patterns!

If you looked up close at a crystal with a microscope, you'd see that the little parts that make it up (called **molecules**) all fit together in an even pattern. That's what gives crystals their fun and funky shapes.



DID YOU KNOW?

Gemstones — like diamonds, sapphires, emeralds, and amethysts — are crystals that form deep within the earth.

Where can you see crystals in nature?



You have crystals in your kitchen! Sugar and salt are made of tiny cube-shaped crystals.



Snowflakes form when ice crystals stick together and fall! No two snowflakes are the same, but almost all have six sides.



Even the thin, wispy clouds you see on a cold day — called cirrus clouds — are made up of ice crystals, floating in the air!

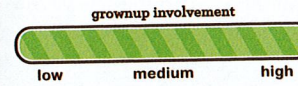
Ready to add your own crystal garden to the mix? Put your eyes on the prize, and get ready to crystallize! ↪

CRYSTAL CHEMISTRY GARDEN

Make a garden that grows colorful crystals overnight!

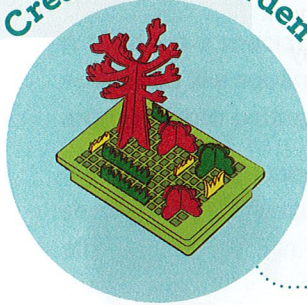


messiness



grownup involvement

PART A: Create your garden



you'll use:



garden set



gloves



liquid watercolors



mess mat



tray



garden base

from home
you'll need:



scrap paper



scissors



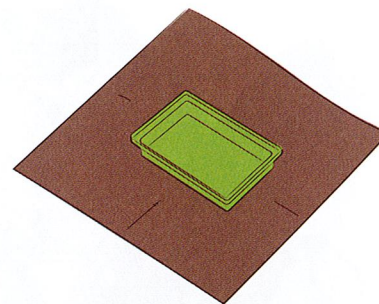
science can get messy!

Cover your workspace. This project uses dye that may stain some surfaces.

STEP 1

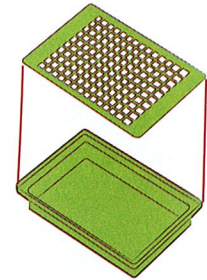
Cover your workspace with **scrap paper** from home, and spread out the **mess mat** on top.

Place the **tray** on the mess mat.



STEP 2

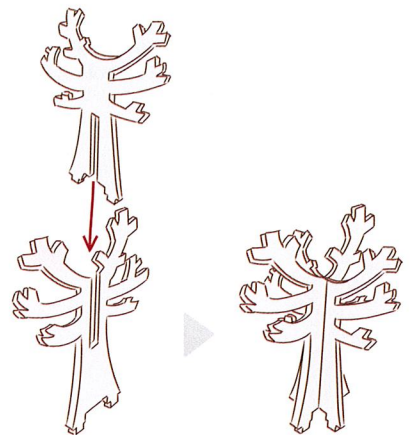
Set the **garden base** into the tray.



STEP 3

Slot the **tree pieces** together ...

tree pieces



then slot the **bushes** together ...

bushes

Make sure all the tabs are pointing the same way.



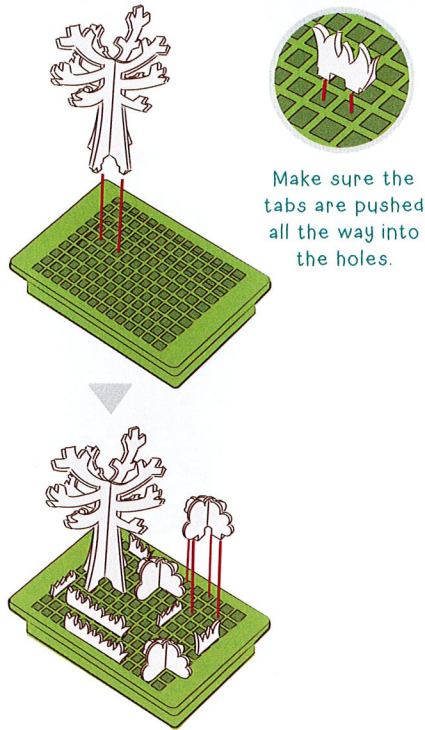
and the **grass** is ready to go!

grass



STEP 4

Build the garden by pushing the tabs on the plants into the holes in the base. Arrange your plants however you'd like!



STEP 5

Check your garden to make sure that each plant has some space around it and that you're happy with how the plants are arranged.

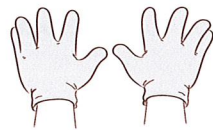
After this point, you can't go back and change the garden.



STEP 6

Put on the **gloves**.

It's time to color your garden!



STEP 7

Ask a grownup assistant to cut the tips off the **liquid watercolor** bottles with **scissors**.



STEP 8

Carefully squeeze liquid watercolor onto the edges of the plants. Make sure each plant is completely colored.



creative coloring

You can color your garden however you'd like!
Here are some ideas to get you started:

Make the whole plant green or red or yellow to grow crystals in those colors.



Mix yellow and red to grow orange crystals.



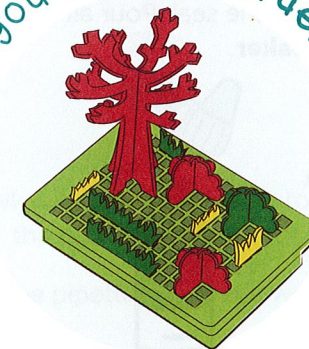
Mix yellow and green to grow bright green crystals.



Careful! **Don't mix red and green** or your crystals will come out a muddy brown.



You made a garden!



PART B:
Time for chemistry



- you'll use:
- bluing
 - 3% ammonia
 - salt
 - grass mat
- from home you'll need:
- colored garden
 - beaker
 - pipette
 - stir stick
 - cup of water

STOP Things to remember

- Keep chemicals out of your eyes.**
If exposed, remove contact lenses (if you wear any) and rinse eyes immediately. Put your face in a large bowl of water and open your eyes wide. Then sit up, blink to flush out the water, and repeat.
- Never put chemicals in or near your mouth.**
If in doubt, contact a poison control center.
- Always wash your hands after handling chemicals.**
Wash with soap and plenty of warm, running water.

STEP 1
With your gloves still on, twist the cap off the **bluing** bottle and remove the seal. Pour all of the bluing into the **beaker**.

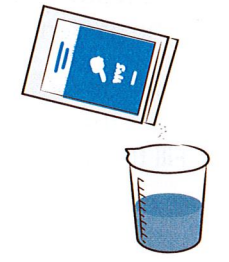
Bluing is a blue iron-salt solution. It's used with laundry detergent to make white fabric look whiter.



STEP 2
Ask a grownup assistant to help twist the cap off the **ammonia** bottle. Then pour all of the ammonia solution into the beaker.



STEP 3
Tear open the **salt** bag and pour all of the salt into the beaker.



STEP 4
Use the **stir stick** to mix up the solution until most of the salt disappears.



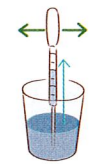
STEP 5
Find the **pipette**.

Time to practice! Before you add the crystal-making solution to the garden, let's practice pipetting with a **cup of water**.



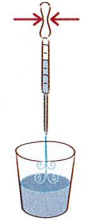
1

Squeeze the bulb and put the tip in the water.



2

Slowly unsqueeze the bulb to fill the pipette with water.



3

Squeeze the bulb again to release the water.

Pull the pipette out of the water.

Practice a few more times until you get the hang of it!

STEP 6

Now you're ready to make crystals grow on the garden!

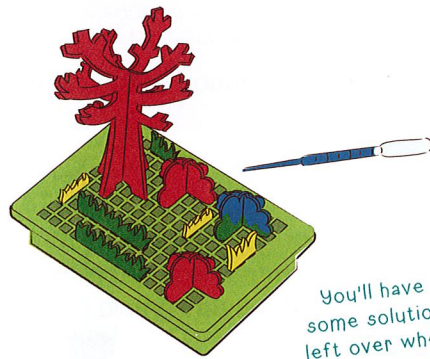
Stick the pipette into the solution so it touches the bottom of the beaker. Fill the pipette.



Make sure the pipette touches the bottom of the beaker so you can pick up some salt crystals.

STEP 7

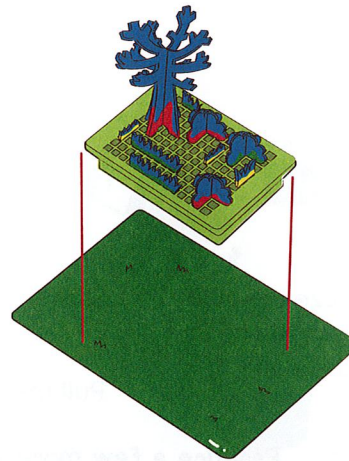
Carefully squeeze the solution onto the edges of each plant. The solution will soak into the felt and turn it blue. Keep going until every plant is completely blue.



STEP 8

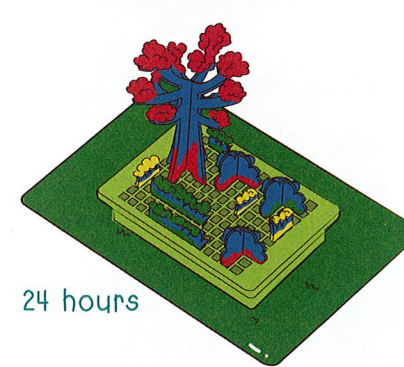
Set the **grass mat** indoors in a place it won't be disturbed. Ask a grownup assistant to slowly and steadily move your garden onto the grass mat. Be careful to not tip the tray!

Pick a place where your garden can be seen but won't be disturbed.

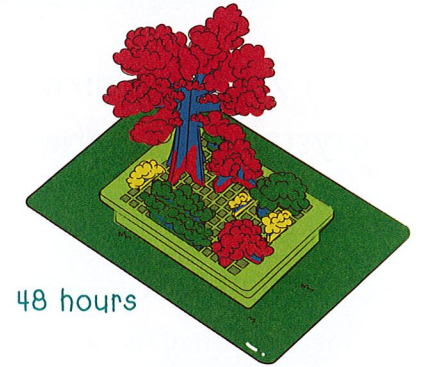


STEP 9

Leave the garden overnight and check back as crystals start to grow! They'll appear on the tree first.



24 hours

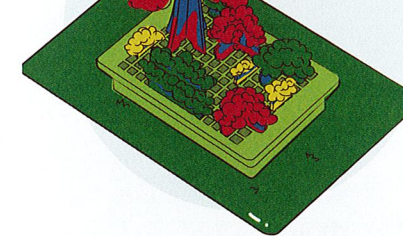


48 hours

Keep the garden indoors at room temperature or warmer. The crystals will continue growing over the next few days.

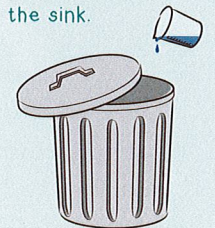
If you want to move your garden, ask a grownup assistant for help. Don't shake or jostle the garden.

You made a crystal chemistry garden!



clean up

There should be some solution left in the beaker. Dump the leftover solution in the trash. Then rinse out the beaker in the sink.



a close-up on chemicals

How did your tree grow so many colorful, little crystals overnight? **It's chemistry!**

Problem? Solution!

When you mixed salt, ammonia, and bluing, the salt looked like it disappeared — but it didn't! It actually created a crystal-making **solution**. The salt's still in there, hiding!

solution = a liquid mixture that's the same throughout

Soak It Up!

When you added color to your garden, the liquid **soaked into** the felt pieces. The felt is full of tiny holes and pockets that are too small to see, but they're big enough to hold liquid. Then when you squeezed solution on the garden, that soaked into the felt too!

Let It Grow!

What do wet things do over time? They dry up! Overnight, the liquid your garden soaked up started to **evaporate**, or turn into gas. But the salt couldn't turn into a gas, so it stayed behind — as dry crystals! As the salt crystals grew, they picked up the dye to create a colorful garden!

The ammonia helped it evaporate faster.

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