

Problem Solvers Activity SE 20: Let's Make Paper

CHILDREN ARE LEARNING...¹

Science Content:

- How paper is made
- Materials can be recycled or reused to help the environment (specifically: how new paper can be made from old/used paper)
- The benefits of recycling paper

CHILDREN ARE DOING...

Science Practices:

- Make observations
- Explore cause and effect
- Ask questions
- Plan and carry out investigations

NOTE TO TEACHERS:

Young children can develop misconceptions (things they misunderstand) about science. You can use this activity to correct some common misconceptions children may have about recycling.

Misconception 1: Used paper is always trash. The truth is that most paper can be recycled—or turned into something new and useful.

Misconception 2: Recycling and reuse are for adults, not children. There are ways that everyone in a community can participate in recycling and reusing items, no matter how old they are.

TIMING NOTE:

This is a multi-day activity.

Day 1 involves preparing the paper for reuse.

Day 2 involves making the recycled paper.

Days 3-5 involve checking the recycled paper to see if it is dry yet.

MATERIALS NEEDED:

This activity requires some fairly intense preparation, especially to gather the paper scraps needed to make paper. The paper scraps will shrink when wet so you will need about 4-5 large adult handfuls of paper scraps per pair of children.

Paper scraps/paper from your program's recycling bin (note: printer/multi-purpose paper or newspaper will work best. Avoid paper scraps with a shiny or slick surface).

Large plastic bowl

Water

2 child-sized water pitchers

1 adult-sized pitcher

¹ Adapted from the Next Generation Science Standards (kindergarten): <https://www.nextgenscience.org/>

Child-safe scissors, 1 per child

Sturdy plastic colander/strainer (like the ones used for pasta) OR a window screen (search “adjustable window screens”, approximately 15”x21”; see <https://amzn.to/3uyfrfp> for similar item)

Baking sheet with a rim

Large spoons (for scooping paper pulp), 1 per child

Rubber spatula

Ruler

Tray

Several heavy books

Optional: Cooling rack (like those used in baking)—using a rack helps the paper dry more quickly

PREPARATION:

DAY ONE:

- **For the ENGAGE activity:** Have the paper scraps ready to show children.
- **For the EXPAND activity:** Have the scissors ready for children to snip the paper into small pieces. Keep the plastic bowl and spatula aside, out of children’s reach, until needed.
- Fill the two child-sized water pitchers and place to the side until needed. Fill an adult-sized pitcher to refill as needed.

DAY TWO:

- **For the EXPLORE activity:** Have strainer (or screen, if using), baking sheet, and ruler ready. The tray, books, and cooling rack (if using) will also be used at this time.

Activity Instructions

ENGAGE

Gather a group of 3 to 4 children at a table or in a circle on the floor. Invite the children to explore the various scraps of paper you have gathered. If your classroom has a recycling bin for paper, invite children to take paper from there as well.

ASK: Have you ever heard the word recycle? What does that mean? What questions do you have about recycling?

Facilitate a short discussion with children about their experiences with recycling and reuse.

EXPLAIN: Recycling is when we turn old things—or even things that look like garbage—into something new. Today we are going to recycle paper to make *new* paper.

ASK: What do you think paper is made of?

EXPLAIN: Paper is made from wood. Where does wood come from? Trees! It takes a very long time for trees to grow. To make the paper, trees need to be cut down. So if we recycle and reuse paper, trees don’t need to be cut down to make new paper.

TRANSITION: Sometimes people think that paper we don’t need is trash. But today we have a fun job, Problem Solvers! We are going to use these paper scraps to make new paper! We will **recycle** the paper.

EXPAND

INTRODUCE: When things get recycled, they often have to be changed a bit so they can be used again. The first step to recycling paper is to turn these BIG pieces of paper into very small, teeny tiny pieces of paper. What can we do to get these big pieces into smaller pieces?

Distribute the child-safe scissors. Demonstrate how to snip paper if this is a new skill for children.

Supervise carefully as children explore/practice with the scissors.

TRY IT: Encourage children to tear or cut the paper as small as they can. You will need about 4-5 large handfuls of paper scraps per pair of children. Demonstrate the size needed—small about the size of a dime work best. Children may need assistance with this task, since ripping or cutting this small requires strong hand and finger muscles. (Note: It is a great fine motor skill exercise!)

ASK: How do you feel about being able to recycle this paper? What do you think about recycling? Is it a good idea or a bad idea? What kinds of things will you make/draw once we make our new paper?

ASK: *When children are done tearing the paper:* What do you think the next step is for making paper? What do you think we need to do in order to turn these little pieces into a brand-new piece of paper? *Take children's ideas.*

EXPLAIN: Next, we are going to put these paper scraps into this bowl (*show children*) and then pour water on top. What do you think will happen to the paper? (It will get all wet. It will look like paper soup!)

TRY IT: Let the children help you put all the paper scraps in the bowl. Invite the children to take turns pouring water on the scraps and stirring with the spatula to make sure all of the scraps are soaking wet. Refill the child-sized pitchers so children can continue to pour water until the paper scraps are covered in water.

EXPLAIN: Now that our scraps are torn and soaking in water, we need to leave them in the bowl overnight because we want them to be very, very wet. What do you think the paper will look like after being in the water overnight? (*Take children's ideas. Encourage the children to help you find a safe place to place the bowl overnight.*)

QUICKER OPTION

If desired: Teachers can prepare most of the paper scraps ahead of time (cutting, ripping or using a paper shredder/cutter). Children should still participate in shredding, but this option takes less time as children don't have to rip the entire quantity of paper needed.

EXPLORE

SHOW: Begin the Day 2 portion of this activity by showing children the bowl of wet paper scraps.

REVIEW: Review with children what happened on Day 1, using questions like the ones below:

- Can anyone tell me what we started making yesterday in this bowl?
- What did we do yesterday to start recycling paper?
- Do the paper scraps look different today? What makes them look different? How are they different?

EXPLAIN: Our wet paper scraps are now called **paper pulp**. Pulp is soft and wet, and feels a little bit like glue or paste. (*Let children touch the pulp if they wish.*)

EXPLAIN: Now, we're going to take this paper pulp and use it to make a new piece of paper! We need a special tool to help us.

If you are using a colander: The tool we're going to use is called a colander. Let's look at it. What do you see? Have you ever seen one of these before? (*Point out all the holes, if children don't notice them.*) What do you think will happen when we put the water and wet paper into the colander? (*The water in the paper scraps will drip through the holes.*)

If you are using a window screen: The tool we're going to use is called a **screen**. (Show children the screen.) What do you notice about the screen? (Observe that there are tiny holes in the screen.) What do you think will happen when we put the wet paper scraps on the screen? (The water in the paper scraps will drip through the holes.)

NOTE: Place the colander/screen over a sink, if possible to do so and still manage child participation. You can also place the colander/screen on the rimmed baking sheet (to catch the water that drains from the holes). If weather allows, you can do this part of the activity outdoors to reduce the risk of water spilling inside. **Press as much water as possible out of the paper scraps as you can. The wetter the pulp is, the longer it will take to dry.**

TRY IT: Show children how they can use their hands to push down and squeeze the paper scraps so the water drains, and the scraps are not as wet. (Some children will not want to get messy and that is okay. Observing peers is also a valuable experience.)

ASK: What does the pulp feel like to you? Do you like the texture of the pulp or not?

When the paper scraps have had as much water as possible pressed out of them:

If using a colander: Give each child a spoon. Demonstrate how to scoop the wet paper scraps to the cooling rack. (Place the rack on top of the rimmed baking sheet to catch any last drips of water.) Model and describe how you are moving your hand *slowly* and *carefully*. Show the children how to help you flatten the scraps out on the rack to form a rectangle which, when dried, will be a piece of paper.

If using a screen: Pour off any water from the rimmed baking sheet. Replace the screen on the baking sheet. Encourage children to help you spread the pulp over the screen in a flat layer.

EXPLAIN: We have another tool to help us now. It's called a **ruler**. We can use a ruler to tell us how long something is. But today we're going to use our ruler in another way. We're going to use the ruler to help us smooth out our pulp, like this. (Gently slide the ruler across the top of the paper pulp to make an even surface of about $\frac{1}{4}$ inch in thickness. You should not be able to see through the pulp.)

TRY IT: Give children a turn using the ruler if they wish. Using a ruler or rubber spatula, encourage the children to carefully spread the pulp into an even layer (about $\frac{1}{4}$ of an inch in thickness).

TEACHERS ONLY: Show children how you place a flat heavy item (like a tray with several large books) over the pulp mixture and press down to remove any remaining excess water. Ask children to describe what happens when you press down on the paper with something heavy. Remove the tray. Place the recycled paper on a shelf to dry. Let it dry for several days until the paper is no longer damp and feels firm to the touch.

Over the Next Several Days:

OBSERVE: As the paper begins drying, prompt children to observe how it changes. Is the paper changing as it dries (in color, texture, etc.)? What does the paper feel like as it dries when they touch with their finger?

- **For children aged 2 ½ to 3:** Look at the paper drying on the screen each day. Making this a routine will help them to remember the activity, notice and track changes to the paper. Ask questions like: *Do you want to gently touch the paper? What does it feel like on your fingers – cold, wet, hard soft?*
- **For children aged 3-5:** Make daily observations to notice and track changes to the paper. Ask children questions like: "Do you think it will be dry today, or just a little dry? What do you think it will feel like?" You can also ask "what-if" questions, like: "What might happen if we took the paper outside to dry in the sun?" Questions like these prompt children to use their knowledge and experience to make predictions.

QUICKER OPTION

You can have children press the paper pulp up the sides of the colander and leave the pulp in the colander to dry. This will eliminate the step of transferring pulp to the rack. NOTE: This quicker option will produce a paper bowl, rather than a piece of paper.

You can document children's predictions and observations on a piece of chart paper that you hang near the drying paper. As children describe what they see and how the paper feels as it dries, write their words down on the chart paper. You (or one of the children) can also take photos of the paper during each step as a documentation as well.

You can also ask children what ideas they have to speed the drying process. For example, could you put the paper outside on a sunny day to dry? Could you put a fan or blow dryer on it? Try to test children's ideas, if possible.

ASK: Once the paper is dry, encourage the class to think about how they want to use it. You can ask questions like the ones below:

- What can we do with this paper?
- Should we cut it so everyone has a little piece or leave it whole?
- Would you like to paint or use markers on this paper? What could we make with it?

REFLECT

To close the activity, bring the children back together. Use a reflective question/s - like those below - to prompt children's thinking about paper recycling.

- What did we discover about recycling this week?
- What did we do to make paper?
- What was the hardest part of recycling paper?
- What is different about our recycled paper, compared to our classroom paper? (*Show children a sample of each. For example, the recycled paper may be grayer, thicker or bumpier than the classroom paper. You can explain that when machines recycle paper, it looks and feels just like the paper they use in class.*)
- What do you think is important about recycling paper?

SUMMARIZE: We helped our environment by turning paper scraps into new paper. People can help the environment by recycling things that they might usually throw out, like paper scraps. Recycling paper is helpful because we don't have to cut down trees to make new paper.

Individualizing the Activity

Make it more challenging:

- Invite children to gather paper scraps for recycling from other classrooms and/or home. Teach children the "social script" of how to ask other teachers if they have extra paper scraps and give them a chance to practice: "Hello Ms. X, do you have extra paper scraps we can use? Thank you!" Go with children to support but let them take the lead.
- Ask children to re-tell the steps of making paper during the **Reflect** portion of the activity. As they do, write down their words on a large poster-sized piece of paper. Encourage children to draw pictures that go with each step. Or, take photos of each step of the process and add these to your documentation. Hang the poster in the classroom to document their experiences. Or make a classroom book about this paper-making experience.

Make it less challenging:

- For toddlers (2 ½-3 years), this is a project with many components. Getting toddlers involved in the paper tearing and stirring the pulp will be age appropriate. You may find it easier to have them watch while you transfer the pulp to the screen to dry. Encourage them to pat the wet scraps down to make a thin, flat surface. Talk about how the wet pulp feels on their hands. *(Note that some children won't want to touch due to sensory preferences and this is okay.)*
- As this activity goes on for several days, be sure to review the goal (making recycled paper from paper scraps) and what the class is working on each day (touching the homemade paper to see if it is dry). Toddlers are still building their long-term memory and will need reviews and reminders to consolidate and understand the steps of this activity. Taking photos of each step may help children with remembering what came before.

MAKING CONNECTIONS ACROSS THE DAY:

- Create a classroom recycling center (a box or bin) for paper scraps in your classroom. Encourage them to use the paper scraps in other artworks, such as collages.
- Talk with children about what can be recycled before they throw materials into the trash.
- When outside on the playground, notice your Center or Agency's recycling bins outside. If you can watch from a safe distance, take children to see when the recycling truck comes to enter these large bins.
- When taking a community walk, notice recycling bins outside homes or businesses. Point out how the recycling bins for home use are often a different color (green or brown) than those used for garbage.
- During meal or snack times, notice the recycling symbol (the triangle made of arrows) on food items. Point this out to children and explain that it means an item can be recycled. Help children notice this symbol in other places in the community as well.
- Ask children what they could do to reuse other items, like plastic bottles.



Song: *Recycle!*

As you listen, model the actions noted in the song lyrics below. Encourage children to imitate and join in!

Refrain 1

Recycle, do it today.	(Point finger and nod to the beat)
Recycle, don't throw it away.	(Shake head "no" to the beat)
Recycle, do it today,	(Point finger and nod to the beat)
Don't throw it away, don't throw it away.	(Shake head "no" to the beat)

Verse 1

I was out playing in the yard	(Pretend to throw a ball)
Suddenly, the wind blew hard	(Wave arms side to side)
A piece of paper came my way	(Pretend to grab something)
I wondered, should I throw it away?	(Shrug shoulders, face expression as in thinking)
A little voice... in my head	(Tap finger to head on the beat)
Reminded me what my teacher said	
Instead of throwing it out...	

Refrain 2 (2 times)

Pick it up; sort it out	(Model picking up and sorting into piles)
Pick it up; sort it out	
Pick it up; sort it out	
Pick it up; sort it out / That's what recycling's all about!	(Palms up; nod head to the beat)

Verse 2

I was out walking in the park	(Model walking in place)
Sun shined, my doggie barked.	(Hands up, wiggle fingers like sunshine)
Plastic bottle on the ground	(Point to the ground)
But there was no trash can around.	(Shake head "no", sad face)
A little voice in my head	(Tap finger to head on the beat)
Reminded me what my teacher said	
Instead of throwing it out...	

Refrain 2 (2 times)

Pick it up; sort it out	(Model picking up and sorting into piles)
Pick it up; sort it out	
Pick it up; sort it out	
Pick it up; sort it out / That's what recycling's all about!	(Palms up; nod head to the beat)

Refrain 1 (2 times, fade out)

Recycle, do it today.	(Point finger and nod to the beat)
Recycle, don't throw it away.	(Shake head "no" to the beat)
Recycle, do it today,	(Point finger and nod to the beat)
Don't throw it away, don't throw it away.	(Shake head "no" to the beat)
	(Free dance as the music fades...)

Making Literacy Connections

Share the following book with children as an opportunity to deepen their understanding of recycling and reusing materials.

Suggested Book: *Snowballs* by Lois Ehlert

AS YOU READ:

- Before you start the story, explain that in this book, the children will see how they can reuse materials to make something else—like a snowman. Ask children to predict what they need to make a snowman. What could they use for eyes, nose, mouth?
- On the page that shows the “good stuff in the sack,” ask children what they observe. Talk about the different items in the picture. What do they think can be done with this stuff to make a snowman?
- When you get to the illustrations of the snow dad, snow mom, snow boy, snow girl, and snow baby, ask children to look at these pictures carefully. What materials do they see being reused to make the snow family?
- Ask children to predict what snow pets they might see next. Turn the page to observe the items that make the snow cat and (next page) snow dog named Spot. Why do children think the snow dog is named Spot? What makes its spots?
- On the page talking about the sun, ask the children to predict what happens to figures made of snow sitting in the sun.
- At the end of the book, there is a “good stuff” page showing all the different items used to make the snow family. Let children look at and discuss these items. Have they ever seen any of this stuff before? Do they have any of these items at home? What could they make with these items?

BUILD ON THE BOOK: RECYCLED ART

Materials: A collection of child-safe clean, discarded items (buttons, craft sticks, paper scraps, paper towel or toilet paper tubes, egg cartons, fabric scraps, bottle caps, lids, mesh onion bags, twisties from bread bags, etc.). **Be sure to use items that are not a choking hazard for your age group.**

1. Invite families to collect small items at home and at school that are broken or headed for the trash. If collecting from home, give families a small bag (sandwich/lunch-sized) to help them understand the size and quantity of items needed.
2. Create a **reuse area** in the art area where these materials can be stored to create artworks. Talk to children about how, like in the story, they can reuse these items to make something else—like a piece of artwork or a toy.
3. Encourage children to think about how materials could be repurposed – a bottle cap can be used as a person’s hat in a drawing or sculpture, fabric scraps can be used to decorate a card for a friend.
4. Make sure children have the other items they need (glue, masking tape) to use these items to create art.
5. Offer “Recycled Art” as a free play choice to children to build on this activity. You can create a classroom museum by hanging the art at children’s level and inviting family members or other classes to visit and see the children’s work.



Just for Families

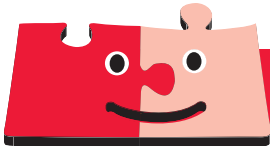
Recycle and Reuse at Home

This week, children explored how to recycle paper and we made our own paper from paper scraps!

To help your child explore how to recycle and reuse at home, here's what you can try:

- Show children how you recycle at home and let them help. Allow children to touch (child-safe) **plastic**, **glass**, and **paper** recycling. Explain how you recycle: "I am putting the plastic bottle in the blue bin. Can you help me?"
- Put aside small items at home that would normally be trash. Think about: small boxes, plastic lids, clean yogurt containers, red mesh onion bags, strawberry baskets, etc. Talk about ways to reuse these materials. Let your child explore and play with these items. Help your child use glue or masking tape to combine these materials to create recycled art.
- Watch the recycling truck with your child as it comes through your neighborhood. Watch as the truck lifts and dumps recycled materials. Explain the truck will take these materials to a recycling center. At the recycling center, different trucks will take the bottles, paper, and cans to places where they will be used to make new things!





Solo para familias

Reciclar y reutilizar en la casa

Esta semana, los niños observaron cómo se recicla el papel y cómo fabricamos nuestro propio papel con restos de papeles.

Para ayudar a su hijo a aprender a reciclar y reutilizar en la casa, esto es algo que puede hacer:

- Muéstreles a los niños cómo recicla usted en la casa y permítales que lo ayuden. Deje que los niños toquen (de forma segura para ellos) el **plástico**, el **vidrio** y el **papel** que se va a reciclar. Explique cómo recicla usted: “Voy a depositar la botella de plástico en el contenedor azul. ¿Me ayudas?”.
- Separe y reserve objetos pequeños que usualmente serían basura. Piense en: cajas pequeñas, tapas de plástico, envases de yogur limpios, bolsas de malla roja para cebollas, cestas para fresas, etc. Deje que su hijo observe estos materiales y juegue con ellos. Ayude a su hijo a utilizar pegamento o cinta adhesiva para combinar estos materiales y crear arte reciclado.
- Observe con su hijo mientras el camión de reciclaje pasa por su barrio. Observe cómo el camión levanta y se lleva los materiales para reciclar. Explíquele que el camión llevará estos materiales a un centro de reciclaje. En el centro de reciclaje, diferentes camiones llevarán las botellas, el papel y las latas a lugares donde se utilizarán para fabricar objetos nuevos.

