

## ACTIVITY 6: Dress for Success



### The properties of materials!

A material is what something is made out of. All materials have different properties that can be observed, like color, weight, and texture. The properties of materials can sometimes make those materials useful, and sometimes not.

#### TARGET AGE GROUP

5-8 Years

#### TIME

60-90 minutes

#### PREPARATION

Review the RTL Activities introduction for tips and suggestions before implementation.

## WATCH

### **“A Dry Pet is a Happy Pet”**

#### ***The Ruff Ruffman Show***

Reflect on the ideas being explored by Ruff and his friends. Here are some places you might pause:

- ☐ After Ruff and Fluff head back inside because it's raining (~00:54), ask kids to describe some of the properties of Fluff's mop costume.
- ☐ Before Ruff calls his friends to investigate (~ 1:22), ask kids what ideas they have for covering Fluff to keep him dry on his walk.

Let's investigate the different properties of materials!

## EXPLORE

**Kids will engage in the Engineering Design Process as they use common materials to dress-up a 'mini Ruff' based on different challenges and scenarios.**

### **Materials:**

- ☐ An orange, a ball or small stuffed animal– one for each child or group of children
- ☐ Various household items that kids can use to make costumes, such as:
  - Plastic bags
  - Sponge
  - Paper (toilet paper, paper towels)
  - Balloons
  - Tin foil
  - String or yard
  - Cardboard
  - Cloth or other various types of fabric (like old t-shirts)
  - Tape
  - Markers

# INSTRUCTIONS

## INTRODUCE RUFF SCENES & MAKE PREDICTIONS:

- ☐ Share with the kids that they are going to have a chance to dress up their own “mini-Ruff” by choosing one of the provided Ruff scenes or making up their own new Ruff adventure! They can work as a class, in small groups or individually—depending on your preference—and dress their Ruff accordingly.

**Scene 1 - Rainy Day:** Ruff is stuck outside in the rain! Dress Ruff in something **WATERPROOF** so he won’t get wet.

**Scene 2 - Big Spill:** Ruff spilled his smoothie and now he has to clean up a big mess! Dress Ruff in something that **SOAKS UP** liquid.

**Scene 3 - Party Time:** Ruff is having a disco dance party. Dress Ruff in something **SHINY** that the light will bounce off.

**Scene 4 - Nap Time:** Ruff wants to take a nap. Dress him in something **SOFT** so he’ll be cozy.

**Scene 5 - Create your own!:** Have the kids make up their own story about Ruff! Ask them to think about what kind of clothes Ruff would need to wear in their scenario, and what kind of materials they have available to create his costume.

- ☐ Have the kids write down their predictions.
  - ▶ *Ask: Based on your exploration of the materials, which ones do you predict will be the best ones for Ruff’s costume?*

## PLAN, CREATE & TEST

- ☐ Next, ask the kids to plan out their costume designs.
  - ▶ *Ask: Draw what you want your costume to look like. Be sure to document all the materials you’re going to use.*
- ☐ Invite the kids to dress up their mini Ruff using their chosen materials.
- ☐ Once they have finished their outfits, have them test them out.

**Scene 1 - Rainy Day:** Pour water on the costume. Observe if the water soaks through or slides off.

- ▶ Ask: *If the costume is waterproof, the water will slide off. What happened to the costume? Did the water slide off or soak in?*

**Scene 2 - Big Spill:** Pour water on the costume. Observe if the water soaks up or slides off. Ask:

- ▶ *If the water soaks into the costume, that means it will be able to soak up Ruff's mess. What happened to the costume? Did the water slide off or soak in?*

**Scene 3 - Party Time:** Shine a flashlight on the costume. Observe if the light absorbs or reflects. Ask:

- ▶ *If the light reflects off of the costume, that means it is shiny enough for the disco dance party. What happened to the costume? Did the light reflect off it?*

**Scene 4 - Nap Time:** Feel Ruff's outfit. Observe if it's soft. Ask:

- ▶ *If the costume is soft, that means Ruff will be able to take his nap. How does his costume feel? Does it feel soft? Can you think of other things that are soft (example: blanket, pillow); is this similar to how those things feel?*

**Scene 5 - Create your own!:** Create and run a test based on your original story. When you're creating your test, think about how you can test whether the material in Ruff's costume did its job. Ask:

- ▶ *What happened to the costume? Did it work or not?*

After each test, ask about what happened and have them write down their answers.

- ▶ *What happened when you tested?*
- ▶ *Was your prediction right? Why do you think those materials worked?*
- ▶ *Was your prediction wrong? Why do you think those materials didn't work?*

☐ If time allows, have the kids improve their designs based on the test results.

For detailed instructions see the 'Showtime' activity handout.

### **MORE WAYS TO PLAY:**

☐ If you have enough materials, instead of dressing up a small object or stuffed animal, challenge kids to dress each other up to address the challenges in the activity. Afterwards, host a fashion show where everyone shows off and shares their creations.

## READ

Bring the whole group together and read *Soft and Smooth, Rough and Bumpy: A Book About Touch* by Dana Meachen Rau, pausing often to ask questions and connect back to the topic of the properties of materials.

### Before reading:

Read the title, author, and illustrator, then ask the kids:

- ▶ *By looking at the cover of the book, what do you think the book is about?*

### As you read:

Pause often to discuss the texture of different types of materials kids see on each page.

### After the reading, ask:

- ▶ *What can sensors in your skin tell you about different objects?*
- ▶ *What objects are hot or cold to touch? smooth or rough to touch? prickly or soft to touch?*

## Other book suggestions:

*Beautiful Oops!* By Barney Saltzberg

*The Most Magnificent Thing* by Ashley Spires

*Rocks: Hard, Soft, Smooth, and Rough* by Natalie M. Rosinsky

*Sam Sorts* by Marthe Jocelyn

## PLAY

**Photo Stuff with Ruff** app. This app is available for free through the default app store on your smartphone or tablet. Use the app to inspire kids to discover what the 'stuff' in their world is made of.

As kids explore and take pictures using the app, ask them about why they are choosing the materials they choose. Challenge them to find additional materials that also match Ruff's prompts.

## SHARE

Send the parent letter home with children to encourage at-home conversations with families about this activity.

Hello Families:

Today your child worked with others to “Dress For Success.” Using their engineering and critical thinking skills, your child worked with others to imagine and create an appropriate outfit for Ruff Ruffman based on a challenge they were given. With the help of Ruff, from the PBS KIDS program *The Ruff Ruffman Show*, we discovered that materials have different properties that make them useful in some situations (like waterproof raincoats for when it’s raining).

To find out more about what your child learned, you can ask:

- ▶ *What challenge did you have to design an outfit for?*
- ▶ *What materials did you use to make your outfit?*
- ▶ *What happened when you tested your outfit?*
- ▶ *If you could have changed or improved anything about your outfit, what would you have improved?*

We also had the opportunity to read together *Soft and Smooth, Rough and Bumpy: A Book About Touch* by Dana Meachen Rau. Have your child tell you about the book.

Here are some related books to look for at the library:

- ◆ *Beautiful Oops!* by Barney Saltzberg
- ◆ *The Most Magnificent Thing* by Ashley Spires
- ◆ *Rocks: Hard, Soft, Smooth, and Rough* by Natalie M. Rosinsky
- ◆ *Sam Sorts* by Marthe Jocelyn

Tune into your local PBS station and visit [PBSKIDS.org](http://PBSKIDS.org) online for more opportunities to learn, watch and play together with your family. Watching videos and playing games with your child encourages social interactions, bonding and learning.

You can also access PBS KIDS content free in PBS KIDS Video app and the PBS KIDSGames app.

## Resources to Support Material Properties Activities

Get children thinking and exploring like scientists using this collection of resources about **material properties** from Ready to Learn and PBS KIDS. Providing young children the opportunity to participate in simple investigations, inspired by PBS KIDS characters they know and love, where they ask questions, make predictions, collect data, and draw conclusions is a great way to support developing science inquiry skills and practices.

These resources can be used and adapted to meet the particular needs of your learning environment and the children that you are working with. Whether you are a program director, classroom teacher, after-school and summer provider, or any other adult working with young children, these resources are for you!

Resources are grouped by activities, videos, and games (online and mobile), and include a list of books related to the topic of properties of materials. Resources can be used as-is, adapted, grouped to make a complete lesson, integrated into preexisting lessons, or used as a jumping off point for your own lesson ideas.

**Visit [klru.org/guideresources](http://klru.org/guideresources) for links to each resource**



### Videos

#### ***The Ruff Ruffman Show***

***"Make Sure it's a Hamster" (7:31 min)***

**Grade Level: K-2**

In this video Ruff has to put together a leash in order to stop an out-of-control rhinoceros from completely ruining Blossom's apartment. But what material could possibly be strong enough to hold a 5,000-pound rhino?

#### ***The Ruff Ruffman Show***

***"Plan It" (4:47 min)***

**Grade Level: K-2**

In this video Ruff must figure out how to fix Blossom's things, which were ruined by Fluff the Rhino. Luckily, two kid scientists introduce him to plarn (plastic yarn). Will this creative material be the answer to Ruff's problems?

#### ***The Ruff Ruffman Show***

***"Turn Your Rhino into a Dog" (4:08 min)***

**Grade Level: K-2**

In this video Ruff has to find the right material to transform Fluff the Rhino into Fluff the shaggy Puli Dog before Blossom comes home. Can Ruff and Chet find the right materials and create a convincing costume in time?

### ***The Ruff Ruffman Show***

**"A Dry Pet is a Happy Pet!" (5:27 min)**

**Grade Level: K-2**

In this video Ruff is on a quest to find the best material for a rhino-sized raincoat for Fluff. Can Ruff figure out how to keep the 5,000-pound rhinoceros dry?

### ***STEM from the START***

**"Sorting by Properties" (1:57 min)**

**Grade Level: preK-3**

The Quinks have brought back a number of items that all look different. Willow challenges them to identify properties of items that are the same. They identify color as a property. Flux tries to organize the items by colors, but he gets it wrong. He tries again and gets it right this time.

### ***Everyday Learning***

**"Muffin is Missing" ( 1:59 min)**

**Grade Level: preK-1**

This animation takes children on a hunt through the backyard to find Muffin, a missing cat. Students will need to use their knowledge about counting by ones and twos, sorting by color, and patterns to reunite Muffin with her owner in time for dinner.



## **Activities**

### ***The Ruff Ruffman Show***

**Showtime (Pg. 133)**

**Grade Level: K-2**

Explore wearable science and use materials found around your classroom or your house to create costumes and dress-up a mini Ruff for his next show

### ***The Ruff Ruffman Show***

**Grab it and Run (Pg. 143)**

**Grade Level: K-2**

Explore wearable science and try to make it to the finish line of this special relay race without breaking any materials



***The Ruff Ruffman Show***

**Ruff and Smooth Scavenger Hunt (Pg. 147)**

**Grade Level: K-2**

Encourage children to explore core science concepts in this activity. From a prickly pinecone to a soft sweater, everything we touch has texture. How many textures can you find inside or outside?

***The Ruff Ruffman Show***

**Teacher's Guide: Wearable Science (Pg. 149)**

**Grade Level: K-2**

Learn about wearable science and material properties alongside Ruff in this Teacher's Guide.

# showtime

## Time:

45–60 minutes

## Explore:

material properties, engineering design process (define a problem, imagine and plan, create, test, and improve)

## Materials:

Gather up a bunch of household items that kids can use to make costumes. The kids will be dressing up an orange or ball that will represent Ruff in their show.

## Here are some suggestions:

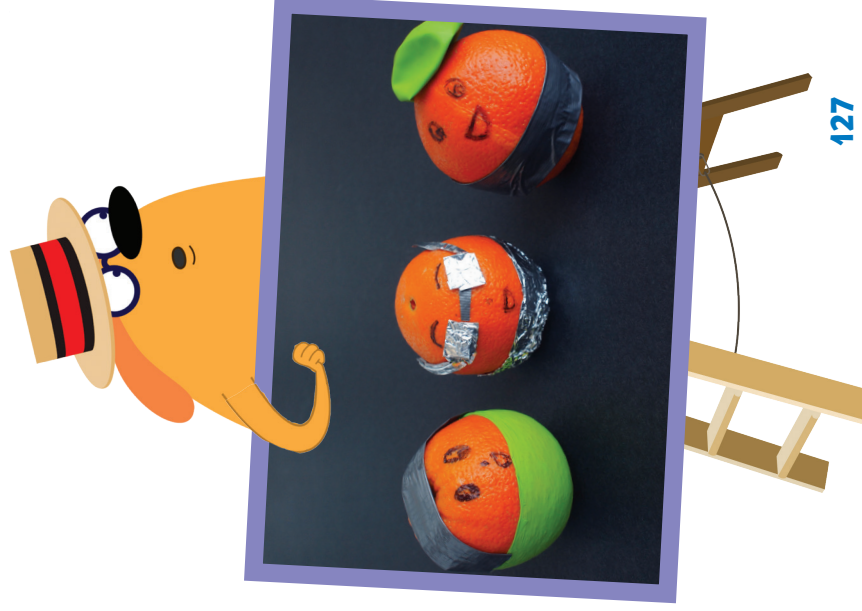
- ☐ Plastic bags
- ☐ Sponge
- ☐ Paper (toilet paper, paper towels)
- ☐ Balloons
- ☐ Tin foil
- ☐ Mop or string
- ☐ Cardboard
- ☐ Cloth (like old t-shirts)
- ☐ Tape
- ☐ Marker

## You'll also need:

- ☐ Orange or tennis ball (to be Ruff) for each player
- ☐ Scissors
- ☐ Flashlight (if you're doing the "Party Time" scene)
- ☐ Plastic basin, sink, or plastic sheet (for any scenes with water)

**Kid Description:** Grab a grown-up and some friends to create costumes for Ruff's next show! You'll use materials found around your home to dress-up a mini Ruff.

This activity is for two or more players, and you should have about one grown-up for every two children who are participating. If you are a big group, try having all the children work on the same one or two scenes. You can play this activity indoors or outdoors.



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## Wonder

- ★ Lay out all the materials on the floor or a table.
- ★ Pass around the materials one at a time, and ask kids to use their senses to explore each one.
  - **Ask:** How does this material look?
  - **Ask:** How does this material feel?
  - **Ask:** How does this material sound?

## Define a Problem

- ★ Ask kids to choose one of the Ruff scenes provided below, a story from the videos, or make up their own new Ruff adventure!
- ★ You could also assign one scene to each kid.
- ★ For each scene, ask the kids what problem Ruff needs their help to solve.



★ Here are some ideas (for the “Party Time” scene):

**Scene 1 – Rainy Day:** Ruff is stuck outside in the rain! Dress Ruff in something WATERPROOF so he won’t get wet.

**Scene 2 – Big Spill:** Ruff spilled his smoothie and now he has to clean up a big mess! Dress Ruff in something that SOAKS UP liquid.

**Scene 3 – Party Time:** Ruff is having a disco dance party. Dress Ruff in something SHINY the light will bounce off.

**Scene 4 – Nap Time:** Ruff wants to take a nap. Dress him in something SOFT so he’ll be cozy.

**Scene 5 – Create your own!:** Make up your own story about Ruff! Ask the kids to think about what kind of clothes Ruff would need to wear in their story, and what kind of materials they have available to create his costume.



## Imagine and Plan

★ Once they’ve chosen a scene, ask the kids what kinds of materials they predict will be best for their costume:

### Scene 1 – Rainy Day

★ **Ask:** Which material might be good to keep him dry?

### Scene 2 – Big Spill

★ **Ask:** Which material will soak up liquid?

### Scene 3 – Party Time

★ **Ask:** Which material will let light bounce off of it?

### Scene 4 – Nap Time

★ **Ask:** Which material feels the softest?

### Scene 5 – Create your own!

★ **Ask:** Let’s make up a story for Ruff that uses these materials. Think about what kind of clothes he’d need to wear in the story.

★ Write down the kids’ predictions on their printouts.

★ **Ask:** Based on your exploration of the materials, which ones do you predict will be the best ones for Ruff’s costume?

★ Next, ask kids to plan out their costume designs on the printout.

★ **Ask:** On the printout, draw what you want your costume to look like. Document all the materials you’re going to use.

## Create

★ It’s time to create the costume!

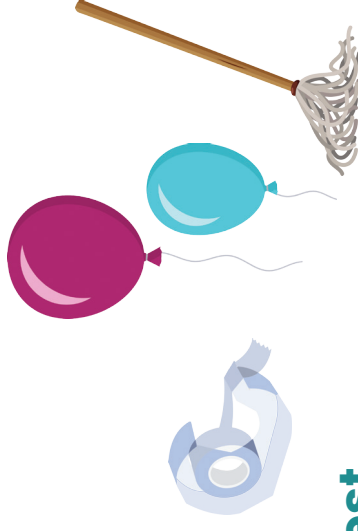
★ Ask kids to pick out their building materials, using the list on their printout.

★ Have kids dress up their mini Ruff, and ask them questions about whether the costume does what it needs.

★ **Ask:** Do you predict Ruff’s costume will do what it needs to do? Why or why not?

★ Encourage kids to draw a face on their mini Ruff, if they want to!

★ You may need to help kids with the tape or scissors as they create their costumes.



## Test

★ It’s time to find out if the kids picked the best materials for Ruff’s costume!

★ If you have a smartphone or tablet, try using it to record the tests.

★ **Explain:** It’s time to test your costumes, to see if you picked out the best material for Ruff.

★ Kids should run their own tests while you offer them support.

★ The kids can act out the scene as part of their testing, OR just run the test by itself.

**Scene 1 – Rainy Day:** Pour water on the costume. Observe if the water soaks through or slides off.

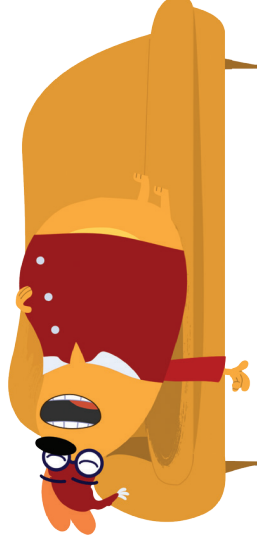
• **Ask:** If the costume is waterproof, the water will slide off. What happened to the costume? Did the water slide off or soak in?

**Scene 2 – Big Spill:** Pour water on the costume. Observe if the water soaks up or slides off.

• **Ask:** If the water soaks in to the costume, that means it will be able to soak up Ruff's mess. What happened to the costume? Did the water slide off or soak in?

**Scene 3 – Party Time:** Shine a flashlight on the costume. Observe if the light absorbs or reflects.

• **Ask:** If the light reflects off of the costume, that means it is shiny enough for the disco dance party. What happened to the costume? Did the light reflect off it?



**Scene 4 – Nap Time:** Feel Ruff's outfit. Observe if it's soft.

• **Ask:** If the costume is soft, that means Ruff will be able to take his nap. How does his costume feel? Does it feel soft? Can you think of other things that are soft (example: blanket, pillow); is this similar to how those things feel?

**Scene 5 – Create your own!:** Create and run a test based on your original story. When you're creating your test, think about how can you test whether the material in Ruff's costume did its job.

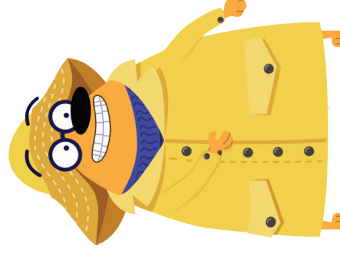
• **Ask:** What happened to the costume? Did it work or not?



## Reflect

★ After each test, ask kids what happened and write down their answers on the printout.

- **Ask:** What happened when you tested?
- **Ask:** Was your prediction right? Why do you think those materials worked?
- **Ask:** Was your prediction wrong? Why do you think those materials didn't work?



## Improve

★ Ask kids to improve their costume designs based on the results of their tests.

- **Ask:** How would you improve your costume, so it passes the test? Spend a few minutes changing your design, then let's run the test and see if you get a different result!



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# Activity Showtime

Draw your costume for Ruff in the space provided, and list which materials you're going to use to make it.

## Scene:

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## Materials:

1. 

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2. 

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3. 

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4. 

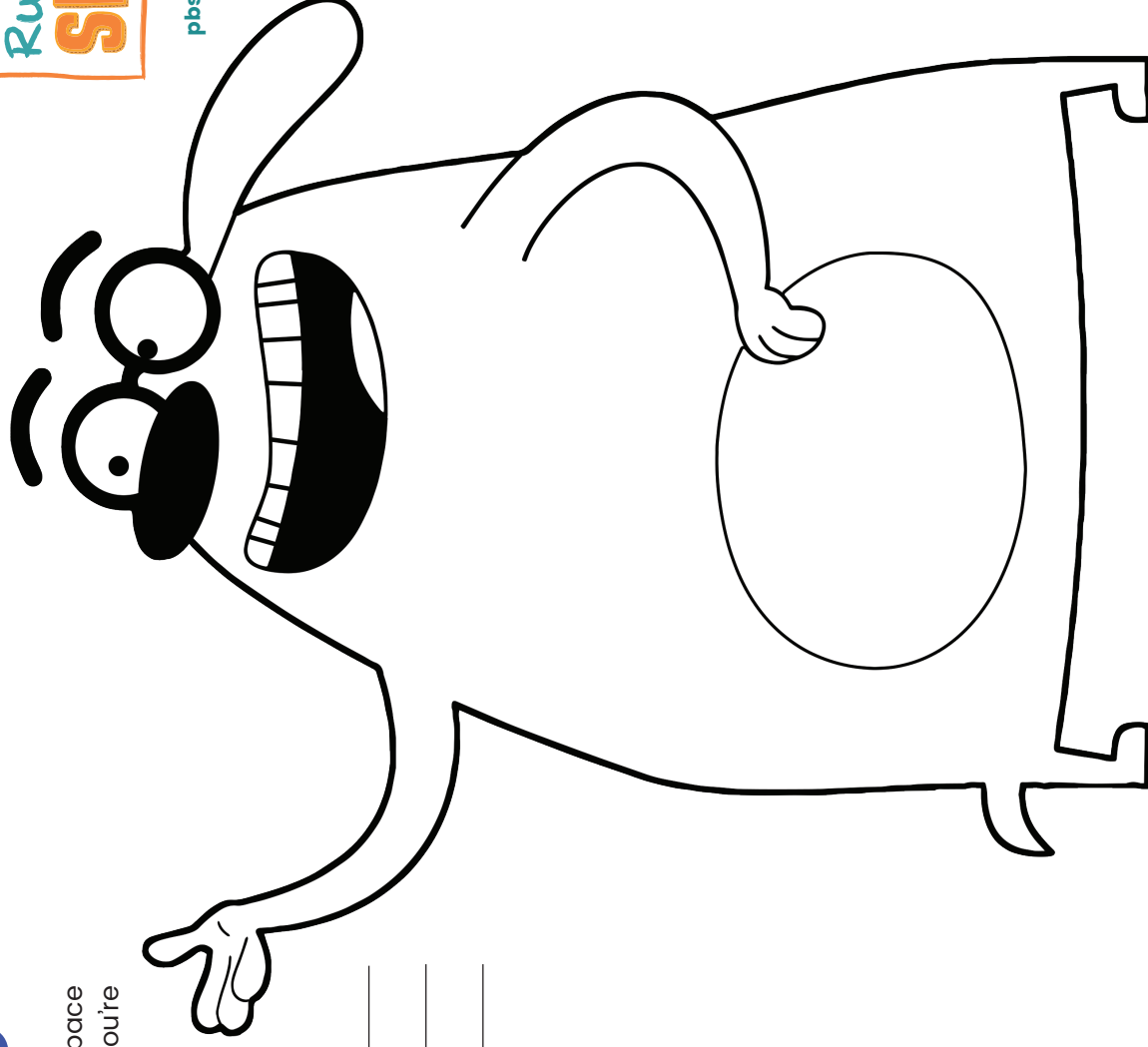
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5. 

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6. 

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7. 

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8. 

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# Grab It and Run

## Time:

45-60 minutes

## Explore:

material properties, inquiry practice (predict, document, investigate, reflect)

## Materials:

Gather up a bunch of household items with different properties – that's how they look, feel, smell, sound, or taste. You'll want a mix of strong and weak materials for the race.

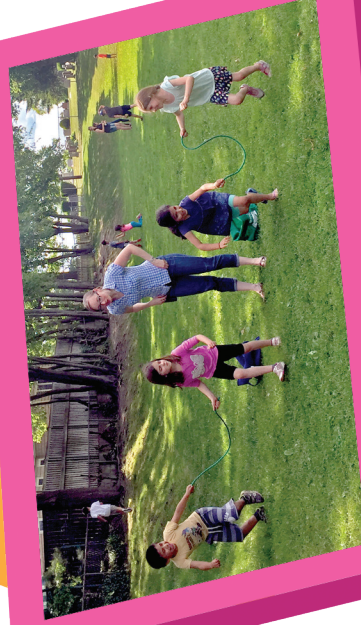
Here are some

suggestions, but feel free to add your own! Each material should be about 2 feet long, and you'll need at least 2 of each (one for each team, plus extras if they break).

- ☐ Rope or ribbon (strong, flexible)
- ☐ Rubber bands (stretchy)
- ☐ Licorice ropes (stretchy, breakable)
- ☐ Tin foil sheet (unfolded – breakable; rolled – strong)
- ☐ Toilet paper (breakable)
- ☐ Wooden dowel (stiff, hard)
- ☐ Dry paper towel (somewhat strong)
- ☐ Wet paper towel (weak)
- ☐ Plastic bag (as bag – weak; knotted – strong)

**Kid Description:** Grab a grown-up and some friends for this special relay race! Can you make it to the finish line without breaking any materials?

This game is for four or more players, and should be played outdoors or indoors in a big open area. If you have kids with motor issues or who otherwise cannot participate, ask them to be a team coach or score keeper.



## Predict

- ★ Sit in a circle and pass around the materials one at a time.
- ★ Ask kids to use their senses to explore each material. What do they notice about each material?
  - **Ask:** How does each material look?
  - **Ask:** How does each material feel?
  - **Ask:** How does each material sound?
- ★ Ask kids if they could experiment with the materials to make them stronger.
  - **Ask:** How could you experiment with the materials, or change them, to make them stronger? (Hint: could you roll them up, knot them, something else?)



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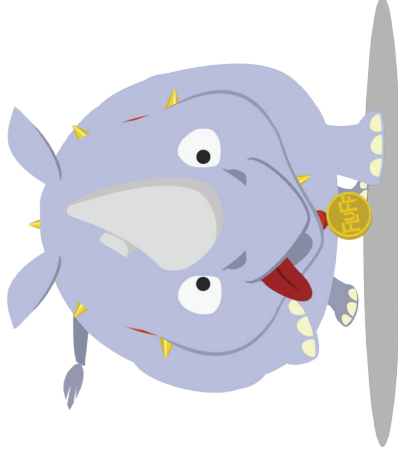
- ★ Have kids line up the materials on the ground, in order from “strongest” to “weakest.” This will be their order in the relay.
- **Ask:** Based on our investigation of the materials and any other experience you might have, predict which are the strongest and which are the weakest. Line up the materials in order from strong to weak. I’ll also document your prediction by writing it on the printout.
- ★ On the printout, write down each kid’s predictions for the materials.



## Investigate

- ★ Pick two grown-ups to be leaders. They will mark a “start line” and a “finish line” about 10–20 yards apart. At the finish line, put down a simple marker for each team.
- ★ Split the kids into two even teams, then have kids pair up within each team.
- ★ One leader stands at the start line, and one leader at the finish line.

- ★ Explain the relay rules to the kids.
  - **Explain:** Teammates will work together to run each material to the finish line without breaking it. The first team to get ALL their materials to the finish line wins!
- ★ At the start line, each pair picks up a material from the line-up. Make sure they hold the material by the ends, so it’s in between them.
  - **Explain:** The first pair for each team needs to pick up a material from the line. Make sure you each hold one end of the material, so it’s in between you.
- ★ Time to start the race! When one leader says “Ready, set, go!” players run with their material to the finish line.
  - ★ If their material breaks, players have to start over with the same material.
  - ★ If their material breaks again, players can start over with a different material.
  - ★ If their material doesn’t break, hooray! Players drop the material by their marker, then run back to get the next item.
- ★ Keep playing until one of each material has been delivered to the finish line.
- ★ The first team to get each material to the finish line wins. Or, the team that gets the most materials to the finish line wins.



## Reflect

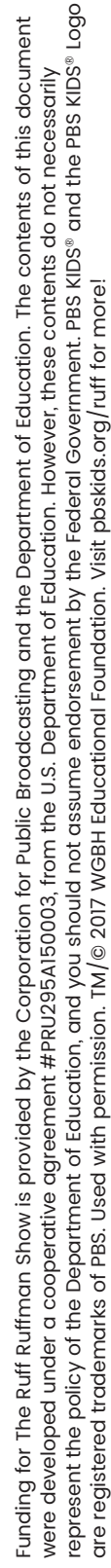
- ★ Sit in a circle around the two piles of materials.
  - ★ Ask kids about their predictions on the printout.
    - **Ask:** Were your predictions right?
    - **Ask:** Why do you think some materials were easier to run with?
    - **Ask:** Why do you think some materials were harder to run with?
    - **Ask:** Did you have to run differently when you were holding different materials? Why or why not?
  - ★ Ask kids what other materials could be used in the race.
    - **Ask:** What are some other materials we could use in the relay? Do you think those would be easy or hard to run with?

## Activity



# #1 Material

### #3 Result







# Ruff and Smooth Scavenger Hunt



## Search for TEXTURED treasures!

**From a prickly pinecone to a soft sweater, everything we touch has texture.  
How many textures can you find inside or outside of your house?  
Race the clock or race a friend with this printable scavenger hunt.**

### Instructions:

- 1) Print the scavenger hunt table (on the following page).  
If you are playing with a friend, print two.
- 2) Begin hunting for textures on your list.
- 3) When you find something, draw a picture or write the object's name next to its matching texture.

**TEXTURE** describes the feel or appearance of an object or the material an object is made of.



### More Ways to Play:

- Instead of drawing or writing, snap photos with a digital camera.
- In the spaces on your sheet, make crayon rubbings of the textures you find.
- Target your scavenger hunt. Look for objects in nature, in your kitchen, or on your walk to school.
- Explore other senses. Find things with different colors, smells, or even tastes. (Tastes found in the kitchen, of course.)

**For more fun, visit: [pbskids.org/ruff](http://pbskids.org/ruff)**



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# Teacher's Guide

# Wearable Science



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## Overview

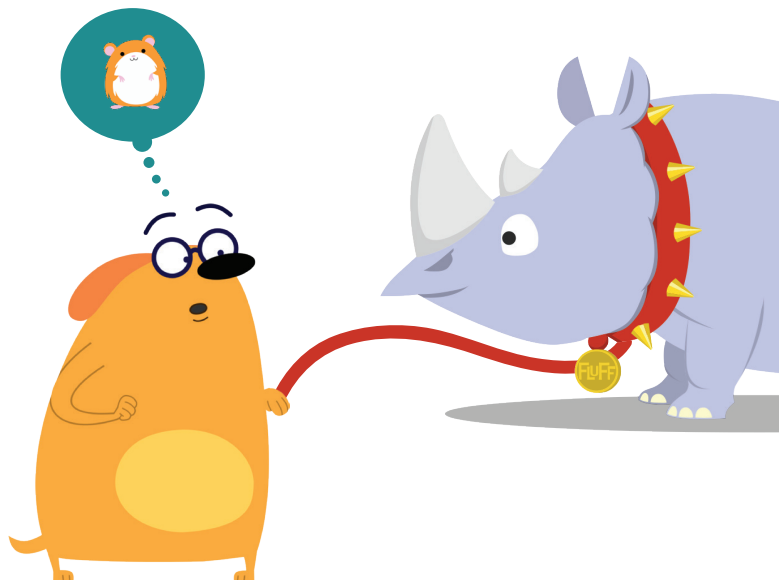
Investigating the properties of materials with Ruff Ruffman is a great way for your students to engage in science learning. This series of episodes about material science starts with Ruff pet-sitting what he thinks will be a hamster, but he gets a BIG surprise when a rhino shows up at his door instead! Ruff is excited to discover that he can use what he knows about materials science to create a leash, a raincoat, a dog costume, and other materials for the rhino.

This guide will help you bring the fun of Ruff's scientific investigation to your students. There are four parts:

1. Background Information
2. Science Talk
3. Let's Investigate: Material Challenge
4. Extensions

You can find all the resources referenced below on PBS LearningMedia:

[www.pbslearningmedia.org/collection/ruff-ruffman-show](http://www.pbslearningmedia.org/collection/ruff-ruffman-show)



## Background Information

Bringing Ruff Ruffman into the classroom provides an opportunity for students to investigate and develop a deeper understanding of properties of matter and how these properties determine if a material is useful for a particular task.

One science practice to point out is how collecting data helped Ruff Ruffman solve several problems. It was important for him to have an organized way to test and record his observations. Then, he could use what he found out to make the best decision or find the best solution. Here are some key understandings from his data collection and observations:

- ★ A material is what something is made out of, like wood, plastic, or cotton.
- ★ Materials have different properties, like color, weight, and texture.
- ★ You can observe, compare, describe, test, and sort materials by their properties.

- ★ You can make different objects (like chairs and bowls) from the same material (like wood). These objects may share some properties (color) and not others (shape).

## Developing Understanding

Children may have had other experiences with properties of materials and may have ideas about the reasons why some materials are useful in certain situations and not useful in others. Some questions you might encounter as they work to reconcile their thinking might include:

- ★ Can everything be strong?
- ★ What if we just add tape?
- ★ How does fabric hold water?

## Acquiring New Science Words

Young learners can benefit from having Word Walls to help them communicate their developing ideas. Including pictures of the word in context, whether it is a classroom investigation or a media resource like a Ruff Ruffman video, can help students remember the experience that corresponds with the word.

Some of the vocabulary words related to Wearable Science include:

- **Absorb** – to soak up a liquid
- **Data** – information to help us think about something
- **Material** – what something is made of
- **Observe** – to carefully look at something
- **Predict** – what you think will happen based on what you already know
- **Quality** – a property of matter
- **Record** – write down



## Science Talk

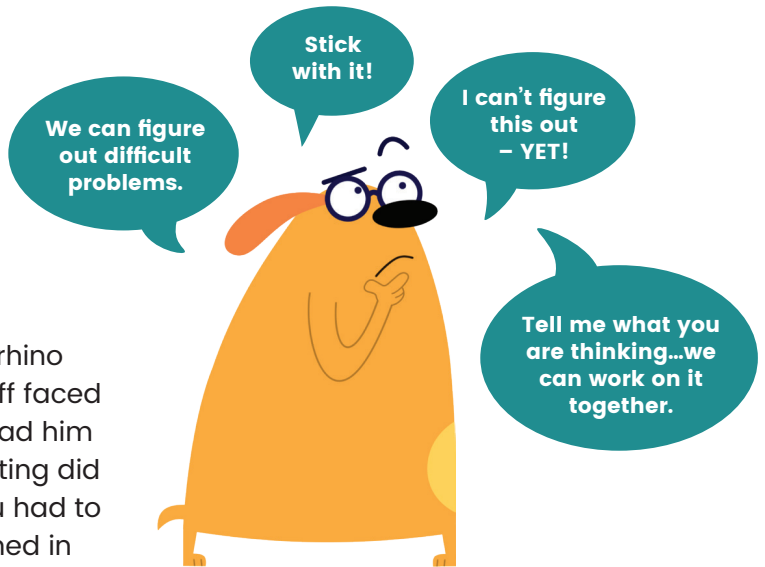
Talking about science – by making observations, sharing ideas, and participating in group discussion – is an important science practice. Watch the Ruff Ruffman videos with your students, and use the discussion prompts on the next page to engage in science talk.

In **Make Sure It's a Hamster**, Ruff had several mishaps when things did not turn out as he had planned with Fluff the rhino. Scientists run into this problem frequently. Learning to be resilient can help us be successful in science. A great way to help young students adopt resilient habits of mind is to create "Resiliency Thought Bubbles" filled

with phrases they can use when they're faced with a challenge. Ruff is illustrating how this might work in the image to the right.

### Discussion Prompt 1

Ruff Ruffman had a big problem to solve in **Make Sure It's a Hamster**. He thought he would be taking care of a hamster, and he wound up looking after a rhino instead. As a whole class, discuss what problems Ruff faced when the rhinoceros arrived. How did the situation lead him to find a new solution and a new material? What testing did he have to do to create Fluff's leash? When have you had to make or use something different than you had planned in order to solve a problem?



### Discussion Prompt 2

In **Plarn It!**, Ruff realizes that he needs to fix the big hole in Blossom's wall before she returns. By asking his friends for help, Ruff discovers he can use plastic shopping bags in a new way. As a class, make a T-chart comparing and contrasting the properties of the plastic bag versus the properties of the materials made from plarn.

### Discussion Prompt 3

Ruff takes on another BIG challenge in **Turn Your Rhino into a Dog**. How did sorting and gathering data help him find the right material to turn Fluff into a dog? Why are comparing things and recording data important skills in science?



## Let's Investigate: Material Challenge

An important point to consider is that sometimes a material's qualities are useful and sometimes they are not, depending on the need or task at hand. As a class, watch **A Dry Pet is a Happy Pet** and see how Ruff finds this out when Fluff's mop-head costume disguises him as a dog inside the house, but then becomes heavy and leaves puddles behind outside in the rain. Then figure out what the best material is to clean up Fluff's puddles!

### Ask Questions

- ★ *How were the mop heads useful inside the house?*
- ★ *What happened to them when Ruff and Fluff went out in the rain?*
- ★ *What science words could we use to describe this?*

## Get Set

### Materials:

- 3–5 plastic trays or plates
  - Various materials to test such as the following:
    - Paper towels
    - Plastic wrap
    - Paper
    - Ribbon
    - Cotton balls
    - Aluminum foil
    - Towel
    - Fabric
    - Sponge
  - Clipboard, paper, and pencil (1 per student)
- ★ While students are at lunch, recess, or another time when all students are out of the classroom, stage several “puddles” left behind from Fluff stopping by in the soggy-wet costume. Pour the puddles into plastic trays or plates and place them on several desks or tables in the classroom.
  - ★ When students have returned, explain that Ruff and Fluff came by and left puddles in the classroom! Now, the class has to think like scientists and figure out the best material to clean up the puddles.
  - ★ Have the students think of a way to solve the problem of the puddles. Show them the materials they can use in this experiment. As a class, discuss the properties of each material and decide on the material you’re going to try at each puddle station.
  - ★ Brainstorm a list of way to test the materials to figure out which one is the best for cleaning up Fluff’s puddles.

## Predict

Engage students in thinking about what might happen when they use each material to clean up the puddles. Offering students a chance to decide on the prediction through class vote or other method can increase motivation and connection to the experiment. Students might want to predict:

- ★ What material will be the best at cleaning up the puddles?
- ★ What material will be the worst at cleaning up the puddles?

## Observe

- ★ Divide the class into groups, 1 for each puddle station. Place the selected materials at each station.
- ★ Provide each student with a clipboard, paper, and pencil so they can record their observations of the material’s performance as they conduct the tests you’ve decided on as a class.

## Debrief

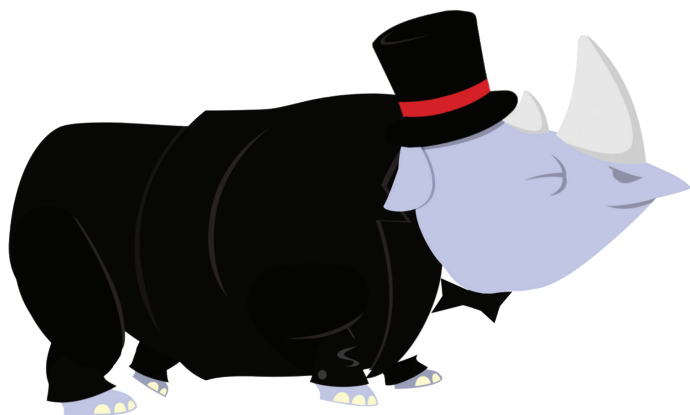
Gathering students to debrief after an activity is an important part of a science learning experience. Students can use the following sentence starters to help share their learning.

- ★ To communicate their observations: “I saw...”
- ★ To reflect on their predictions: “I thought...but then...”
- ★ To demonstrate science community skills: “I liked...” or “I respected...”
- ★ To make a conclusion: “If Ruff Ruffman wants to clean up puddles, he should...”



## Extensions

- ★ Students can use their wearable science knowledge in the **Dress That Rhino** game, where they test different materials to find a solution for Ruff and Fluff.
- ★ Have students watch **A Well-Dressed Rhinoceros**, starring Ruff Ruffman, to reinforce all the useful properties of matter in choosing the right thing to wear! Students can help Fluff dress for a trip in the **What Should Fluff Wear?** activity. Fluff will need different clothing depending on where he goes on his trip. Encourage students to be creative and resourceful as they look around the classroom for materials that will keep Fluff comfortable in different weather. They can either glue the material onto Fluff or draw the clothing on using a pencil or crayons. Then have them describe why they chose that particular material based on Fluff's destination.



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