Sensational Science Camp with Ruff Ruffman™

Day 1

Material World
Investigating Material Science

Explore: Ruff Ruffman videos, games, discussion
Make: Using materials to solve problems
Share: sharing, comparing, and discussing materials

Introduction

(10 min) Find out what the kids already know about materials. Have a small selection of materials such as felt, feathers, fabrics, sheet protectors, foam sheets etc. Show them a material and ask them to describe the materials with their senses. What does it look like? Ask the kids to take it out of their materials bag and feel it and then describe how it feels: soft, crinkly, rubbery sticky? How would it feel to wear it?

Encourage the children to be on the lookout for these words today:
Materials: which is what something is made of.
Properties: which are the characteristics of an object or substance.
Test: which is to try something out to see if your prediction is right.
Engineering: which is a process of identifying and developing solutions to problems.

Tip: Don't spend too much time defining and discussing the words at this point. Vocabulary out of context is often meaningless to young children. Instead, introduce the words, tell them to be on the lookout for them, and then make a conscious effort to reference and incorporate them throughout the session.

Video

(15 min) Set up the video “A Dry Pet Is a Happy Pet”
https://klru.pbslearningmedia.org/resource/sensational-science-camp-ruff/rtl-2015-2020/
SCROLL down and click on the correct video link.
When you click on the link, please look at the video titles at the bottom and choose the correct one. Pet-sitting Tip #4: A Dry Pet is a Happy Pet.

Before showing the Ruff Ruffman video provide some info about Ruff and the video to help orient the group to what they’re about to watch.

You can say something like, “In this video, you’ll see our favorite orange dog, Ruff, and his friends testing out different materials to see if they are waterproof. I wonder how they will test their materials. Let’s find out!” Then show the video.

As the group watches, pause the video occasionally to reflect on new vocabulary and 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, ask kids to describe some of the properties of Fluff’s mop costume.

Before Ruff calls his friends to investigate, ask kids what ideas they have for covering Fluff to keep him dry on his walk.

After the video, lead a group discussion about the topics in the video, using questions like:

- What was the problem Ruff needed to solve?
- What were the different materials the kids tested?

- What were the properties of the three materials?
- What did they observe when they applied water to the different materials?
- How did they test again to find the most waterproof material? Why did they do this?

Game

(15 min) Demo the digital game Dress That Rhino (https://pbskids.org/ruff/materials/game) in which you will help Ruff dress up a rhino by choosing materials with different properties. Ask kids to give you suggestions for what you should select.

If you think your kids can play independently after the demo, then go ahead and put the link in the chat box and ask them to click on it. This will open up the game in a different tab. Give them about 5-10 minutes to play.

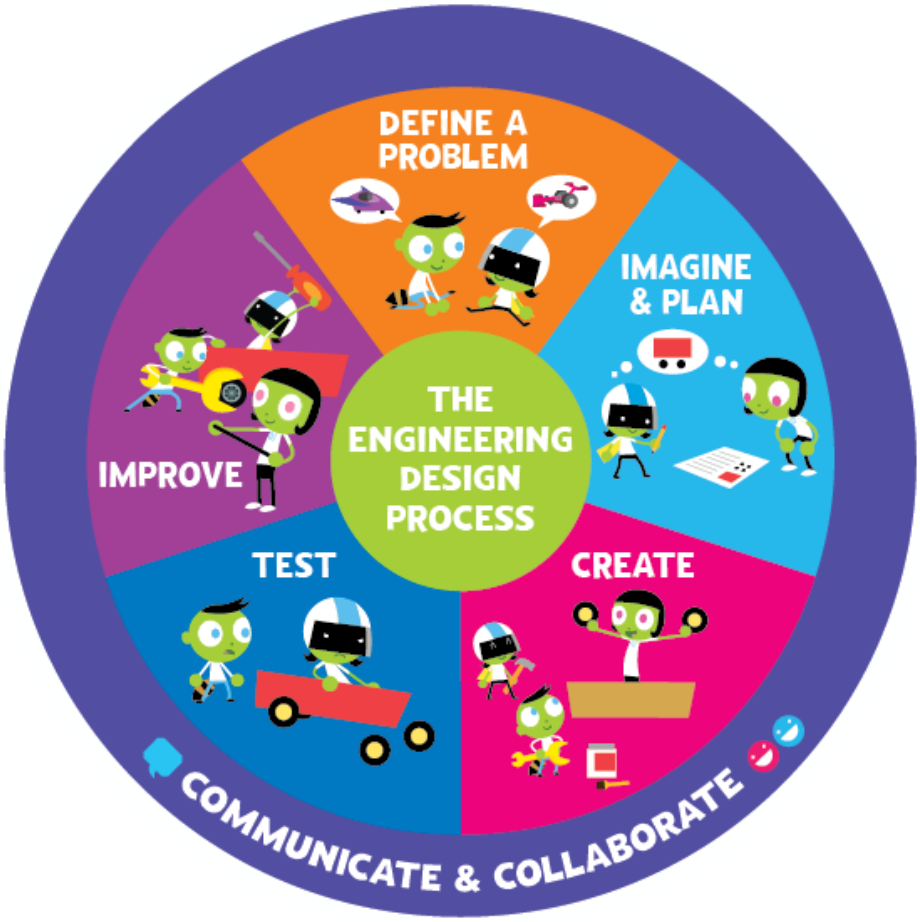
Regroup and discuss the games they just played.
Ask them:

- Did the game help you notice any new materials around you? What were they?
- Did the game help you think of new ways to describe the properties of materials?
- What were some of the silliest materials you found or used?
- In the video, Ruff needed to find something to keep Fluff dry. Did you come across any materials while playing the game that would have worked for Fluff?

Hands-on exploration

(15 min) The children will have a Ruff Ruffman plushie and different types of materials. Their challenge is to design something Ruff can wear to keep him dry from water.
Ask them:

- Where/when/why might you wear something like this?
- What are some things that keep you dry?



They can use the Curiosity Journal: pages 17 through 19 or they can use a piece of paper.

Define a Problem: Have kids write down which problem they are solving for.
Imagine and Plan: Next, encourage kids to Imagine and Plan. Have them record which materials they plan to use to solve the problem. They might also want to do a quick sketch of what their creation might look like.
Create: Have them create an outfit for Ruff using the materials in their bags.

Share

(5 min) Show and Tell
If time allows, have kids show their creations to the whole group!
Test: While it is not feasible to test out their creation, ask them what they think they might do to test out their creation to see if they have solved the problem.
Improve: Ask them how they might improve their design if the test failed.

Day 2

Stick or Slide
Exploring Friction

Explore: Ruff Ruffman video, games, discussion
Make: Build ramps to investigate friction
Share: sharing, comparing, and discussing friction

Introduction

(10 min) Discuss friction.
Let kids know that friction is a force that slows the motion of object.
Friction is created when two objects rub together and push and pull against each other.
Have kids rub their hands together.
Discuss examples of friction, including a lot of friction (rubber shoes on the floor) and a little friction (hard-soled shoes on ice).

Ask some questions about friction to help guide a fun introductory discussion:

- Who has slid on something slippery? What was it and what did it feel like?
- Who has slid across a wood or concrete floor in their socks?
- Who has tried to do the same thing on a carpeted floor or outside in the grass?
- Who has some ideas on why it might be easier or harder to slide on some of these surfaces?

Encourage the children to be on the lookout for these words today:
Friction: a force that slows how an object moves, when two objects rub together and push or pull against each other.
Surface: which is the outside layer of something.

Investigate: which is when you explore things and find stuff out.

Tip: Don't spend too much time defining and discussing the words at this point. Vocabulary out of context is often meaningless to young children. Instead, introduce the words, tell them to be on the lookout for them, and then make a conscious effort to reference and incorporate them throughout the session.

Video

(15 min) Set up the video "Pulling for the Plushie"
https://klru.pbslearningmedia.org/resource/sensational-science-camp-ruff/rtl-2015-2020/
SCROLL down and click on the correct video link.
When you click on the link, please look at the video titles at the bottom and choose the correct one.

Before showing the Ruff Ruffman video provide some info about Ruff and the video to help orient the group to what they're about to watch. You can say something like, "In this video, you'll see Ruff and his friends investigating friction, a force that affects how an object moves. But what exactly does friction do? Let's find out!"

Then show the video. As the group watches, pause the video to reflect on new vocabulary and ideas being explored by Ruff and his friends. Here are some places you might pause:

After Blossom shows Ruff the three surfaces Steve pulled him across, ask them why some surfaces might have made him go faster than others.

After the kids in the video make their predictions about which surface will allow the fastest movement, ask the kids what their predictions are. Why?

When the video is over, lead a discussion with the following questions:

- In the video, what was different about the three surfaces (sand, grass, concrete)?
- How did the different surfaces affect the sled's movement?
- Why did the concrete allow the sled to go fastest? What properties did it have that made it different from the other surfaces?
- If the concrete allowed the sled to go the fastest, does that mean it created more friction for the sled, or less?

Game

(15 min) Demo the digital game Fish Force (https://pbskids.org/ruff/sports/game). In this game, kids will use force and friction to help Ruff rescue his plushie toy!Ask kids to give you suggestions for what you should select.

https://pbskids.org/ruff/sports/game 

If you think your kids can play independently after the demo, then go ahead and put the link in the chat box and ask them to click on it, this will open up the game in a different tab. Give them about 5-10 minutes to play.

Regroup and discuss the game they just played.

- How does the amount of force used relate to the distance the object moves?
- How do changes to the surface (the patch of sand) affect how the object moves?
- If it were all sand instead of ice, would you need to use more force or less force to move the fish?
- What is your favorite part of this game? What is the most challenging?

Hands-on exploration

(15 min) Now kids will participate in their own investigations to explore friction by using and testing different surfaces to see how they affect the distance an object travels.

Kids will have three with pieces of cardboard with three pieces of surfaces (bubble wrap, rubbery cabinet liner, and foil) taped to them. They will also have a toy car and a

measuring tape. You will demo how to make a ramp using books (they could use the books we give them plus other objects from home that could prop the ramp up). You will demo letting go of toy car at the top of the ramp and then measuring how far it went for one surface. They will then conduct the same investigation for the other surfaces.

Before the kids do their tests, ask them to comment on the materials, which ones do you think will make the go the farthest? Have them write these predictions in their diaries: pages 27-29

The children then conduct their investigation. Have them write down their measurements for each of their tests. They can use the Curiosity Journal: page 30 or they can use a piece of paper.

Share

(5 min) Reflect and Draw Conclusions: When they've tested all three materials, ask them to reflect on and analyze all the results they documented.

- Are any of the results for the different materials the same (a tie)? If so, is this surprising?
- What are the differences in the surfaces tested?
- What is the biggest difference in the results (the shortest distance traveled by the car versus the longest distance traveled by the car)?
- Which material(s) let the car travel the farthest?
- Which material(s) seemed to keep the car from moving very far?

Day 3

Build it Up
Learning about Structures

Explore: Ruff Ruffman video, games, discussion
Make: Design and build a playground for a Ruff plushie
Share: sharing, comparing, and discussing structures

Introduction

(15 min) Start the conversation by asking what the children already know about structures.

Think about a tower, which is a type of structure. What might this kind of structure need to be sturdy and strong, to keep it from falling over?

What kind of materials do you think you could use to build a tower that is sturdy and Strong?

If a structure is sturdy, it is strong, and if it is stable, it doesn't move easily. What are some things a structure might need so it is stable and doesn't move easily?

Now that they have heard these words, have them be on the lookout for them today:
Structure: or something that is built.
Stable/stability: which is when something doesn't move easily.
Sturdy: another word for strong.
Observe: or using your senses to gain information about something.

Tip: Don't spend too much time defining and discussing the words at this point. Vocabulary out of context is often meaningless to young children. Instead, introduce the words, tell them to be on the lookout for them, and then make a conscious effort to reference and incorporate them throughout the session.

Video

(15 minutes) Set up the video "Eye of the Hamster"
https://klru.pbslearningmedia.org/resource/sensational-science-camp-ruff/rtl-2015-2020/
SCROLL down and click on the correct video link.
When you click on the link, please look at the video titles at the bottom and choose the correct one. "Ask Ruff First: Eye of the Hamster"

Before showing the Ruff Ruffman video “Eye of the Hamster,” provide some info about Ruff and the video to help orient the group to what they’re about to watch.

You can say something like, “In these videos, you’ll see Ruff’s friends build an obstacle course for a hamster! But how do they plan and test the pieces of the course? Let’s find out!”

Then show the video. As the group watches, pause the video to reflect on new vocabulary and ideas being explored by Ruff and his friends. Here are some places you might pause:

After Ruff’s friends tell Ruff their problem (that their hamster is bored), ask kids what they would do to solve the problem.

After Ruff falls off the sky bridge (the platform with balls under it), ask kids why they think it didn’t work for him.

When the video is over, lead a discussion with the following questions:

- Some objects stack more easily than others. What kinds of things are easy to stack, and why?
- What kinds of things are hard to stack, and why?
- What kinds of shapes are better for building a stable structure?
- Ruff’s friends talk about the importance of support for their sky bridge. What did they mean?

Game

(15 min) Demo the digital game Hamster Run (https://pbskids.org/ruff/structures/game). In this game, the kids will experiment with a variety of building pieces to construct stable and sturdy structures that help the hamster get to its carrot. Have the kids give you suggestions as you play.

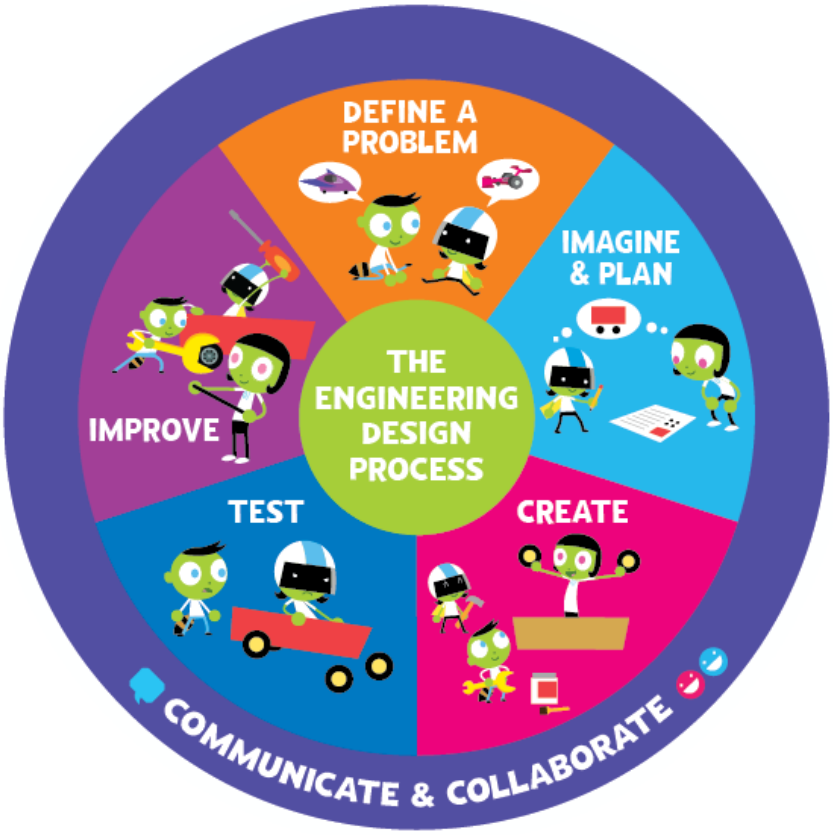
If you think your kids can play independently after the demo, then go ahead and put the link in the chat box and ask them to click on it, this will open up the game in a different tab. Give them about 5-10 minutes to play.

Regroup and discuss the game they just played.

- How was this game like the video you watched?
- Did you always get the solution right on the first try in the game?
- What kinds of things did you notice the structures needed to be stable?

Hands-on exploration

(15 min) Now kids will participate in their own investigations to further explore structures. Kids will work on building a playground for their Ruff Ruffman Action Plushie to play on.



They can use the Curiosity Journal: pages 37 and 38 or they can use a piece of paper .

Define a Problem: Before they begin, they need to define a problem or challenge that they want to create a solution for.

Imagine and Plan: Next, support kids as they imagine and plan what they want to build for their plushie. Encourage them to sketch some plans for their creation and to think about the materials available to them. They can refer to their sketches while they build. They can use any of the materials in their bag.

Create: After the plans are made, it's time to create. Using the materials available to them, they should start building their playground equipment!
Encourage the kids to refer back to their plans. They should also keep their plushies nearby so they can test, measure, and change the materials they are using as needed.

Test: When they have a completed piece of playground equipment, it's time to test it!
Have the kids put their plushie in (or on) the equipment and give it a try.
Have them observe things that need to be adjusted. They may look for things such as:

- Does the plushie fit perfectly, or is it too big or too tight?
- Does the plushie move easily through the creation?

- Is the creation stable and sturdy enough to support the plushie?

Have them record their observations.

Improve: Now that they have an idea of how their first try works, they are ready to improve their playgrounds.
Have the kids refer to the observations they made from the test, and record possible solutions to make their structure even better. Then have them make the changes and test it once again.

Share

(5 min) Show and Tell
If time allows, have kids show their creations to the whole group! You can ask them:

- How are your creations similar to or different from the hamster obstacle course in the video?
- Why did you choose these materials to build with?
- Have you done anything to make your structure more stable or sturdy?
- What kinds of changes did you have to make to get the design just right?