Science Notebook

Investigating Things in My World
Observing and Measuring Materials and Objects
Dear Student Scientist,

Scientists use notebooks, and you will too.

This is a place to keep track of your work and your questions. Here’s where you’ll record your measurements. Or you might make a drawing to show what you observed and add notes to it. You can explain your ideas here too.

Your notebook is for you, to help you remember what you were thinking, what you did, and what you found out. And, it is for others who want to know what another scientist (you) was thinking.

When it’s time for science, open your notebook and fill it with your ideas, questions, drawings, and findings!
#### What are things in my world made of?

We sorted a set of objects by their materials.

We made ________________ groups.

Here are our groups and what we put in each group.

<table>
<thead>
<tr>
<th>Group name:</th>
<th>Group name:</th>
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</thead>
<tbody>
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</table>

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**Investigating Materials 1:** *What are things in my world made of?*
What kind of material makes an object work well?

Objects and Materials

<table>
<thead>
<tr>
<th>Object</th>
<th>What it is made of</th>
<th>Another material it could be made of</th>
<th>A material it can’t be made of</th>
</tr>
</thead>
<tbody>
<tr>
<td>window pane</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>spoon</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>my object</td>
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</tbody>
</table>
What kind of material makes an object work well?

Reflection:

1. What’s a good object to make with paper? Why do you think so?
   _____________________________________________________________________
   _____________________________________________________________________
   _____________________________________________________________________
   _____________________________________________________________________

2. What’s a bad object to make with paper? Why do you think so?
   _____________________________________________________________________
   _____________________________________________________________________
   _____________________________________________________________________
   _____________________________________________________________________
Date ______________

*How are materials the same and different?*

My description of materials in 2 cubes:

<table>
<thead>
<tr>
<th>Kind of Cube (oak, pvc, copper, etc)</th>
<th>Words to describe the material the cube is made of</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

Here are two ways the materials in these cubes are alike:

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

Here are two ways the materials in these cubes are different:

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

Investigating Materials 3: How are materials the same and different?
How can we sort cubes that are all the same size?

We sorted the cubes in different ways.

Here are 3 of the ways:

- [Blank]
- [Blank]
- [Blank]
How can we sort cubes that are all the same size?

Reflection:

Here’s what I’m thinking now.

Here’s what I noticed about materials when I grouped the objects by weight:

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

Here’s what I learned about materials when I grouped objects by kind of material (metal, plastic, wood):

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
**My observations of objects and materials:**

<table>
<thead>
<tr>
<th>Material</th>
<th>Why this is a good material to use</th>
</tr>
</thead>
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Here’s a different material that could be used to make a pencil.

________________________________________________

Here’s why I think so: ________________________________

**Investigating Materials 5: How do materials help us in our classroom?**
How good are our senses at comparing the weights of the cubes?

Using my hands, I think the cubes go in this order by weight

[Diagram showing cubes in order of weight]

Our group thinks the 8 cubes go in this order by weight

[Diagram showing cubes in order of weight]

I was surprised that:

[Blank lines for notes]
What does a pan balance tell us about the weight order of the cubes?

We used a pan balance to compare the weights of the cubes.

Here’s what my group found out.

Weight order using pan balance:

<table>
<thead>
<tr>
<th>Least Weight</th>
<th>Most Weight</th>
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</thead>
<tbody>
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</tbody>
</table>

Here’s how the weight order using our hands and the weight order using a pan balance compare:

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
</table>

Our class decided the order of the cubes by weight is:

<table>
<thead>
<tr>
<th>Least Weight</th>
<th>Most Weight</th>
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<tbody>
<tr>
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</table>

Investigating Weight 2: What does a pan balance tell us about the weight order of the cubes?
What does a pan balance tell us about the weight order of the cubes?

Reflection:

We used our hands and a pan balance to compare the order of cubes by weight.

Here’s what I’m thinking now.

1. Our senses are good at predicting the order of objects by weight when:

2. Our senses are not good enough when:
What does a pan balance tell us about the weight order of the cubes?

Checkpoint: What cube might be in each pan?

Investigating Weight 2: What does a pan balance tell us about the weight order of the cubes?
How can we measure the weights of our cubes?

We used plastic bears, washers, and paper clips to weigh three cubes.

Our Data:

<table>
<thead>
<tr>
<th>Weights</th>
<th>Aluminum cube</th>
<th>PVC cube</th>
<th>Acrylic cube</th>
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</tbody>
</table>

I think the next time I weigh cubes I will use:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Because:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
Date ______________

*How much heavier is one cube than another?*

Our class agreed to use _________________ to weigh things.

Our Data:

<table>
<thead>
<tr>
<th>pine</th>
<th>oak</th>
<th>nylon</th>
<th>acrylic</th>
<th>pvc</th>
<th>aluminum</th>
<th>steel</th>
<th>copper</th>
</tr>
</thead>
<tbody>
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</table>

My object weighs ________________

When I looked at our data I saw that:

1. Two cubes close in weight are:
   __________________________ and   __________________________.

2. Two cubes that have very different weights are:
   __________________________ and   __________________________.

3. My object weighs more than:
   __________________________ and less than __________________________.

4. __________________________ weighs about 2 times as much as
   __________________________.

*Investigating Weight 4: How much heavier is one cube than another?*
How can grams help us compare weights?

Data:
The object I weighed is ________________________.

It weighed ________________________________.

Here's what I'm thinking now.

When I think about using grams to weigh things, I am surprised that:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

I wonder:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
How much do the cubes weigh in grams?

My Group’s Data (weight in grams):

<table>
<thead>
<tr>
<th></th>
<th>pine</th>
<th>oak</th>
<th>nylon</th>
<th>acrylic</th>
<th>pvc</th>
<th>aluminum</th>
<th>steel</th>
<th>copper</th>
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</tr>
</tbody>
</table>

Our Class Data (weight in grams):

<table>
<thead>
<tr>
<th></th>
<th>pine</th>
<th>oak</th>
<th>nylon</th>
<th>acrylic</th>
<th>pvc</th>
<th>aluminum</th>
<th>steel</th>
<th>copper</th>
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</tbody>
</table>

I think some good reasons to use grams to weigh things are:

_________________________________________________________________________
_________________________________________________________________________
_________________________________________________________________________
_________________________________________________________________________
Do very tiny things have weight?

Here is a sketch or picture of my desktop weight line and the pieces of clay.

If I gather up all the pieces of clay (including any stuck to my knife, fingers, desk, or plate) I predict the weight will be:

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

I think so because:

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

Investigating Standard Measure 3: Do very tiny things have weight?
Investigating Standard Measure 3: Do very tiny things have weight?
The 10-10-10-10 Challenge

Team members
1. 
2. 
3. 
4.

What can you create using all of these materials?
- 10 grams of wood
- 10 grams of plastic modeling clay
- 10 grams of aluminum
- 10 grams of Styrofoam

Procedure
1. Decide what your group plans to make.
2. Weigh out 10 grams of each material.
3. Create the sculpture or object.
4. Predict the final weight.
5. After you build your creation, check the final weight.

Our group plans to make:

_________________________________________________________

_________________________________________________________

I predict when it’s finished, it will weigh ________________

My reason is:

_________________________________________________________

_________________________________________________________
The 10-10-10-10 Challenge

Here’s a drawing or picture of our 10-10-10-10 creation.

It weighed ____________________________

Here’s what I’m thinking about weighing things now:

_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________

Investigating Standard Measure 4: The 10-10-10-10 Challenge
What does it mean to take up space?

Three pieces of fruit and the space they take up.

```
Less Space ←----------------------------------------→ More Space
```

Do you think a tiny ant takes up space?

I think:

________________________________________________________________________________

________________________________________________________________________________

Because:

________________________________________________________________________________

________________________________________________________________________________

________________________________________________________________________________

________________________________________________________________________________

________________________________________________________________________________

Investigating Volume 1: What does it mean to take up space?
How do centimeter cubes help us measure space?

Estimating:
We estimated the amount of space some blocks take up.

<table>
<thead>
<tr>
<th>Least volume</th>
<th>Next</th>
<th>Next</th>
<th>Most volume</th>
</tr>
</thead>
</table>

Measuring:
Here’s what we did to measure the volume of the blocks:

Data:

<table>
<thead>
<tr>
<th>Block</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume in Cubic Centimeters</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Here’s the order of the blocks by volume.

<table>
<thead>
<tr>
<th>Least volume</th>
<th>Most volume</th>
</tr>
</thead>
</table>

Here are some objects that have about the same volume as a cubic centimeter:

Investigating Volume 2: How do centimeter cubes help us measure space?
**If we change the shape of an object, will the volume change?**

We made 8 clay centimeter cubes. Then we made new shapes out of the clay.

**Data:**

<table>
<thead>
<tr>
<th>Object</th>
<th>Number of centimeter cubes (cc)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 clay centimeter cubes</td>
<td></td>
</tr>
<tr>
<td>Sketch of new shape</td>
<td></td>
</tr>
<tr>
<td>Sketch of new shape</td>
<td></td>
</tr>
</tbody>
</table>
Does changing the shape of an object change its volume?

Reflection:

Here’s what I’m thinking now.

When I change the shape of an object, I predict the volume will:

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

What would you say to somebody who asks, “What is volume?”

I would say:

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
How can we describe our personal objects?

Data I collected to describe my object

My object is ________________________

Materials
My object is made of these materials ________________
___________________________________________

Number of different materials ________________

Weight
My object weighs ________ grams

Volume
The volume of my object is approximately

___ less than 1 cubic centimeter
___ 1-10 cubic centimeters
___ 10-100 cubic centimeters
___ more than 100 cubic centimeters
How can we describe our personal objects?

I used data from our class charts to answer these questions.

**Data table #1: What kinds of materials are our objects made of?**
Most of our objects are made of __________________ materials.
The number of materials ranges from _____________ (smallest #) to _____________ (highest #).

**Data table #2: What materials are our objects made of?**
How many different materials are our objects made of?
_____________________________________________________________________
The material that is used most often is ____________________________.
A material that isn’t used in any of our objects is ________________.

**Data table #3: How much do our objects weigh?**
The weight of our objects range from ________________(lightest) to _______________ (heaviest).
The most common weight is about _________________ grams.

**Data table #4: What is the volume of our objects?**
The most frequent volume is _________________.
The least frequent volume is _________________.

*Investigating Volume 4: How can we describe our personal objects?*