

# Nano Days

## Informing Your County about our tiny big world

<p><b>Overview:</b></p> <p>In this lesson students will create and design a children’s book or art piece about nanoparticles that they will then present to their community during a “Nano Science Night.” Members of the school and community will be able to come out and see the students’ products. Students will also have the opportunity to perform demos for the community related to their nanoparticles.</p>	<p><b>Classroom time:</b> Students will be working on this throughout the semester.</p>
<p><b>Objectives:</b></p> <ul style="list-style-type: none"><li>● Apply knowledge about nanoparticles in an artistic and literary medium</li><li>● Teach members of the community about nanoparticles and their impact in the world.</li><li>● Demonstrate mastery of nanoparticles by teaching and demonstrating knowledge gained from projects.</li></ul>	
<p><b>Related Next Generation Science Standards (NGSS):</b></p> <ul style="list-style-type: none"><li>● HS-PS2-6. Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.</li><li>● Scientific and Engineering Practices:<ul style="list-style-type: none"><li>○ Developing and Using Models</li><li>○ Analyzing and Interpreting Data</li><li>○ Planning and Carrying Out Investigations</li><li>○ Engaging in Argument from Evidence</li></ul></li><li>● ELA/Literacy - RST.9-10.7 Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.</li></ul>	<p><b>Materials:</b></p> <ul style="list-style-type: none"><li>❖ Device that connects to the internet.</li><li>❖ White Board</li><li>❖ Copy paper</li><li>❖ Various lab supplies (depending on demos they want to do)<ul style="list-style-type: none"><li>➢ Periodic Tables</li><li>➢ Demo Kits</li></ul></li><li>❖ Various art supplies<ul style="list-style-type: none"><li>➢ colored markers</li><li>➢ pens/pencils</li><li>➢ poster board</li><li>➢ paint</li></ul></li></ul>
<p><b>Related North Carolina Standards:</b></p> <ul style="list-style-type: none"><li>● Big Idea 2: Chemical and physical properties of materials can be explained by the structure and the arrangement of atoms, ions, or molecules and the forces between them.<ul style="list-style-type: none"><li>○ 2.19 The student can create visual</li></ul></li></ul>	<p><b>Safety:</b></p> <p>Follow normal lab safety procedures when conducting lab demos: ie wear safety goggles, lab coat, and gloves when handling any type of substance (other than water).</p>

- representations of ionic substances that connect the microscopic structure to macroscopic properties, and/or use representations to connect the microscopic structure to macroscopic properties
- 2.20 The student is able to explain how a bonding model involving delocalized electrons is consistent with macroscopic properties of metals and the shell model of the atom.

**Lesson Preparation:**

Students should be given ample time in and out of class to complete research for their books and art piece. Once the research and information are gathered, students can work on most of the projects outside of class (unless more materials or help is needed).

**Teacher Instructions:** *Teacher prep time is varied for this activity*

- Art Piece- this activity can be done before or after the children's book.
  - Give students 1-2 class blocks to complete research for this activity.
  - Give students various examples of artwork and access to the art classroom to collaborate with other students.
  - Give students rubrics and directions up front so they have enough time to think and ask questions.
- Children's Book Activity- the teacher should have examples of different types of children's books (upper elementary and middle school level) for students to use as a reference. Give students rubrics and directions up front so they have enough time to think and ask questions.
  - Give students 1-2 class blocks to complete research for this activity.
  - Electronic devices should be provided along with time to work in the library.

**Assessment:**

--Students should be able to teach about their nanoparticles easily. They should be able to explain all the properties and uses easily and tie it back to the information in class regarding properties/thermodynamics/energy, etc.

**Extensions:**

--Students can conduct simple lab demos during their project presentations. This will give them another opportunity to reach out to the community and teach about their particles given.

\*\*Teacher should provide books/supplies for lab demos\*\*

**Resources:** <https://www.zaption.com/>

<https://www.tes.com/lessons>

<http://www.powtoon.com/>

<https://itunes.apple.com/us/app/vanillapen-poster-maker/id866563170?mt=8>

## Nanoparticle Children's Book (Student Handout)

### Introduction:

Nanoparticles are invisible to the human eye and are a part of this expansive tiny BIG world. They are used in so many aspects of technology, medical usage, and multitudes of other avenues. Most people don't know or completely understand the implications of these particles.

### Task:

Your task in this phase of the project is to create a book that will tell the story of your nanoparticle and its specific classification. It should be engaging, colorful, and informative, and should be geared towards upper elementary to middle school aged students.

A high-quality book will contain a thorough overview of the particle's properties, presented in a highly creative way, and communicated appropriately for 9- to 12-year-old students. Illustrations should be high quality and engaging, and layout should be thoughtful. Of course, there should be no errors in spelling, grammar, or mechanics. After you submit your book, it will be sent to a local elementary or middle school to be shared with students in their science classes or published in the local library.

You are encouraged to personify your particles and tell their stories in a way that is engaging to your audience.

### Your book should include:

- A front and back cover neatly & securely bound.
- Has a distinct and effective introduction, body, and conclusion. Introduction acts to grab the reader's attention and conclusion
- A creative/original title on the cover and cover page (the author's name should also be listed on both).
- A dedication page located following the cover page.
- An index located in the back of the book. (This is where you can put certain vocabulary or guides to specific information. You can also have a glossary (if needed).)
- An about the author bio section in the back of the book including a picture of yourself.
- The name of the particle, including its properties and the following:
  - its impact, uses in the modern world, how it can be used to do good/bad, its importance to science (if any).

For your book, use the following rubric to assess your level of understanding.

### Learning Target Rubric

<p>4 <i>Got it!</i></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Contains all relevant background information, information about the discovery, along with additional relevant details.</li> <li><input type="checkbox"/> A creative/original title on the cover and cover page (the author's name should also be listed on both).</li> <li><input type="checkbox"/> A dedication page located following the cover page.</li> <li><input type="checkbox"/> An index located in the back of the book. (This is where you can put certain vocabulary or guides to specific information. You can also have a glossary (if needed).)</li> <li><input type="checkbox"/> An about the author bio section in the back of the book including a picture of yourself.</li> <li><input type="checkbox"/> Has a distinct and effective introduction, body, and conclusion. Introduction acts to grab the reader's attention and conclusion</li> <li><input type="checkbox"/> Includes thorough and detailed information about all properties of the rxn .</li> </ul>
<p>3.5 <i>Really close!</i></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Includes most, but not all, of the characteristics above</li> <li><input type="checkbox"/> May include minor errors of execution, but not of understanding</li> </ul>
<p>3 <i>Close!</i></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Contains all relevant background information and information about the discovery.</li> <li><input type="checkbox"/> Book includes information about all properties of the rxn.</li> </ul>
<p>2 <i>Getting closer!</i></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Contains most relevant background information and information about the discovery.</li> <li><input type="checkbox"/> Book lacks some information about the properties of the rxn.</li> </ul>
<p>1 <i>Not really</i></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Information in text is significantly incomplete.</li> <li><input type="checkbox"/> Is missing introduction, body, or conclusion.</li> </ul>
<p>0 <i>Totally off</i></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Frivolous or irrelevant</li> </ul>

## 21st Century Skills Rubric

4 <i>Got it!</i>	<ul style="list-style-type: none"><li><input type="checkbox"/> Highly creative and illustrations are clear and detailed, engaging and informative</li><li><input type="checkbox"/> Text, color, graphics, and layout work together skillfully to support and enhance understanding and engagement.</li></ul>
3.5 <i>Really close!</i>	<ul style="list-style-type: none"><li><input type="checkbox"/> Includes most, but not all, of the characteristics above</li><li><input type="checkbox"/> May include minor errors of execution, but not of understanding</li></ul>
3 <i>Close!</i>	<ul style="list-style-type: none"><li><input type="checkbox"/> Uses at least one effective strategy to engage readers throughout most of the text.</li><li><input type="checkbox"/> Attempts to incorporate creativity in some aspects and illustrations are clear and detailed, engaging and informative.</li></ul>
2 <i>Getting closer!</i>	<ul style="list-style-type: none"><li><input type="checkbox"/> Delivery is somewhat smooth, with some errors and some attempt at variation in tone.</li><li><input type="checkbox"/> Book lacks some information about the properties of the rxn.</li></ul>
1 <i>Not really</i>	<ul style="list-style-type: none"><li><input type="checkbox"/> Does not attempt to engage readers.</li><li><input type="checkbox"/> Delivery is extremely choppy OR has many errors OR makes no attempt to vary tone.</li></ul>
0 <i>Totally off</i>	<ul style="list-style-type: none"><li><input type="checkbox"/> Frivolous or irrelevant</li></ul>

## Nanoparticle Art Piece (*Student Handout*)

### Introduction:

After all of your research and recent works in the smaller side of science, you will be creating an artistic representation of a nanoparticle. The art can be as creative as you want, however, needs to show why YOU chose the particle you did. This piece can also show the implications of your particle, its future uses or potential impact.

### Questions to ponder:

What is the dark/light side of your particle?

What are its causes and effects?

How can you make people feel something about it?

Why did you choose it?

### Some Ideas of Artistic Representations:

- Visual:
  - Painting
  - Drawing
  - Collage
  - Sculpture
  - 3D model
  - Photography
  - Mixed Media
  - Jewelry
- Performance
  - Movie
  - Song
  - Dance
  - Dramatic
- Written
  - Poetry
  - Comic book
  - Play script
- Memoir
- Digital
  - Video game
  - Timeline using [these links](#)
  - Lesson using [Zaption](#), [Blendspace](#), or [Nearpod](#)
  - Website using [Wix](#), [Weebly](#), or [Squarespace](#)
  - Poster using [Vanilla Pen](#)
  - Animation using Animation HD or [Powtoon](#)
- Other
  - Game
  - Interactive museum exhibit
  - Science experiment
  - Edible art

**\*It will be challenging to grade creative art pieces, however, it will be very easy to grade effort. Keep that in mind when creating your masterpieces!\***

You must have a description card, typed neatly on cardstock, accompanied with your art piece. The exhibit label needs to be clear, thoughtful, flawless and sophisticated in structure and conventions. It should include a title, artist's name, and explanation of piece and meaning behind it.

### Art Gallery Rubric

<b>CRITERIA</b>	<b>Exceeds Expectations (4)</b>	<b>Meets Expectations (3)</b>	<b>Nearly Meets Expectations (2)</b>	<b>Does Not Meet Expectations (1)</b>
Clarity of Message	Piece clearly and creatively communicates why student feels scientific discovery is important.	Piece clearly communicates why student feels scientific discovery is important.	Piece is somewhat clear in communicating why student feels scientific discovery is important.	Piece is not clear in communicating why student feels scientific discovery is important.
Effectiveness of Persuasion	Piece sends a message that goes beyond statement to be highly persuasive.	Piece sends a message that goes beyond statement to be persuasive.	Piece attempts to persuade, but is not successful.	Piece merely states an opinion and does not attempt to persuade.
Scope of Product	Piece is extensive, far beyond what is expected.	Piece is appropriate in scope.	Piece is slightly less than appropriate scope.	Piece is significantly less than appropriate scope.
Quality of Exhibit Label	Exhibit label is clear, thoughtful, and flawless and sophisticated in structure and conventions. It includes a title, artist's name, and explanation of piece and meaning behind it.	Exhibit label is mostly clear and thoughtful, with no errors in structure and conventions. It includes a title, artist's name, and explanation of piece and meaning behind it.	Exhibit label is somewhat clear and thoughtful, with few errors in structure and conventions. It includes a title, artist's name, and explanation of piece.	Exhibit label shows minimal clarity or thoughtfulness, with significant errors in structure and conventions OR does not include all required elements.