

# The Glow Show

**Maker Challenge Title** The Glow Show

**Grade level** Target grade = 9 and *scalable* down to grade 8 and up to grade 12

**Subject area(s)** Problem Solving; Science and Technology

**Estimated Time Required** 180 minutes

**Header image**



**Image 1**

**Image file:** glow-2304346\_960\_720

**ADA Description:** Particles are glowing green under a black light. The surroundings are completely black.

**Source/Rights:** © <https://pixabay.com/en/glow-glow-in-the-dark-granules-2304346/>

**Caption:** Glow-in-the-dark particles

## Maker Challenge Recap

Students start by making glow-in-the-dark slime or spray chalk to illustrate how nanoparticles can affect the properties of any materials they are added to. They take their new materials (slime or spray chalk) and devise industrial applications for them. Once they have determined a use for the slime or chalk, they build and test their devices. The groups create advertisements (videos, brochures, performances, etc.) for their new products or applications, and present them to judges for review in a “Shark Tank” environment.

## Maker Materials & Supplies

For the glow-in-the-dark-slime (per group):

- 1 cup warm water
- 4 ounces clear non-toxic liquid glue (can use white glue, but the slime will be opaque)
- 1 teaspoon glow powder
- 2 teaspoons borax (sodium tetraborate or sodium borate, NOT boric acid)

For the glow-in-the-dark spray chalk:

- Warm water
- Neon paint
- Cornstarch
- Spray bottles (condiment bottles will work)
- Something for them to spray the chalk onto (cloth, poster board, paper, etc.)

## **Kickoff**

**[It is easier to have the materials and instructions separated into totes/bins for each group ahead of time. Make sure you remove/change the labels on the glow powder and neon paint]**

Today, we're going to talk about one of cornerstones of science: innovation! Discovery simply means that you make observations that no one has noticed before. Innovation means taking what we discover, or what we already know, and using them in new ways. Innovation can also mean improving on a current design. However, before we can be innovative anything, we need a starting point.

Kutol Products was trying to make a paste that could be used as wallpaper cleaner. The paste was not a great wallpaper cleaner, but the company noticed that children were using the paste to make ornaments and other art projects. Abracadabra! Say hello to Play-doh!

At the University of Buffalo, Wilson Greatbatch was making a heart-recording prototype, when he added the wrong resistor to a circuit. He realized that the circuit's signal matched the electrical signal of the heart itself! Now the old, television-sized, pacemakers were replaced with ones that fit in the palm of your hand!

Today, you are going to be innovators! In groups, you are going to make either slime or spray chalk. These will be our starting points. You get to decide which one you are making. Once you have decided on your starting point, come up to the front of the room to gather your materials and instruction page.

**[Give them time to make their slime/chalk, then turn out the lights. Their slime/chalk should glow!]**

**[As an added layer of discussion, you can purposefully leave out one of the ingredients and allow the students to make discoveries about what happens]**

What did you discover? The powder you added to your slime or chalk causes it to glow! Right now, these particles are being added to toys, adding entertainment value. But what else could they be used for? How could glow-in-the-dark slime or chalk be useful in industry? Think as a biologist, as an engineer, or as an architect. How would they use a product that glows in the dark?

I want you to take your starting point and change its purpose. You now have indicators: indicators that glow in the dark! Let's make that useful. Where is this type of indicator needed?

You are going to design a use for your indicators and test it. Create a journal of your initial design, testing, observations, and any changes you make along the way. Once your design is perfected, I want you to advertise for your design. How you advertise it is up to you: video, brochure, poster, etc. You will then set up your advertisements for the judges. Prizes will go to the top three designs!

**[I have attached a sample rubric that you can give the students for the three parts of their project]**

## Resources

- Website for more glow in the dark slime recipes
  - <https://sciencenotes.org/easy-glow-dark-slime-recipes/>
- Website for glow in the dark spray chalk
  - <https://www.hgtv.com/design-blog/how-to/diy-glow-in-the-dark-squirty-chalk>

## Maker Time

- If students need help during their design phase, ask them
  - What industry would you like to focus on?
  - What would that industry need indicators for?
  - How are you going to add your slime/chalk to their industry?
- For their journals, encourage them to document every step. Have them include sketches and keep everything detailed and neat in their journal.
- If students need help with their advertisements, ask them
  - What type of advertisement would you like to do?
  - How are you going to show off your design and how the indicator works in your advertisement?

## Wrap Up

As a class, students will set up their advertisements for judging. Separate the advertisements into slime and chalk. If you would like, they can also be separated by industry.

The different categories that you use to judge the advertisements are up to you. Some selected categories could be: journals, design process, advertisements, and presentation.

## Attachments

- PowerPoint to introduce the project
- Sample rubric for the entire project, separated into parts

## Tips

- If you want to scale this down, you can limit the students to particular industries, or provide starting materials for them to consider.

## Contributors

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## Supporting Program

Nanotechnology Enabled Water Treatment Systems (NEWT) RET, Rice University  
NSF EEC-1449500

## Copyright

Rice University

Remember, you are trying to sell your product! How are you going to advertise it so everyone will need what they didn't even know they wanted? Here are a few things you should go over in your advertisement.

Use this page to answer the following questions. Make sure you include these in your advertisement!

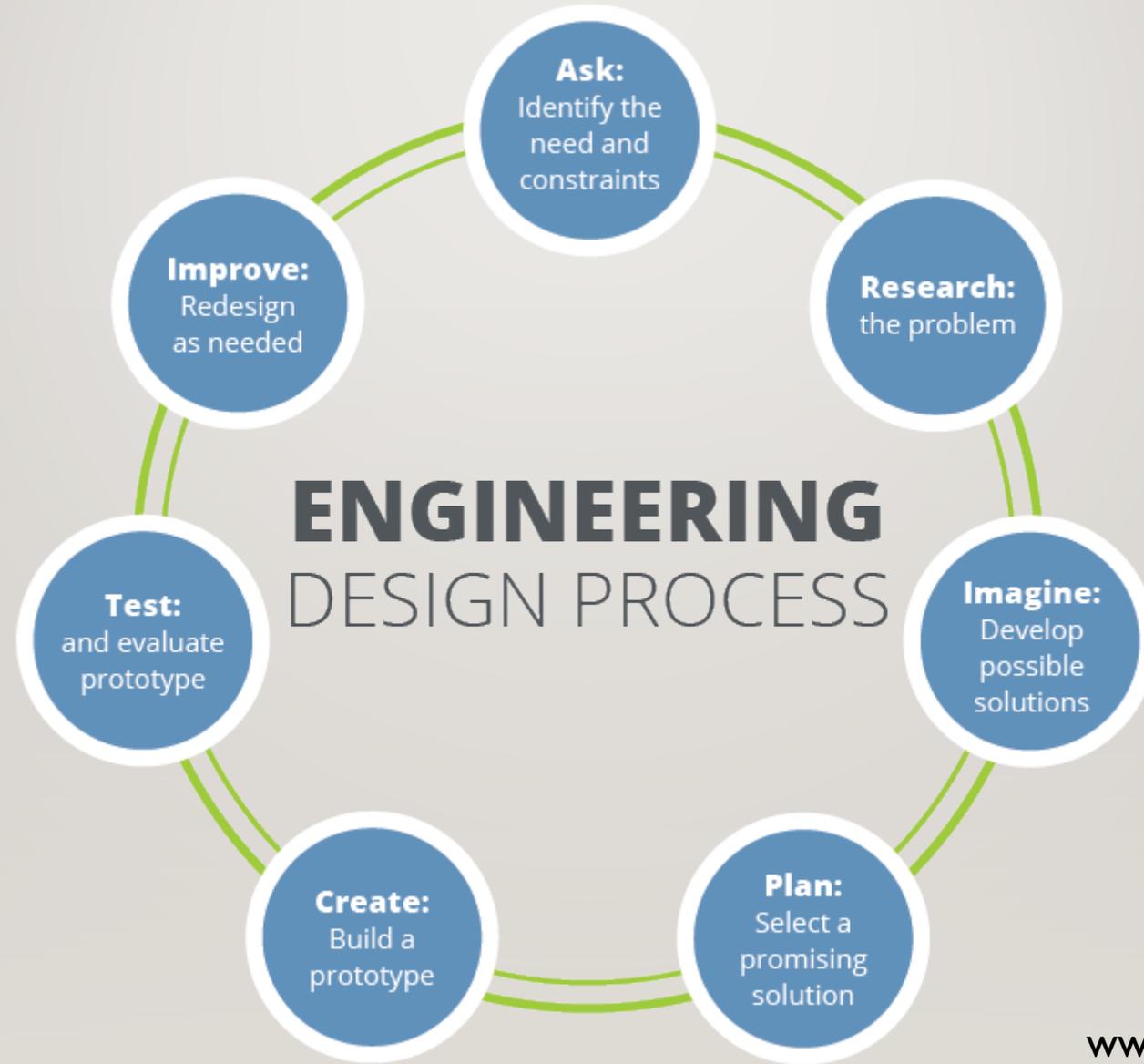
1. Explain what "nano" means.
2. Why are nanoparticles so innovative?
3. What field/industry are you focusing on?
4. How can an indicator be useful in your chosen industry?
5. How does your product improve the industry? What makes it innovative?
6. Did you have any setbacks? If so, what were they, and how did you overcome them?
7. What type of advertisement did you choose? Why did you choose that format?
8. Give a sample layout/plan for your advertisement below.

# FUN WITH ENGINEERING!

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(OR, PRACTICING THE ENGINEERING DESIGN PROCESS)





# WHAT IF YOU HAVE THE PRODUCT FIRST?

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MEANT TO BE A WALLPAPER  
CLEANER



STARTED AS A HEART-RECORDING  
DEVICE



# CHOOSE YOUR PRODUCT!



# NOW FIND A USE FOR IT!

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- Your product must fill a need in industry as an indicator.
  - What industry will you choose?
  - What will your product indicate?
- Keep an electronic journal of the engineering process!
  - Include prototypes, pictures, corrections, additions, and thoughts along the way.
  - Collect as much data as possible!

# PROMOTE YOUR INVENTION!

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- Advertise your product!
- How you advertise is up to you, but it must include:
  - The industry your invention is designed for
  - How it will be used as an indicator
  - A working demonstration

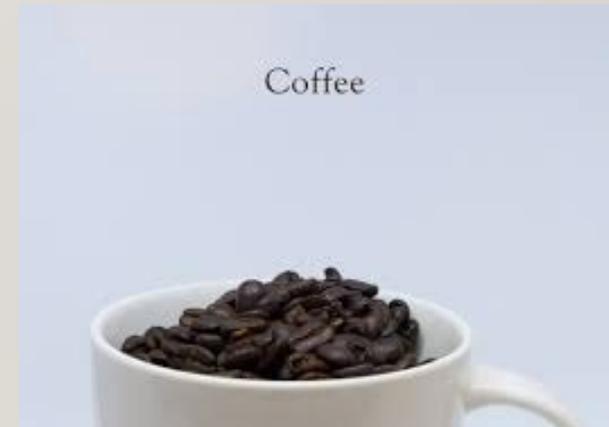


Free Book

## ***RAISE HAMSTERS***

The new wonder animals from Syria. Often called Toy Bears. Delightful pets. Everyone wants them. Laboratories need thousands. Clean, odorless. Raise anywhere. A profitable and interesting hobby or business. We furnish breeders and instructions. Write today for free book.

**GULF HAMSTERY, 1540 BASIL ST., MOBILE, ALA.**



"THE GLOW SHOW" RUBRIC  
Student Name: \_\_\_\_\_

Category	Weight for Each Category	4	3	2	1	0	Student Score
Invention Name				Invention is included on project		No invention name	
Student Name				Student name is included on project		No student name	
Digital Journal	x8 (32 points max)	The digital journal includes prototype information, modifications and testing information/data. At least 5 sketches/photos are included, and are of high quality. The journal includes all steps of the Engineering Design Process (shown on the instructions page), and the steps are highly detailed.	The digital journal is missing ONE of the following: prototype information, modifications, and testing information/data <b>OR</b> only 3 sketches/photos are included, and are of good quality <b>OR</b> the journal is missing one step of the Engineering Design Process (shown on the instructions page), or one of the steps is not detailed.	The digital journal is missing <b>TWO</b> of the following: prototype information, modifications, and testing information/data <b>OR</b> only 2 sketches/photos are included, and are of good quality <b>OR</b> the journal is missing TWO steps of the Engineering Design Process (shown on the instructions page), or TWO of the steps are not detailed.	The digital journal is missing <b>THREE OR MORE</b> of the following: prototype information, modifications, and testing information/data <b>OR LESS THAN TWO</b> sketches/photos are included, and are of good quality <b>OR</b> the journal is missing <b>MORE THAN TWO</b> steps of the Engineering Design Process (shown on the instructions page), or <b>MORE THAN TWO</b> of the steps are not detailed.	No digital journal turned in	
Advertisement	x8 (32 points max)	The advertisement makes excellent use of color and design. It is effective as a stand-alone advertisement (no extra explanation needed). The advertisement has a hook, explains usefulness of the invention, and how the invention benefits the user.	The advertisement makes good use of color and design. It is effective as a stand-alone advertisement (no extra explanation needed). The advertisement is missing one of the following: a hook to gain interest, an explanation usefulness of the invention, or how the invention benefits the user.	The advertisement is not in color or is sloppy <b>OR</b> It advertisement needs a little extra explanation need <b>OR</b> The advertisement is missing one of the following: a hook to gain interest, an explanation usefulness of the invention, or how the invention benefits the user.	The advertisement appears as if it was done at the last minute <b>OR</b> It advertisement needs a lot of extra explanation <b>OR</b> the advertisement is missing <b>MORE THAN ONE</b> of the following: a hook to gain interest, an explanation usefulness of the invention, or how the invention benefits the user.	No advertisement turned in	
Presentation	x8 (32 points max)	The presentation makes excellent use of color and design. It is at least 5-7 minutes long. The presentation has a hook, explains usefulness of the invention, and how the invention benefits the user. The student makes their presentation without any additional notes or reading.	The presentation makes good use of color and design. It is at least 5-7 minutes long. The presentation is missing ONE of the following: a hook, explanation usefulness of the invention, or how the invention benefits the user <b>OR</b> The student makes their presentation few additional notes or reading.	The presentation makes is not in color or is a little sloppy <b>OR</b> It is at least 3-5 minutes long <b>OR</b> The presentation is missing <b>TWO</b> of the following: a hook, explanation usefulness of the invention, or how the invention benefits the user <b>OR</b> The student makes their presentation some additional notes or reading.	The presentation appears as if it was done at the last minute <b>OR</b> It is at least 3-5 minutes long <b>OR</b> The presentation is missing <b>MORE THAN TWO</b> of the following: a hook, explanation usefulness of the invention, or how the invention benefits the user <b>OR</b> The student solely reads from their notes or presentation.	No presentation turned in	
<b>TOTAL</b>							