

Sadie Levy

Engineering LAP 1: What is an engineer? What are uses for different materials?


1/21/19

1. Content: Describe **what** it is you will teach. What is the content?

In this lesson students will be discovering what it means to be an engineer and the design process through starting our boat-making creation as a group. I will introduce that we are starting a new study on engineering, that today our job is to discover what engineers do. How do they create things? How do they decide what will work and what doesn't? We will gather in the front and partake in boat-creation while simultaneously recording our process so we ultimately have the design cycle written down on the board. After this, we will start our Engineering Journals which will include vocabulary section, the design process, and their results/findings once they have done two trials of their boats.
2. Learning Goal(s): Describe what specifically students will **know** and **be able to do** after the experience of this class.
 - a. SWBAT participate in a whole-group discussion regarding the creation of a boat.
 - b. SWBAT listen and work collaboratively to participate in a whole-group conversation.
 - c. SWBAT follow directions, copy what's on the board, and brainstorm in their engineering journals.
3. Rationale: Explain how the content and learning goal(s) relate to your Curriculum Unit Plan learning goals.
 - a. To start off this unit, I think it is imperative that students have a clear understanding of the design process. That is the epicenter of our engineering unit and is also key to the student's ability to apply those design skills to other areas of life that require testing and rebuilding. I imagine that by modeling how I would go about starting this boat challenge and by coming up with the steps together, they will feel they have more personal stake in following the design process and it will seem more intuitive to them personally.
4. Assessment: Describe **how** you and your students will know they have reached your learning goals.
 - a. I will assess students based on their participation as we go through the creating process of the design cycle, as well as what they put in their Engineering Journal for brainstorming. I am interested in what they draw, write and color for their ideas and how they choose to use the materials presented to them. There is no right or wrong to this, as long as they are thinking about their ideas and rationalizing them. Even if students do not write down their rationalization, their participation is what I am most concerned about for this lesson, and if I were to ask them, they could tell me why they chose the materials they did.

5. Personalization and equity: Describe how you will provide for individual student strengths and needs. How will you and your lesson consider the needs of each student and scaffold learning? How specifically will ELL students and students with learning disabilities gain access and be supported?
- a. This whole unit is designed with my ELL students and those with individualized plans. As Ms. E reminded us, when we make plans with students who need more adjusting in mind, we create lessons for everyone. I really loved her imagery of making a buffet dinner instead of individual plates for everyone. That has helped guide me in my creation of lessons, although I am still figuring out what that means exactly at every moment. In this lesson, my hope is that by creating the design cycle together, ELL students will have more of an opportunity to listen and see the words, as opposed to just reading them or having to come up with them on their own. I think for students like Christian, Chino, Angelo, Angelyn, Khloe, Prince (I'm thinking of students who have a hard time getting started sometimes), *feeling* and seeing the materials can be a good motivator and way to get them involved. Especially for students who are ELL, physically touching things to make the connection between word and the purpose of a material can be very helpful in their ability to brainstorm.
6. Activity description and agenda
- a. Describe the activities that will help your students understand the content of your class lesson by creating an agenda with time frames for your class. Be prepared to explain why you think each activity will help students on the path toward understanding.

time	teacher does	rationale
5 minutes	write down objectives on board as I introduce the new unit: -We will discover what engineers do when they design things! -We will understand the design process. -We will begin to understand what materials are good for what task.	As I teach more, I realize more and more how helpful it is (if not for the kids, at least for me), to know my focus and keep returning back to it. I think it's helpful for the students to know where they're going also.
3 minutes	Present the problem by reading the letter on the elmo and ask students what to do.	From this letter students will develop their first part of the design which is the Ask - what is the letter asking them to design?
15 minutes	Go up to the front of the room and follow their directions by asking	By asking students to tell me how to create the design process, they will

	<p>questions. What should I do first? What would come next? etc. Create a cycle like this on chart paper:</p> 	<p>have more personal stake in the creating of the engineering cycle and will hopefully feel more inclined to follow it when the boat-making time comes.</p>
<p>5 minutes</p>	<p>Students will have a chance to feel the materials to get an idea of what they're working with.</p>	<p>It's important for students (especially those who are more tactile learners or who have never seen these materials), to be able to feel the materials before they start brainstorming how to create a boat with them.</p>
<p>10 minutes</p>	<p>Write down the vocabulary they should have in their journals and the design cycle process. vocab: -Engineer: someone who wants to know how and why things work and create things to make them better -Design: to create or make something</p>	<p>I think having each student write down the vocabulary as they acquire it throughout the unit will help in their accumulation of knowledge and be helpful as a reference point (especially for the ELLs and students with IEPs).</p>
<p>5-10 minutes</p>	<p>Give students time to start brainstorming. They can write down whatever they want for their ideas based on the materials they got acquainted with.</p>	<p>Giving students independent time to get out all their creative ideas is important to validate all of their ideas and also let them creatively design!</p>

b. What particular challenges, in terms of student learning or implementing planned activity, do you anticipate and how will you address them?

- i. I imagine it might be hard for some students to participate in a whole-group discussion (stay focused, participate and raise their hand, follow my train of thought), however I hope to bring people in by warning them when I'm going to call on them so everyone has a chance to participate. I also imagine creating and writing in their the Engineering Journal may be tricky for some students (copying definitions), however they already have science lab notebooks, among many other notebooks, so I hope that they will be able to follow a format if I make it very explicit and model it.

7. List the Massachusetts Learning Standards this lesson addresses.

- a. K-2ETS1-3. Analyze data from tests of two objects designed to solve the same design problem to compare strengths and weakness of how each object performs.
- b. 2-PS1-1. Describe and classify different kinds of materials by observable properties of color, flexibility, hardness, texture, and absorbance.
- c. 2-PS1-2. Test different materials and analyze the data obtained to determine which materials have the properties that are best suited for an intended purpose.

8. Reflection

- a. In light of all areas of planning, but especially in terms of your stated purpose and learning goals, in what ways was the activity(ies) successful? How do you know? In what ways was it not successful? How might the activity be planned differently another time?
- b. What did you learn from the experience of this lesson that will inform your next LAP?

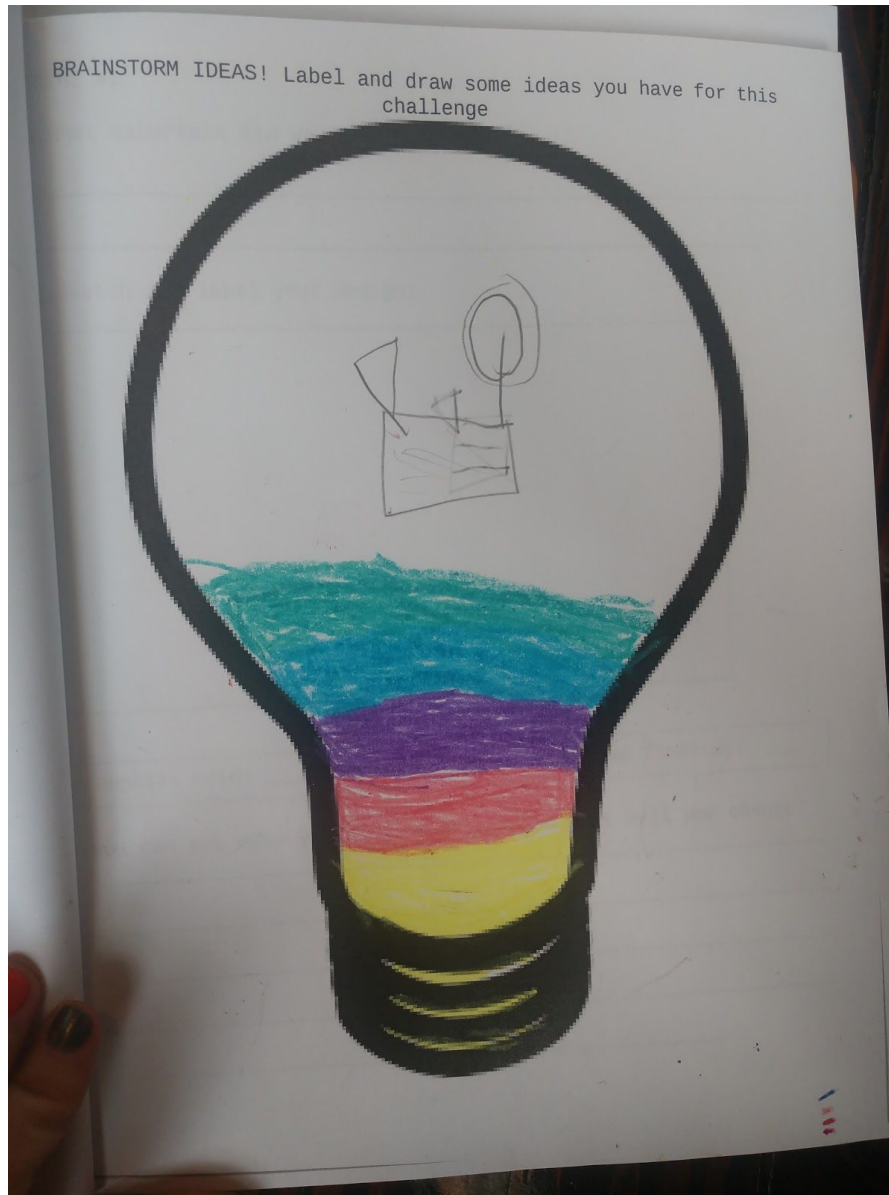
Overall, this lesson was more difficult than I first anticipated! There were several things that did not go quite as planned, that I'm sure I could have avoided if I thought about it more beforehand, but also are mistakes that I'm glad I made so I can prepare more for future lessons. The largest take-away from this lesson was my surprise that my students weren't as fluent with brainstorming for themselves as I thought. Although we've done some group brainstorming together where we either just vocally call things out, or I take notes on our brainstorm, I didn't think about how we hadn't really brainstormed individually before. Although some students were able to do this, others found it really challenge and I should have modeled it beforehand instead of during. What I wanted them to do was write, sketch, draw, color any of their ideas they had for boat creation. I didn't expect any of their ideas to really be complete or well thought out, just a brain dump. Instead, I had students asking me, "Can I color?" "Can I write?" etc, etc, which really surprised me and made me realize I hadn't prepared them enough or made clear my expectations.

One thing I realized part way through the lesson that was not intentional, could have made it more clear, which is that I had them doing independent work and then applying that independent thinking to group work the following week. Starting them off independently

brainstorming I realized was giving them a chance to fully dream and create for themselves. That low-stakes solo-thinking is so important in school! It made me realize I should do more of that.

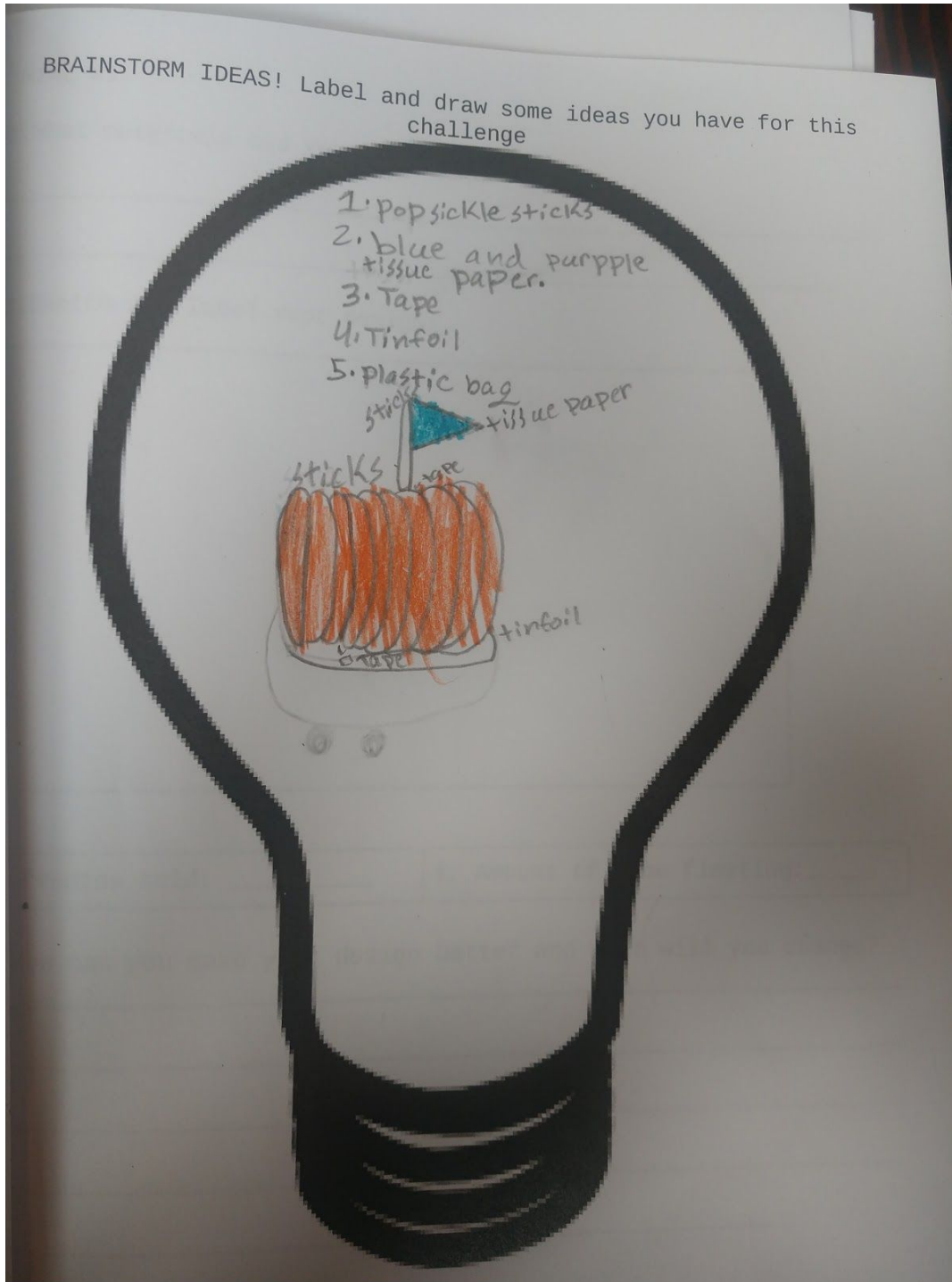
We didn't end up having time to do the journal work of writing down vocabulary and the engineering design process, so we will start our next lesson with that.

The first student sample I have is of Angelyn's work. She can usually get right to work if she understands the assignment, but clearly didn't quite understand my expectations because she did not mention any materials. She did, however, draw a boat diagram and probably has some reasoning as to which materials she would use.



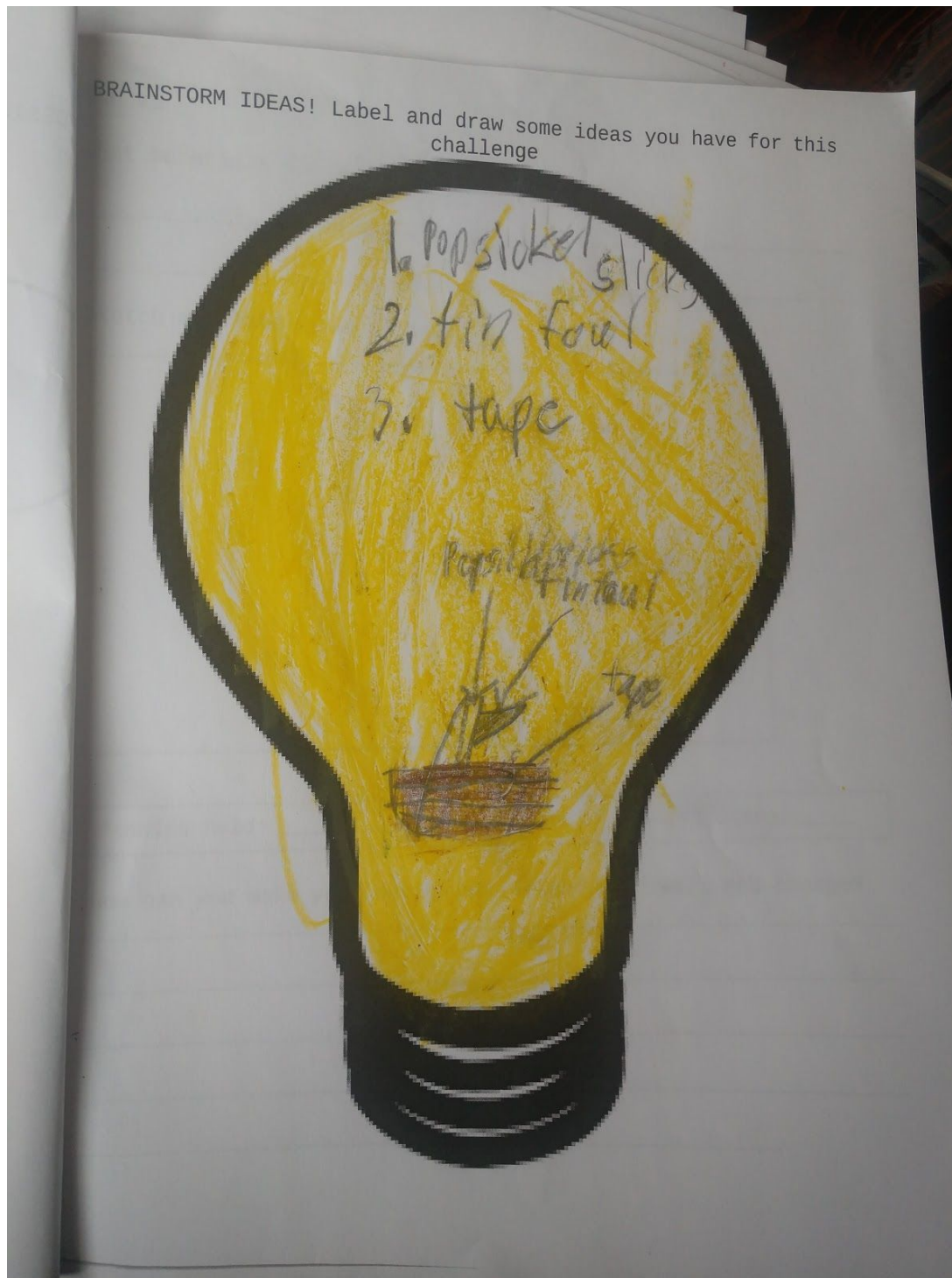
The following work is Khloe's. It seemed like her and Astried (who's work is not shown) showed some of the best understanding of what I expected. She clearly is drawing and coloring based

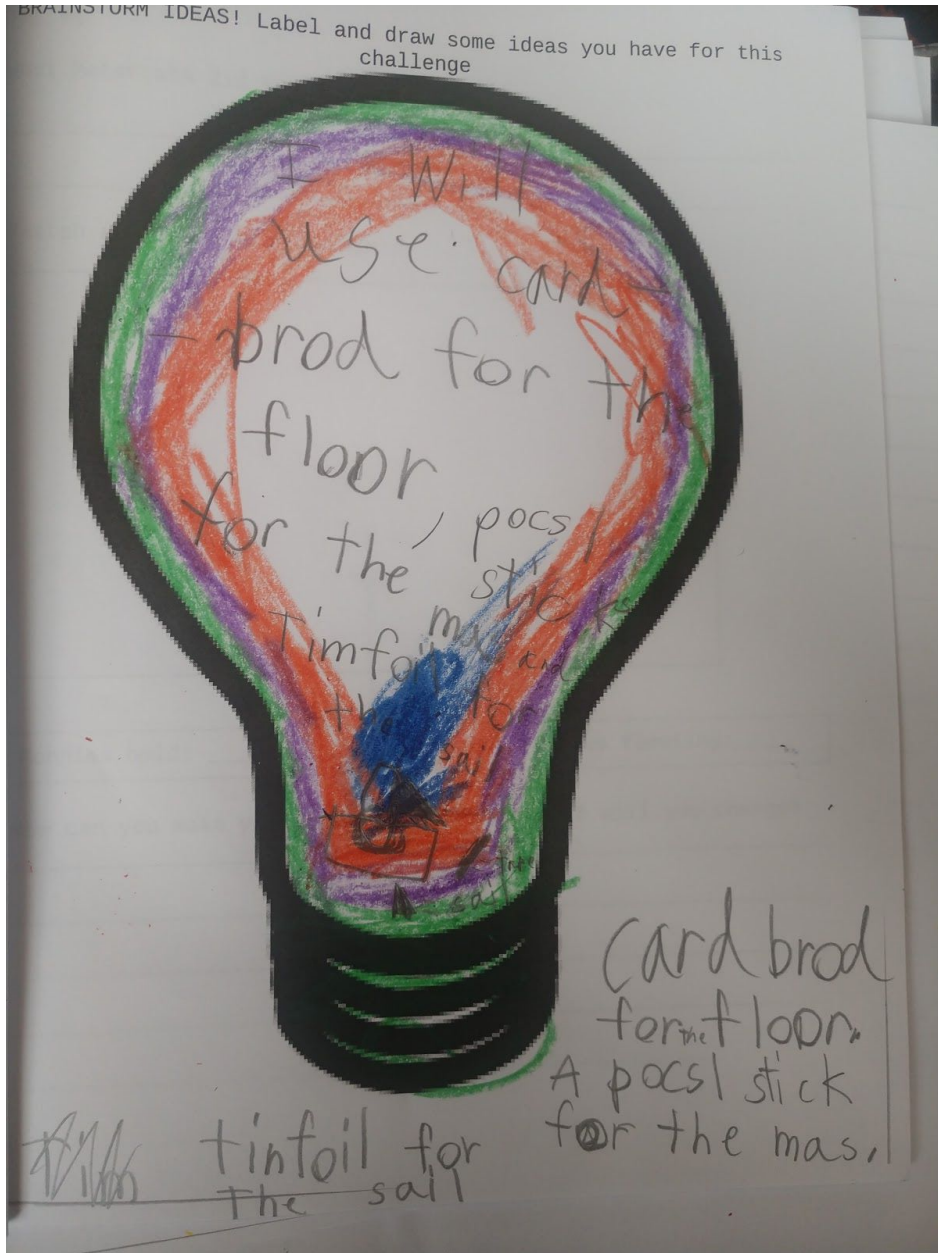
on what she observed of the materials and labeled her drawing.



Below is an example of work that made sense, but the coloring did not aid in my understanding of what the student was trying to get across. This is Nathaniel's work. Although it essentially gets to what I was hoping for, he is a student who I think could benefit from paying more close

attention to detail and applying himself more to the thought process. He is a bright student who I think could develop this brainstorm more.





This is Chino's work. I

really liked all the writing he did, and how this format I think allowed him to write wherever he pleased. I was a little confused, however, that his coloring didn't add to his brainstorm, seemingly. I should ask him why he colored the way he did. I think part of that was just that I didn't make it clear what the purpose of coloring could be.