Lesson Title: Air Time! Mathematical Slopes

Grade Level: 8th grade

Subject: Math

Time frame: 170 minutes (3 or 4 class periods)

Learning Goals

Learning Goals	Goal 1	How will they be met
Content Specific Goals	**CCSS.MATH.CONTENT.8.EE.B.5:** Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed. **CCSS.MATH.CONTENT.8.EE.B.6:** Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation y = mx for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b.	✓ Students will watch and reflect on a BrainPop video to understand how to calculate slope (they will use prior knowledge of calculating speed and distance as well). ✓ Students will graph and calculate (in Collabrify Flipbook) the slope of half pipes and predict the speed, distance and airtime. ✓ Students will calculate the slope of half pipes at different places on the non-linear axis to understand that slope m is in fact the same at any space. ✓ Students will research and design a skate boarding half pipe based on a specific air time and distance criteria.
Technology-based Goals (NETS-S)	**Empowered Learner:** Students leverage technology to take an active role in choosing, achieving and demonstrating competency in their learning goals, informed by the learning sciences.	EL & KC & ID-Students will use the Internet to gather information to design and build their own half pipe EL & KC & ID-Students will use a camera to capture half pipe images and video to construct their knowledge of the

☑ **Empowered Learner** ☐ **Digital Citizen** ☑ **Knowledge Constructor** ☑ **Innovative Designer** ☐ **Computational Thinker** ☐ **Creative Communicator** ☑ **Global Collaborator**	**Knowledge Constructor:** Students critically curate a variety of resources using digital tools to construct knowledge, produce creative artifacts and make meaningful learning experiences for themselves and others. **Innovative Designer:** Students use a variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions. **Global Collaborator:** Students use digital tools to broaden their perspectives and enrich their learning by collaborating with others and working effectively in teams locally and globally.	relationship between slope, distance, and speed. GC-Students will use Collabrify Flipbook to connect with other students, the teacher and an expert engineer around their half pipe design.
Other Goals	Learn how to perform at least 2 Skateboarding tricks http://www.exploratorium.edu/skateboarding/largeglossary.html	Students will use their newly built half pipe to try a few tricks!

Materials Needed for Lesson (tech and non-tech)	Brain Pop (https://www.brainpop.com/math/algebra/slopeandintercept/) Collabrify Flipbook Software (free) http://www.imlc.io/apps Camera (still and video) Google Customized Search Engine https://cse.**google**.com Materials such as Wood and tools to construct a half pipe

Lesson Overview

Lesson Overview: Share how the activities in the lesson will help to meet the learning goals. How will technology play a role in meeting the learning goals?
In order to understand slopes in everyday life and their relation to speed and distance. Students will learn how to calculate the slope of a skateboarding half pipe and create their own half pipe according to specific criteria on slope, speed and distance. The students already know how to calculate speed and distance, but not slope. The students will begin the lesson by watching a short video of skateboarder Tony Hawk. The teacher will start and stop the video as he is just about to exit the half pipe and the teacher will ask student's to predict how much air time he will get as he comes off the half pipe. They will do this with three or four different Tony Hawk videos. They will begin to see how slopes are related to speed, slope and distance. Next, the students will watch a short video from Brain Pop to learn how to calculate slope. While watching the video, the students will each take notes on the Collabrify Flipbook app to show how they understand slope calculation. The students will then take a field trip to the local skateboarding park, where they will take pictures of half pipes and calculate the slopes. They will make predictions based on their calculations as to which half pipes will provide the most air time and speed. Finally, they will videotape themselves going down the half pipes and calculate the airtime and speed by watching the recording. They will capture all their work in the Collabrify Flipbook app. Next the students will use pre-determined Internet websites (created by the teacher using Google Customized Search Engines) to research and build their own skate boarding half pipe. They will post their research on a private Collabrify Flipbook where an Engineer from the University of Michigan will weigh in to give them advice on their research and design ideas. They will build the half pipe (to a create a predetermined level of airtime and speed). Once built, the students will test their half pipe by measuring their own airtime and speed on their new creation. In addition, the students will learn at least two new tricks.

Triple E Framework Considerations

Share which technology tools you plan to integrate into the lesson. Describe how each tool will help to meet your learning goals. In addition, share the instructional practices that you plan to develop in conjunction with the tool to optimize the learning.

Name of Tool	**Tool #1** Brainpop Website	**Tool #2** Still and Video Camera	**Tool #3** Internet Search Engines (Google Customized Search Engine)	**Tool #4** Collabrify Flipbook
Learning goal(s) met by using the Tool	Students will watch the video on how to calculate slope via skateboarding half pipes. They will do the activities associated with the video. As a reflective practice, they will be taking notes on a Collabrify Flipbook to show their understanding of what they are learning in the video. This activity will help them understand how to calculate slope. By using a video, the students can	Students will take pictures of the half pipes at the skate park in order to use a ruler or draw on them to calculate the slope. They will also be able to predict the airtime and speed that their chosen team member will end up going down the half pipe. They will meet both their math learning goals by calculating not only the slope, but also being able to determine that the slope m is the	The students will use the customized search engine (created by the teacher to pre-select websites that are authoritative and on-task) to research how to create a half pipe and how to make it according to the air time and speed specifications that the teacher sets.	Collabrify Flipbook will be used throughout this lesson. First as a reflective tool for individually taking notes as the students watch the BrainPop video. The reason why Collabrify Flipbook is used is so that the teacher can weigh in and comment as the students are taking notes and sketching out their mathematical formulas. This will allow the teacher to synchronously

	self-pace, and there are no games or rewards at the end of the video to distract the student from the learning goals.	same at each point along the slope on the non-vertical line. They will use the video camera to take video of their team members going down the half pipe. They will calculate the air time and speed. They will compare how close they were in their speed and airtime calculation. They will also be able to make inferences about the different angles of a slope and speed/airtime.		monitor the student learning and co-engage in the learning process with the students as they demonstrate how to calculate slope from the video. It would be much more difficult to collect individual notes on paper. The students will share their research on a Collabrify Flipbook, this will help them collaborate with their team members but also it will allow an expert from the University of Michigan to weigh in on their work as they are working (as well as the teacher).
How is the Tool Being Integrated **Team, individual, pairs, or other?**	Individual	Teams	Teams	Teams
What features of the technology tool have elements of engagement? Answer the Triple E Engagement questions concerning how technology can bring about co-use, time-	Can the technology allow students to focus on the assignment/learning with less distraction (Time on Task)? No=0, **Somewhat=1**, Yes=2 Can the technology	Can the technology allow students to focus on the assignment/learning with less distraction (Time on Task)? No=0, **Somewhat=1**, Yes=2 Can the technology	Can the technology allow students to focus on the assignment/learning with less distraction (Time on Task)? No=0, **Somewhat=1**, Yes=2 Can the technology	Can the technology allow students to focus on the assignment/learning with less distraction (Time on Task)? No=0, Somewhat=1, **Yes=2** Can the technology motivate

on-task learning and focus on the learning goals. Anywhere there is a lower score (less than 4), consider adding in instructional moves in the notes to help push the score up! Some instructional moves are listed in the rows below.	motivate students to begin the learning process? No=0, **Somewhat=1**, Yes=2 Can the technology cause a shift in behavior, from more passive to active social learners (co-use)? **No=0**, Somewhat=1, Yes=2 Score=__2_/6 **Notes:** There are few engaging pieces built into this software. It is mostly a video they watch with a few drill and practice questions. The teacher will give a software tour of how to navigate and think when using the video and completing the activities. The teacher will periodically stop and ask students to share-aloud their learning. Finally, each student's will be taking notes and reflecting on their learning in their own Collabrify Flipbook that the teacher will be monitoring and weighing	motivate students to begin the learning process? No=0, **Somewhat=1**, Yes=2 Can the technology cause a shift in behavior, from more passive to active social learners (co-use)? No=0, **Somewhat=1**, Yes=2 Score=__3_/6 **Notes:** There are few engaging pieces built into the tool. The teacher will need to model "how to" think about capturing the slope so that it can be measured in a picture as well as on video. The teacher can do this through an I do, We do, You do approach at the skate park. The students will be co-using the cameras in teams. The teams will be reporting and sharing their work and conclusions via the team Collabrify Flipbook.	motivate students to begin the learning process? No=0, **Somewhat=1**, Yes=2 Can the technology cause a shift in behavior, from more passive to active social learners (co-use)? **No=0**, Somewhat=1, Yes=2 Score=__2_/6 **Notes:** There are few engaging pieces built into the tool. The teacher will show the teams how to navigate the search engine and ask them to brainstorm as a group what they should be looking for. The teacher will develop a mentor text Collabrify Flipbook so they can understand how to begin to organize their thinking. Periodically the teacher should ask the teams to share what they are learning and their progress with the other teams. The students will be co-constructing knowledge together in	students to begin the learning process? No=0, Somewhat=1, **Yes=2** Can the technology cause a shift in behavior, from more passive to active social learners (co-use)? No=0, Somewhat=1, **Yes=2** Score=__6_/6 **Notes:** Collabrify Flipbook has real time collaboration built into it. Beyond using text, Collabrify Flipbook allows students to draw and sketch out ideas and the software is made for synchronous collaborative use, thus other students, teachers and experts can also type and draw on the document in real time. In addition, it has few distractions from the text of the document. The students will also either be co-using the document by working in teams or connecting with the teacher or an expert engineer through

	in on as needed. **Teaching Moves Included (From list below):** The teacher will conduct a software tour of how to use and start and stop the video. Included the tour will be modeling of how to think about the content that is being presented and write down notes and post into Flipbook. She will model how to self-reflect on their notes. The teacher will walk around the room and monitor the students working alone. The teacher will ask the students to periodically pause and share-aloud their thinking and understanding.	**Teaching Moves Included (From list below):** The teacher will model how to use the camera to shoot the video and still pictures. Then the teacher will model what they should be noticing and paying attention to in their filming. The teacher will model using an I do, We do, You do approach. The students will co-engage in the technology by working in teams. The teacher will walk around and monitor teams as they work.	their teams. **Teaching Moves Included (From list below):** The teacher will demonstrate through guided practice how to do a custom search using the search engine, and posting notes into their Flipbook notebooks. The teacher will create a mentor text (example) as part of the guided practice. The students will work in their teams (co-use) as they search. The teacher will ask the teams to periodically pause and share-aloud their thinking and understanding.	Collabrify Flipbook sharing options. **Teaching Moves Included (From list below):** The teacher will conduct a software tour of how to use Collabrify Flipbook. Included the tour will be modeling and navigation of the tool. In addition, they will create a mentor text together as part of the software tour. Students will be working in teams so that they co-use the software (in addition to co-engaging through the software's collaborative features). Finally, teams will participate in a switcheroo, where they will take over another teams Flipbook to give them constructive feedback.
Which teaching moves could be integrated to aid technology in helping students engage in the learning goals? In other words, what is	☐ Guided practice ☑ Modeling thinking ☑ Modeling navigation	☐ Guided practice ☑ Modeling thinking ☐ Modeling navigation	☑ Guided practice ☐ Modeling thinking ☐ Modeling navigation	☐ Guided practice ☑ Modeling thinking ☑ Modeling navigation

lacking in the technology tool (from the score above) that could be improved by good instructional strategies. Which strategies listed might be helpful. Note: This is just a suggested list.	of the tool ☑ Software tour ☐ I do, we do, you do ☑ Teacher monitoring ☑ Student self-reflective monitoring ☐ Co-use or co-engagement ☐ Purposeful partnering ☐ Gradual release of learning ☐ Create a mentor text ☑ Share-aloud ☐ Turn and talk ☐ Switcheroo ☐ Other	of the tool ☐ Software tour ☑ I do, we do, you do ☑ Teacher monitoring ☐ Student self-reflective monitoring ☑ Co-use or co-engagement ☐ Purposeful partnering ☐ Gradual release of learning ☑ Create a mentor text ☐ Share-aloud ☐ Turn and talk ☐ Switcheroo ☐ Other	of the tool ☐ Software tour ☐ I do, we do, you do ☐ Teacher monitoring ☐ Student self-reflective monitoring ☑ Co-use or co-engagement ☐ Purposeful partnering ☐ Gradual release of learning ☑ Create a mentor text ☑ Share-aloud ☐ Turn and talk ☐ Switcheroo ☐ Other	of the tool ☑ Software tour ☐ I do, we do, you do ☐ Teacher monitoring ☐ Student self-reflective monitoring ☑ Co-use or co-engagement ☐ Purposeful partnering ☐ Gradual release of learning ☑ Create a mentor text ☐ Share-aloud ☐ Turn and talk ☑ Switcheroo ☐ Other
What features of the technology tool include	Can the technology allow students to develop or demonstrate a more	Can the technology allow students to develop or demonstrate a more	Can the technology allow students to develop or demonstrate a more	Can the technology allow students to develop or demonstrate a more

elements to enhance student learning? Answer the Triple E Enhancement questions concerning how technology can bring about learning supports/scaffolds, higher-order thinking, and value-added over traditional tools. Anywhere there is a lower score (less than 4), consider adding in instructional moves in the notes to help push the score up! Some instructional moves are listed in the rows below.	sophisticated understanding of the learning goals (possibly use higher-order thinking skills)? **No=0**, Somewhat=1, Yes=2 Can the technology create or provide supports (scaffolds) to make it easier to understand concepts or ideas (possibly differentiate or personalize)? No=0, **Somewhat=1**, Yes=2 Can the technology create paths for students to demonstrate their understanding of the learning goals in ways they could not do with traditional tools? No=0, **Somewhat=1**, Yes=2 Score=_2_/6 **Notes:** The video allows students to have a visual of what they will be measuring at the skate park. It also permits students to start and stop the video so they can work at their own pace as they analyze the	sophisticated understanding of the learning goals (possibly use higher-order thinking skills)? No=0, **Somewhat=1**, Yes=2 Can the technology create or provide supports (scaffolds) to make it easier to understand concepts or ideas (possibly differentiate or personalize)? No=0, **Somewhat=1**, Yes=2 Can the technology create paths for students to demonstrate their understanding of the learning goals in ways they could not do with traditional tools? **No=0**, Somewhat=1, Yes=2 Score=_2_/6 **Notes:** The value-added of the camera is that it captures the video in the moment and will allow for playback so that the speed can be measured. In addition, the still images of the slope make the slope easier to	sophisticated understanding of the learning goals (possibly use higher-order thinking skills)? **No=0**, Somewhat=1, Yes=2 Can the technology create or provide supports (scaffolds) to make it easier to understand concepts or ideas (possibly differentiate or personalize)? No=0, Somewhat=1, **Yes=2** Can the technology create paths for students to demonstrate their understanding of the learning goals in ways they could not do with traditional tools? No=0, **Somewhat=1**, Yes=2 Score=_3_/6 **Notes:** The customized search engine provides options for students of different learning and reading levels to get similar information. They will be able to learn how to construct their half pipe by using the	sophisticated understanding of the learning goals (possibly use higher-order thinking skills)? No=0, Somewhat=1, **Yes=2** Can the technology create or provide supports (scaffolds) to make it easier to understand concepts or ideas (possibly differentiate or personalize)? No=0, Somewhat=1, **Yes=2** Can the technology create paths for students to demonstrate their understanding of the learning goals in ways they could not do with traditional tools? No=0, **Somewhat=1**, Yes=2 Score=_5_/6 **Notes:** Collabrify Flipbook allows for students to collaborate with other students in the class, the teacher and an expert through the tool. Collabrify Flipbook also works in conjunction with the other Collabrify suite

	relationship between the half pipe and slopes. This could allow for differentiation of learning. **Teaching Moves Included (From list below):** The teacher will ask students to share-aloud what they are learning as they watch the video. This will help to elicit reflective thinking and make their ideas visible. Students will be able to self-pace for differentiation of learning.	measure as a 2 dimensional object. **Teaching Moves Included (From list below):** The teacher will ask the students to predict what will happen prior to filming. They will be given an anticipation guide to help them think through their predictions and the actual results.	Internet resources. **Teaching Moves Included (From list below):** The students will organize their notes in a graphic organizer with Collabrify Flipbook as they are researching. This will also serve as a research notebook. They will periodically be sharing aloud what they are learning and using evidence from their Flipbook to support their ideas. The custom search engine will have different reading levels to choose from, so students can locate articles and research for their "just right" reading level.	of tools (maps, writer, spreadsheets…etc) so that students can use the tool that best helps them co-construct ideas. All of the tools have collaboration built into them. **Teaching Moves Included (From list below):** The students will be working in Flipbooks and discussing ideas with the engineers as well as their peers. Flipbook already has collaboration as well as scaffolds built into it.
Which teaching moves	☐ Active listening	☐ Active listening	☐ Active listening	☐ Active listening

could be integrated to aid technology in enhancing the learning goals? In other words, what is lacking in the technology tool (from the score above) that could be improved by good instructional strategies. Which strategies listed might be helpful. Note: This is just a suggested list.	☐ Switcheroo ☐ Self reflective practices ☐ Visible thinking routines ☐ Graphic organizers ☐ Visual representations of learning ☐ Reflective notebooks ☐ Anticipation guides ☐ Questioning practices ☐ Predicting ☑ Differentiation ☐ Personalization ☑ Share-aloud ☐ Other	☐ Switcheroo ☐ Self reflective practices ☐ Visible thinking routines ☐ Graphic organizers ☐ Visual representations of learning ☐ Reflective notebooks ☑ Anticipation guides ☐ Questioning practices ☑ Predicting ☐ Differentiation ☐ Personalization ☐ Share-aloud ☐ Other	☐ Switcheroo ☐ Self reflective practices ☐ Visible thinking routines ☑ Graphic organizers ☐ Visual representations of learning ☑ Reflective notebooks ☐ Anticipation guides ☐ Questioning practices ☐ Predicting ☑ Differentiation ☐ Personalization ☑ Share-aloud ☐ Other	☐ Switcheroo ☐ Self reflective practices ☐ Visible thinking routines ☐ Graphic organizers ☐ Visual representations of learning ☐ Reflective notebooks ☐ Anticipation guides ☐ Questioning practices ☐ Predicting ☐ Differentiation ☐ Personalization ☐ Share-aloud ☐ Other
How does the technology	Can the technology create	Can the technology create	Can the technology create	Can the technology create

extend the learning goals? Answer the Triple E Extend questions concerning how technology can bring about learning that connects to everyday life, allows learners to continue to learn 24/7 and helps them develop soft skills. Anywhere there is a lower score (less than 4), consider adding in instructional moves in the notes to help push the score up! Some instructional moves are listed in the rows below.	opportunities for the students to learn outside the typical school day? **No=0**, Somewhat=1, Yes=2 Can the technology create a bridge between school learning and everyday life (authentic experiences)? No=0, Somewhat=1, **Yes=2** Can the technology allow students to build authentic life skills, which they can use in their everyday life (soft skills)? **No=0**, Somewhat=1, Yes=2 Score=_1_/6 **Notes:** The video is discussing how to measure slope based on an actual half-pipe, which helps connect to their authentic problem that they are addressing. Yet, the video is a cartoon and not very authentic for developing soft skills or creating new opportunities to learn outside their school day. **Teaching Moves**	opportunities for the students to learn outside the typical school day? No=0, **Somewhat=1**, Yes=2 Can the technology create a bridge between school learning and everyday life (authentic experiences)? No=0, Somewhat=1, **Yes=2** Can the technology allow students to build authentic life skills, which they can use in their everyday life (soft skills)? No=0, **Somewhat=1**, Yes=2 Score=_4__/6 **Notes:** The camera allows students to capture skate boarding in real life and can slow down the skate boarding so that they can measure the authentic example. This helps students understand how to use video to capture and measure real world experiences. **Teaching Moves Included (From list below):**	opportunities for the students to learn outside the typical school day? No=0, **Somewhat=1**, Yes=2 Can the technology create a bridge between school learning and everyday life (authentic experiences)? **No=0**, Somewhat=1, Yes=2 Can the technology allow students to build authentic life skills, which they can use in their everyday life (soft skills)? No=0, **Somewhat=1**, Yes=2 Score=__2_/6 **Notes:** The custom Google search engine does not organically extend learning or build a bridge between school learning and everyday life experiences. However, there are some soft skills that come into play, including students using their inquiry skills to ask questions and gather evidence from authoritative resources to provide evidence for how	opportunities for the students to learn outside the typical school day? No=0, **Somewhat=1**, Yes=2 Can the technology create a bridge between school learning and everyday life (authentic experiences)? No=0, Somewhat=1, **Yes=2** Can the technology allow students to build authentic life skills, which they can use in their everyday life (soft skills)? No=0, **Somewhat=1**, Yes=2 Score=_4_/6 **Notes:** Collabrify While Flipbook is an app, through it's collaborative features, it allows students to connect with an expert on engineering and construction. They are able to engage in authentic discuss through Collabrify Flipbook about their construction of their half pipe. **Teaching Moves Included (From list**

	Included (From list below): The teacher will be using a real-world problem that the students will investigate.	The teacher will be using a real-world problem that the students will investigate. The students will also be using their own video cameras on their mobile devices.	to properly construct their half pipe. This could be transferred to searching for other things they would like to do in their everyday lives. **Teaching Moves Included (From list below):** The teacher will be using a real-world problem that the students will investigate, as well as model investigative strategies using the custom search engine. The teacher will also discuss the significance of authoritative resources when researching online (soft skills).	**below):** The teacher will be using a real-world problem, bring in real engineers through the software and ask students to engage in synchronous discourse with others on the development of the half-pipe.
Which teaching moves could be integrated to aid technology in extending the learning goals? In other words, what is lacking in the technology tool (from the score above) that could be improved by good instructional strategies. Which strategies listed might be helpful. Note: This is just	☑ Real world issues ☐ Partner with real world organizations ☐ Connect with authentic experts ☐ Engage students in	☑ Real world issues ☐ Partner with real world organizations ☐ Connect with authentic experts ☐ Engage students in	☑ Real world issues ☐ Partner with real world organizations ☐ Connect with authentic experts ☐ Engage students in	☑ Real world issues ☐ Partner with real world organizations ☑ Connect with authentic experts ☑ Engage students in

a suggested list.	authentic discourse with others ☐ Pen Pals ☐ Student's investigate and direct their own project ☐ Role playing ☐ Use authentic tools that are prominent in everyday life ☐ Other	authentic discourse with others ☐ Pen Pals ☐ Student's investigate and direct their own project ☐ Role playing ☑ Use authentic tools that are prominent in everyday life ☐ Other	authentic discourse with others ☐ Pen Pals ☑ Student's investigate and direct their own project ☐ Role playing ☐ Use authentic tools that are prominent in everyday life ☐ Other	authentic discourse with others ☐ Pen Pals ☐ Student's investigate and direct their own project ☐ Role playing ☐ Use authentic tools that are prominent in everyday life ☐ Other
Lesson set up. **How will I prepare for this piece of technology in this lesson?** **What do I need to do to get the technology ready?** ✓ **Selecting the just right tool or part of the resource** ✓ **Setting up Accounts**	Student accounts should be pre-set up in BrainPop, so they can easily login and get started without distraction. The teacher may want to pre-plan a note-taking template for the video (at least for students who may need this support).	Make certain that each team has a camera that can capture stills and at least 30 seconds of video.	Teacher should set up the Google custom search engine and tiny the URL so the link is easy for the students to access.	Google Accounts should be set up (Collabrify Flipbook works with Google) The expert engineer should know how to connect with the student teams.

✓ **Differentiating** ✓ **Personalizing** ✓ **Creating models or mentor**				
Assessment **How will you assess the activities happening through the tool?** ✓ **Monitoring/observations** ✓ **Formative assessment** ✓ **Informal assessments** ✓ **Summative assessment**	Students' will be assessed via monitoring by the teacher as they are watching the video. In addition, they teacher will ask the students to take notes via Collabrify Flipbook and share the notes with the teacher. The teacher can monitor the note-taking to make certain they are understanding how to properly calculate slope.	The teacher will be observing and monitoring the team's activities with the camera. In addition, each team will post their findings on their collaborative Collabrify Flipbook that the teacher can see and monitor as they are posting. The teacher can give feedback via the Collabrify Flipbook.	The teacher and an engineer will be observing and monitoring the team's activities and research choices in Collabrify Flipbook. In addition, the teacher will be evaluating the final half pipe that the students to constructed and test to see if it met the assignment criteria.	The teacher and an engineer will be observing and monitoring the team's activities in Collabrify Flipbook. In addition, the teacher will be evaluating the final half pipe that the students to constructed and test to see if it met the assignment criteria.

Procedures

What is the minute-to-minute activity that will be happening in the lesson. Describe what the teacher is going to do and say, as well as what the students are going to do.

Time stamp and what is	**What are the students going to do?**	**What is the teacher going to say?**

the teacher going to do		
0-5 Minutes: Teacher will introduce the project with a video of Tony Hawk	Students will watch the Tony Hawk Videos and make predictions, answer teacher's questions from direct instruction.	"Today we are going to learn how to become Tony Hawk! Watch this video and when I stop it, I want you to predict how much air time , in seconds, Tony will get." Ask probing questions…"why did you predict that?" "How does the half pipe play a role in your prediction?" "You are going to have a chance to build your own skate boarding half pipe!
5-7 Minutes: Teacher shows how to use BrainPop (modeling thinking and a "we do")	Students will watch the teacher model and participate in the "we do"	"Eyes on me as I show you how to login to BrainPop. Once you login you will click on the slope video. You will watch this video. As you watch I want you to take notes of how to find the slope of a half pipe. As you watch the video, you will be using Collabrify Flipbook to sketch out your ideas on how to calculate slope of a half pipe. For example, as I watch this scene I notice that the half pipe seems to have a steep slope, I am going to write that down in my Flipbook notes. I am going to count the seconds that it takes the skateboarder to come down from the air. Let's count that together. It says that he went 5 feet. What did everyone get for the air time? How can we calculate the speed of how fast he went in the air? Good. Now the trick is going to be figuring out the slope. That is your task. As you watch the video, write down the equation you need to know in Flipbook. You can rewind the video or pause it. There is no rush getting through the video. I will be monitoring your work in Flipbook. After you think you understand how to calculate the slope, try the practice quiz."
7-25 Minutes: Teacher will circulate and monitor the students as they are using BrainPop. They will also be using their iPad to see the individual student's work in Flipbook.	Students get out laptops and begin to use the BrainPop Website at their own pace	"Now it is your turn, please get a laptop and login to BrainPop and Collabrify Flipbook. Please share your Flipbook with me so I can monitor your work. Begin watching the video at your own pace. I will walk around to help and check in on your work."
	Students will share what they have learned	

25-30 Minutes: Teacher will ask students to participate in a Share-aloud	thus far about calculating slope.	"Hands off computers and eyes on me. I want you to look at your notes for 30 seconds. I want you to find two things to share that you have learned about calculating slope."
30-40 Minutes: Teacher continues to circulate and periodically sites down with students as they work.	Students will continue to work on understanding Slope via the Brainpop video and activities on the website. They continue to share ideas in Flipbook.	
40-45 Minutes: Teacher will ask students to participate in a Turn and Talk.	Students will find a partner and share what they have learned about calculating slope on a half pipe. A couple pairs will be asked to share out.	"Hands off computers and eyes on me. I want you to look at your notes for 30 seconds. I want you to find a partner from your pre-assigned team and share how you know how to calculate slope on a half pipe." "I will ask two teams to share out loud what they know."
45-55 Minutes: Teacher places students in teams and asks them to prepare for their field trip to the Skate Park the next day	Students will get in their pre-determined teams, set up their Collabrify Flipbook for the team, share it with everyone. They will make a plan for each team member to have a role at the skate park the next day (note taker, camera person, measurer, double-checker)	"Now it is time to get into your teams of 4. Please take a minute and give everyone a role from the list on the board. Then set up your Flipbook for the team and share it with me. Decide on whose cell phone camera you will use. It needs to be able to take a still picture and capture at least 30 seconds of video at a time. Your plan should be documented in your Flipbook."
DAY 2 (at Skate Park)		
0-5 Minutes: Students are placed in teams and	Student will gather in their teams with their mobile devices. The should have one	"Please get into your teams. Eyes on me as I show you how to use your

teacher explains the procedures for the day. **5-10 Minutes:** Teacher models through guided practice how to use cameras to capture slope. And then how to calculate the slope from the image. Teacher used "I do, We do, You do" to work with students on creating a mentor text sample of what the students will create.	camera and one or two devices to document the experience with Collabrify Flipbook. They will listen to the instructions and watch the guided practice model by the teacher.	camera to capture the image of a half pipe so you can calculate the slope. You can select any of the half pipes here at the skate park. I am going to take a picture at the side angle so I can see the slope. I want everyone to come take a look at what I mean. Now I am putting the picture into Flipbook and I will sketch out how to calculate the slope here in Flipbook. I will find the Rise and the Run. Now that I have found the slope, I will try to estimate the distance, speed and air time that my chosen team member will get when he or she actually goes down the half pipe. This is a prediction, but to make a good prediction I need to think about the slope and how it will play a role in my prediction. My slope is pretty steep…what does that mean?" Student's answer. "How can it help me determine my prediction?" Student's answer. Now let's do one together." Students and teacher will work on one together. "Alright now it is your turn, please make sure to document everything in Flipbook, I will be monitoring your work in there."
10-35 Minutes: Teacher will monitor teams as they document their learning in Flipbook and circulate as teams are working at the Skate park	Students take pictures of three half pipes and calculates the slopes. They then make predictions on which ones will have the most air time and speed. They will document their learning in Flipbook.	
35-45 Minutes: The teacher models how to use the video camera to video tape someone going down the half pipe and how to use that video to calculate	Students watch the teacher model how to calculate the speed, time and distance by having someone do the half pipe.	"Now I need a volunteer to skate down my chosen half pipe while I video tape. Remember we predicted that the air time would be 4 seconds and the distance would be 5 feet. Let's see how accurate we are. I am going to make sure I get the person the edge of the half pipe and the landing spot so I am doing a long shot. As our student goes down the half pipe, I want everyone to count how long they are on the

speed, distance and time. **45-55 Minutes:** Teacher will monitor teams as they document their learning in Flipbook and circulate as teams are working at the Skate park	Students take videos of one team member going down each slope. Students then use the videos to calculate the air time and speed. They compare and contrast them, trying to understand how slope plays a role.	ramp and how long they are in the air." Now the student goes down the half pipe while the teacher video tapes. "What did everyone get?" "So the air time was 2 seconds and the distance was 3 feet when we measure it in real time on the ground. So what is the speed? How do we calculate that?" Students share answers and they do it together. They re-watch the video to double-check their work.
55-60 Minutes: Teacher asks students to pause and turn and talk to reflect on what they are learning about the relationship between slope, speed, and distance.	Students reflect in their teams with a turn and talk and then as a share-aloud with the whole group.	"Now please take a minute to turn and talk with someone in a different team about what you know about slope, speed and distance. Also, what you still wonder about slope, speed and distance. Finally, share how this will impact the building of your own half pipe."
DAY 3: In Classroom **0-3 Minutes:** Teacher introduces the goal for the day. Teacher reviews what they learned about slope in the previous two classes.	Students listen to teacher as they review the goals for the day.	"Today we are going to start working on your research to build your half pipe. Remember that you need to build a half pipe that allows your chosen teammate to have at least 2 seconds of airtime but no more than 5 seconds. In addition, you need to make sure you go at least 2 feet. You will be using the Custom Search engine I created to do all your research. Before starting your research, I want your team to brainstorm the important keywords that you need to use in order to refine your search. This brainstorm should be reflected in your Flipbook. When

3-5 Minutes: Teacher models how to use the Custom Search Engine		you use the custom search engine, you will need to put quotes around connecting words such as "half pipe" or "slope intercept". You need to come up with materials to build your half pipe and determine the slope of your half pipe (provide evidence that this slope will meet the criteria)." I will be monitoring your work in Flipbook."
5-20 Minutes: Teacher monitors work by circulating and checking work via Flipbook.	Teams work together to research how to build a half pipe. They post their findings on Flipbook.	
20-30 Minutes: Teacher asks teams to do a Switcheroo	Teams each share their Flipbook with another team and begin to comment and give feedback on the other team's work.	"Time for a switcheroo. Please share your Flipbook with the team to your right. Give comments on their resources that they have found, the materials they are selecting, and how they are determining the slope. Saying "good job" is not helpful feedback. Helpful feedback is asking probing questions or suggesting other resources."
30-50 Minutes: Teacher monitors work by circulating and checking work via Flipbook.	Teams work together to research how to build a half pipe. They post their findings on Flipbook.	
50-55 Minutes: Teacher tells teams how to share their research with the engineer expert.	Teams work together to research how to build a half pipe. They post their findings on Flipbook.	"Please share your research and two questions that you would like them to respond to with our expert…engingeertom@umich.edu. Dr. Russell will weigh in to your work over the next week."

55-60 Minutes: Teacher will share the building process. Teams will have one week to build their Half Pipe and demonstrate it the next week in class (if time, they could build during the next class and bring in materials). Teacher will share the rubric that will be used to assess their projects.		