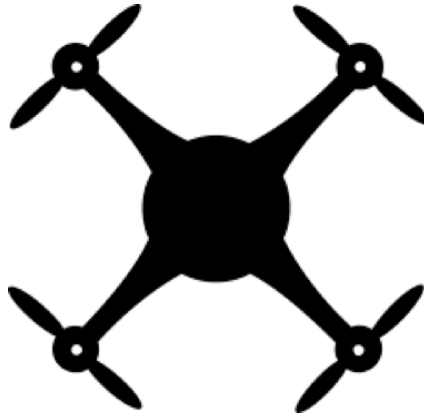


Summer Engineering Experience for Kids  
**Aeronautical Engineering**  
Engineering Design Challenge



DRONES  
Teacher Instructional Guide



**Dear Mentors,**

Over the course of the week, our young engineers will be taking on the **Drone Challenge**. Engineers will work in teams of 4-5 to apply the Engineering Design Process (EDP) and the scientific concepts related to simple machines, force, energy and motion. Below you will find your week-at-a-glance, a materials list, and some background information that will help you prepare for the challenge topic area. Also included is a copy of the challenge letter as well as the end of week challenge expectations.

**Student Challenge Letter: Dear Young Engineers,**

Drone Flight Incorporated, a leader in the development of advanced technologies and the Federal Emergency Management Agency (FEMA) has invited the National Society of Black Engineers (NSBE) to produce quality unmanned aerial vehicles or Drones. FEMA and Drone Flight Incorporated wants NSBE to develop Drones that can navigate through disastrous environments to help people. These Drones will be used to supply essential supplies to people in hard to reach areas and will be able to conduct search and rescue operations. NSBE has contracted several aeronautical engineering teams to develop high performing Drones that are both innovative and durable.

To ensure that NSBE develops high performing Drones, NSBE will host a Drone competition at the Summer Engineering Experience for Kids (SEEK) program.

The aeronautical engineering team that can present the best performing model in the following categories and meets minimum performance expectations will win a chance to represent NSBE.

On behalf of the National Society of Black Engineers, we wish you the best of Luck!

**End of Week Challenge Activities**

There are **five** competition categories that your teams will compete in: **Engineering Content Presentation, Artistic Design Presentation, and Race Challenge 1, Race Challenge 2, and Race Challenge 3.**

Respectfully,  
National Society of Black Engineers

# WEEK AT A GLANCE

## DRONE

DAY	OVERVIEW ACTIVITIES	MATERIALS
1	<p>Students are introduced to the engineering design process through drones. Students participate in activities that show how drone glide.</p>	<ul style="list-style-type: none"> <li>• K-W-L Chart</li> <li>• Literature Read Alouds</li> <li>• Engineering Design Process Visual Process</li> <li>• Show Your Creative Side- The Mover Challenge (per group) use any materials you have available. The list below is sample               <ul style="list-style-type: none"> <li>◦ 1 marble (or another small object)</li> <li>◦ Balloon</li> <li>◦ 3 straws</li> <li>◦ Tape</li> <li>◦ String or thread</li> </ul> </li> <li>• Literature Read Alouds</li> <li>• Paper Plane Activity (per group)               <ul style="list-style-type: none"> <li>◦ Newspaper</li> <li>◦ Plain paper</li> <li>◦ Construction paper</li> <li>◦ Aluminum foil</li> <li>◦ Measuring tape/yard stick</li> </ul> </li> <li>• Literature Read Alouds</li> <li>• Test Your Creativity: Engineering Design Challenge</li> <li>• Drone Technology Timeline &amp; Activity</li> <li>• Track Specifications Activity               <ul style="list-style-type: none"> <li>◦ Meter Stick</li> <li>◦ Chalk to mark the track during the outside activity</li> </ul> </li> <li>• Math Worksheet- Multiplication</li> <li>• Reflection Sheets - End of Day Activity</li> </ul>

2	<p>Students are introduced to the SEEK Challenge Letter and learn more about the types of drone and the parts of a drone.</p>	<ul style="list-style-type: none"> <li>• SEEK Challenge Letter</li> <li>• Competition Specifications</li> <li>• K-W-L Chart</li> <li>• Literature Read Alouds</li> <li>• Math Worksheet- Division</li> <li>• Think Like an Engineer</li> <li>• Vocabulary &amp; Vocabulary Activity worksheet</li> <li>• Literature Read Alouds</li> <li>• Exploring the Quadcopter Drone - Drone Flight Tests 1 &amp; 2 (per group) <ul style="list-style-type: none"> <li>○ Construction paper</li> <li>○ 1 wooden stick</li> <li>○ Glue stick</li> <li>○ 2 rubber bands</li> <li>○ 20g Modeling clay</li> <li>○ Measuring tape</li> <li>○ Scale</li> </ul> </li> <li>• Literature Read Alouds</li> <li>• Create Your Own Quadcopter Drone (per student) <ul style="list-style-type: none"> <li>○ any 5 crayon colors</li> <li>○ Student Manual lists green, blue, orange, black, yellow</li> </ul> </li> <li>• Literature Read Alouds</li> <li>• Math Worksheet - Calculating Wing Aspect Ratio &amp; Wing Surface Area</li> <li>• Reflection Sheets - End of Day Activity</li> </ul>
3	<p>Students begin preparing for the competition by designing their drone using the drone kit. Students review the guidelines for the Engineering Content &amp; Understanding and Artistic Design competition</p>	<ul style="list-style-type: none"> <li>• Vocabulary Review</li> <li>• Building Activity - Drone to the Rescue</li> <li>• Competition Preparation (per group) <ul style="list-style-type: none"> <li>○ Trial 1 - Quadcopter <ul style="list-style-type: none"> <li>■ Drone Kit &amp; Hoops</li> </ul> </li> <li>○ Trial 2 - Quadcopter Transporter <ul style="list-style-type: none"> <li>■ Drone Kit</li> <li>■ Object that weighs approximately 2g</li> </ul> </li> </ul> </li> </ul>

	categories	<ul style="list-style-type: none"> <li>○ Trial 3 - Quadcopter Hovering <ul style="list-style-type: none"> <li>■ Drone Kit &amp; Hoops</li> </ul> </li> <li>• Oral Presentation Rubric</li> <li>• Artistic Design Rubric</li> <li>• Reflection Sheets - End of Day Activity</li> </ul>
4	Students preparing for the competition by finalizing their drone using the drone kit. Students review the guidelines for Race Challenge 1, Race Challenge 2, and Supply Distribution Challenge guidelines	<ul style="list-style-type: none"> <li>• Race Challenge Rubric</li> <li>• Supply Distribution Rubric</li> <li>• Drone Kit</li> </ul>
5	Competition Day	<ul style="list-style-type: none"> <li>• Drone Kit</li> <li>• Hoops</li> <li>• Race Track</li> <li>• Competition Rubrics and Guidelines</li> </ul>

## Day 1 Agenda - Teacher's Instructional Guide

Activity	Overview	Time
Breakfast	Breakfast	8:00-8:20 (20 mins)
<b>Instruction Begins</b>		
Attendance	Attendance sheets must be turned in no later than 9:00am. Students who arrive after 9:00am must report to the SEEK office once your classroom attendance has been picked up and return with a late pass.	
Group Students Using Various Techniques	Mentors should take this time to place students into small groups of 4-5. There should be a max of 5 groups in total. The groups that students are placed in will be the groups they stay in for the remainder of the week.	10 mins
What is an Engineer? K-W-L Chart	<p>The K-W-L chart is designed to spark conversation around Engineering. Students will use this information to build on their understanding.</p> <p><b>Student Instructions:</b> Before you begin your investigation, list details in the first two columns. Fill the last column after completing today's activities.</p> <p><b>Mentor Instructions:</b> Students should do this activity in their assigned groups. One student is responsible for filling in the team's log. Mentors should find a creative way to assign the log keeper. After students have finished, mentors should draw the K-W-L chart on the board and lead a classroom discussion. Mentors should fill in the K-W-L chart during the discussion.</p>	10 mins
<p><u>Literature Read Alouds</u>            What is Engineering? What are Engineers?</p> <p>Engineering Design Process</p>	<p><b>Mentor Instructions:</b> Students should read these out loud in their small group. These readings are intended to help students build knowledge around engineering concepts. Mentors should lead a large classroom discussion.</p>	25 mins

Engineering Design Process Step-by-Step Visual Process	<p><b>Mentor Instructions:</b> Lead a large group discussion about the step-by-step process. Mentors should draw the cycle on the board. Students are expected to draw the cycle in their notebooks.</p> <p><b>Student Instructions:</b> Return to the second page and fill in the L portion of your K-W-L chart.</p>	25 mins
<b>Instructional Time Check</b>		1 hour 10 mins total
Preparation for Bathroom Break	Mentors Line Students Up	5 mins
Staggered Bathroom Break	<p><b>Mentor Instructions:</b> Bathroom break will stagger for each grade with a max of 10 mins time for each grade. The order follows: 3rd (1st), 4th (2nd), 5th (3rd)</p> <p>3rd Grade: <b>9:45 -9:55</b>  4th Grade: <b>9:55 -10:05</b>  5th Grade: <b>10:05-10:15</b></p>	10 mins
Show Your Creative Side - The Mover Challenge	<p><b>Mentor Instructions:</b> This activity is used to help students make real world connections to engineering concepts that affect their everyday lives.</p> <p>Part 1 -Students will individually complete Part 1 of this activity in their notebooks.  Part 2 - Students will be introduced to their first building project where they design and build a transporter using limited materials - <i>SAMPLE MATERIALS LIST: 1 marble (or another small object), Balloon, 3 straws, Tape, 30 feet of string or thread, Large rubber band, 2 paper clips, Square of cardboard, Scissors, Piece of cloth</i></p> <p><b>Student Instructions:</b>  Part 1- Draw 3 objects that fly. For each object, list three characteristics that help each object to fly. Indicate whether the object(s) can glide  Part 2- Design and build something that can move an object at least 2 feet across the room. You have 15 minutes to finish the task. <b>CHALLENGE RULES:</b> You can only choose from the materials provided. You do not have to use all the materials; The object cannot touch the ground; The object cannot be moved across the room by a person (no throwing)</p>	Part 1 (10 mins)  Part 2 (30 mins)

<p><b>Literature Read Alouds</b> The Engineering Design Process Challenge: Prep for Activity</p> <p>Design Team Roles and Badges</p>	<p><b>Mentor Instructions:</b> Students should read these out loud. These readings are intended to help students build knowledge around Engineering concepts. Mentors should lead a discussion with students.</p> <p>Students will be given design team roles. These role assignments can be used for the end of the week challenge.</p> <p><b>Student Instructions:</b> You will get into engineering design teams of 5 or less. You will use the Step-by-Step Engineering Design Process to fulfill this challenge. You will be given engineering design team roles and responsibilities found on the next page. Your team will be using these roles for your end of the week challenge. BUT FIRST, let's discuss safety.</p>	15 mins
<b>Instructional Time Check</b>		1 hour 30 mins total
Preparation for Lunch Break	Mentors Line Students Up	5 mins
Lunch/Recess/Bathroom Break	<p><b>Mentor Instructions:</b>Lunch time is approximately 20 mins with an approximate 30 min recess time. Students should be encouraged to use the restroom during their recess time.</p> <p>The order follows:  <b>3rd Grade: Lunch (11:00-11:20), Recess (11:20-11:55)</b>  <b>4th Grade: Lunch (11:20- 11:40), Recess (11:40 - 12:10)</b>  <b>5th Grade: Lunch (11:40 -12:00), Recess (12:00-12:30)</b></p>	1 hour 30 mins
Make Your Best Airplane	<p><b>Mentor Instructions:</b> They will use the assembly instructions to build a paper airplane out of 4 different types of materials (aluminum foil, construction paper, newspaper, plain paper) and conduct a flight test where they measure the starting height and flight distance. Students record their observations in the Data Table and answer the 3 Data Analysis Questions at the end of the activity.</p> <p>The materials should be prepared prior to the activity and should be the same size (i.e. 8.5 x 11)</p> <p><b>Student Instructions:</b> Follow the assembly instructions to build a paper airplane. Use the material below to make your own paper airplane. Measure the starting height of the airplane,</p>	30 mins



	the starting position, and the distance travelled by the airplane. Use the materials provided to carry out each experiment three times. Give your paper airplane a name! Record your observations in the Data Table and answer the Data Analysis questions at the end of the activity.	
<u>Literature Read Alouds</u> Overview of Drones  Introduction to Drones  How Drones Work	<b>Mentor Instructions:</b> Students should read these out loud. These reading are intended to help students build knowledge around Engineering concepts. Mentors should lead a discussion with students. Students should answer the Review Questions that accompany the Literature Read Alouds  <b>Student Instructions:</b> Answer the Review Questions embedded within the Literature Read Aloud text	20 mins
<b>Instructional Time Check</b>		<b>50 mins total</b>
Preparation for Bathroom Break	Mentors Line Students Up	5 mins
Staggered Bathroom Break	<b>Mentor Instructions:</b> Bathroom break will stagger for each grade with a max of 10 mins time for each grade. The order follows: 3rd (1st), 4th (2nd), 5th (3rd)  3rd Grade: 12:50 -1:00 4th Grade: 1:00 -1:10 5th Grade: 1:10-1:20	10 mins
<u>Literature Read Alouds</u> Uses of Drones  Types of Drones	<b>Mentor Instructions:</b> Students should read these out loud. These reading are intended to help students build knowledge around Engineering concepts. Mentors should lead a discussion with students. Students should answer the Review Questions that accompany the Literature Read Alouds  <b>Student Instructions:</b> Answer the Review Questions embedded within the Literature Read Aloud text	20 mins
Test Your Creativity: Engineering Design Challenge	<b>Mentor Instructions:</b> This activity is used to better guide students through the Engineering Design thinking Process as well as demonstrate an understanding of the significance of drones. Students must understand that in order to be an engineer they must think like an	35 mins

	<p>engineer. This activity must be done in a group</p> <p><b>Student Instructions:</b> Design a drone that can deliver medical supplies, water and other items to a stranded victim until a rescue team is able to reach their location. You must pay attention to the smallest details to ensure you have all the necessary gear for flying your drone. The people and animals around you must stay safe while you fly your drone. Your goal is to design, build and test a gliding model to successfully accomplish the mission. You must hold your drone 7 feet in height to be able to glide it at least 10 feet in distance.</p>	
Drone Technology Timeline & Activity	<p><b>Mentor Instructions:</b> Student should read this out loud in a large group to prepare them for the timeline activity.</p> <p><b>Student Instructions:</b> Fill in the table with the missing date or significant facts. Try to complete as much as you can without referring to the previous sheet. You are free to work with a partner if you like.</p>	15 mins
How Do We Calculate Measurement	<p><b>Mentor Instructions:</b> Students are learning the history surrounding measurements and this will prepare students for the Math Worksheet activity on multiplication, division, and calculating distance, speed, and time. Mentors should lead a large classroom discussion.</p>	15 mins
Track Specifications Activity	<p><b>Mentor Instructions:</b> Students will use the information they learned from the How Do We Calculate Measurement activity to practice drawing their competition track on paper and then going outside to experience the full scale track. The latter part of this activity is outdoor. Students are drawing the actual competition track specs, this will help students prepare more accurately for their end of the week challenge.</p> <p><b>Student Instructions:</b> In the box below, draw a track that is exactly 9 meters long and 5 meters wide. Make sure to label the portions of the track in meters. After you have drawn the track, your team will go outside and draw the track with chalk.</p>	20 mins
Math Worksheet - Multiplication	<p><b>Mentor Instructions:</b> All math worksheets are grade specific. Students should show their work in the space provided.</p> <p><b>Student Instructions:</b> Answer the multiplication questions to assist you in calculating distance, speed, and time.</p>	10 mins

Reflection Sheets - End of Day Activity	<b>Student Instructions:</b> Students will reflect on what they have learned for the day <b>Mentor Instruction:</b> Return to your K-W-L chart for the day and fill in the L section of your chart and write down some things you have learned from the previous activity.	10 mins
<b>Line Students up for Dismissal if Applicable</b>		
2:45 - 3:00	Clean Up & Dismissal	15 mins
3:00 - 3:30	Student Pick Up	30 mins
3:30 - 5:00	Mentor Debrief	1 hr./30 mins

## Day 2 Agenda - Teacher's Instructional Guide

Activity	Overview	Time
Breakfast	Breakfast	20 mins
<b>Instruction Begins</b>		
Attendance	Attendance sheets must be turned in no later than 9:00 am. Students who arrive after 9:00am must report to the SEEK office once your classroom attendance has been picked up and return with a late pass.	
SEEK Challenge Letter & Competition Specifications	<p><b>Mentor Instructions:</b> Mentors will discuss the Drone challenge and the competition specification with students both in large and small groups.</p> <p>Mentor will assign competition categories for each group. The competition categories are:</p> <ul style="list-style-type: none"> <li>• Engineering Content &amp; Understanding</li> <li>• Artistic Design</li> <li>• Race Challenge (1, 2, 3)</li> </ul>	15 mins
What is a Drone? K-W-L Chart	<p>The K-W-L chart is designed to spark conversation around Engineering. Students will use this information to build on their understanding.</p> <p><b>Student Instructions:</b> Before you begin your investigation, list details in the first two columns. Fill the last column after completing today's activities.</p> <p><b>Mentor Instructions:</b> Students should do this activity in their assigned groups. One student is responsible for filling in the team's log. Mentors should find a creative way to assign the log keeper. After students have finished, mentors should draw the K-W-L chart on the board and lead a classroom discussion. Mentors should fill in the K-W-L chart during the discussion.</p>	10 mins
<p><u>Literature Read Alouds</u></p> <p>Types of Drone</p> <p>Drones Work!</p>	<p><b>Mentor Instructions:</b> Students should read these out loud. Mentors should lead a discussion with students. This discussion will assist the students as they prepare for the end of week competitions.</p>	20 mins

Math Worksheet - Division	<p><b>Mentor Instructions:</b> All math worksheets are grade specific. Students should show their work in the space provided.</p> <p><b>Student Instructions:</b> Answer the division questions to assist you in calculating wing aspect ratio and wing surface area.</p>	10 mins
Think Like an Engineer	<p>Students will identify the criteria and constraints of their Drone challenge in their groups.</p> <p><b>Mentor Instructions:</b> Mentors should explain and guide students through identifying the criteria and constraints of the Drone Challenge. Mentor should lead a large classroom discussion. Students should work in the small groups to record data. After reading the information in the "What is an Aeronautical Engineering" section, students should answer the Review Questions.</p> <p><b>Student Instructions:</b> Let's think like an engineer by using the Engineering Design Process. Answer the following questions regarding your Drone challenge letter.</p>	15 mins
<b>Instructional Time Check</b>		1 hour 10 mins total
Preparation for Bathroom Break	Mentors Line Students Up	5 mins
Staggered Bathroom Break	<p><b>Mentor Instructions:</b> Bathroom break will stagger for each grade with a max of 10 mins time for each grade. The order follows: 3rd (1st), 4th (2nd), 5th (3rd)</p> <p>3rd Grade: <b>9:45 -9:55</b>  4th Grade: <b>9:55 -10:05</b>  5th Grade: <b>10:05-10:15</b></p>	10 mins
Drone Vocabulary & Vocabulary Activity	<p>Students are introduced to their grade specific vocabulary list. Students will use these vocabulary words to build on their current understanding of their challenge.</p> <p><b>Student Instructions:</b>  Matching:</p> <ul style="list-style-type: none"> <li>• Match the description to the vocabulary term</li> </ul>	20 mins

<p><b>Literature Read Alouds</b> Drones Work</p>	<p><b>Mentor Instructions:</b> Students should read these out loud. Mentors should lead a discussion. Students should answer the Review Questions embedded within the text.</p>	<p>10 mins</p>
<p>Drone Flight Test Activities</p>	<p><b>Mentor Instructions:</b> Part 1: Students test the impact of height on flight distance. Part 2: Students test the impact of nose weight on flight distance. Students should record their data in the table and answer the questions that follow each activity. Materials: Construction paper; 1 wooden stick; Glue stick; 2 rubber bands; 20g Modeling clay; Measuring tape; Scale <b>**Note:</b> premeasure/weigh the clay prior to class. 2g, 4g, 6g, 8g</p> <p><b>Student Instructions:</b> <b>Part 1:</b> Design and draw your wings and tail on your construction paper; Cut them out and place them where you think suitable on the wooden stick; Use the glue stick to stick the wings together and the tail on wooden stick; Use the modeling clay as a weight, by placing it anywhere on your model; Don't change anything except the variable you are testing; Always hold the model the same way when launching; Record data in the table; Answer data analysis questions <b>Part 2:</b> Use your previous drone model; Begin the second part of the experiment by trying to fly your model from different heights, adding the required weights on the nose of your model; Don't change anything except the variable you are testing; Always hold the model the same way when launching; Fill out the data table; Using the graph paper provided, draw a graph of added nose weight on the x-axis and flight distance on the y-axis.</p>	<p>50 mins</p>
<p><b>Instructional Time Check</b></p>		<p>1 hour 35 mins total</p>
<p>Preparation for Lunch Break</p>	<p>Mentors Line Students Up</p>	<p>5 mins</p>
<p>Lunch/Recess/Bathroom Break</p>	<p><b>Mentor Instructions:</b> Lunch time is approximately 20 mins with an approximate 30 min recess time. Students should be encouraged to use the restroom during their recess time.</p> <p>The order follows: <b>3rd Grade: Lunch (11:00-11:20), Recess (11:20-11:55)</b> <b>4th Grade: Lunch (11:20- 11:40), Recess (11:40 - 12:10)</b></p>	<p>1 hour 30 mins</p>

	<b>5th Grade: Lunch (11:40 -12:00), Recess (12:00-12:30)</b>	
<b>Literature Read Alouds</b> Principles in Flight	<b>Mentor Instructions:</b> Students should read these out loud. Mentors should lead a discussion with students. Students should answer the Review Questions embedded within the text.	10 mins
Create Your Own Quadcopter Drone	<b>Mentor Instructions:</b> Students will use Quadcopter Overview of Parts and codes sheet to identify and color 5 major parts of an assembled quadcopter: Upper Body = green; Rotating; Blade = blue; Reversing Blade = orange; Landing Skids = black; Protecting Frames = yellow Students can use any 5 crayons.  <b>Student Instructions</b> Use the Overview of Quadcopter Parts above to color your own assembled drone.	25 mins
<b>Literature Read Aloud</b> "Why is this Important"	<b>Mentor Instructions:</b> Students should read these out loud. Mentors should lead a discussion with students. Students should answer the Review Questions embedded within the text.	25 mins
<b>Instructional Time Check</b>		<b>1 hour 30 mins total</b>
Preparation for Bathroom Break	Mentors Line Students Up	5 mins
Staggered Bathroom Break	<b>Mentor Instructions:</b> Bathroom break will stagger for each grade with a max of 10 mins time for each grade. The order follows: 3rd (1st), 4th (2nd), 5th (3rd)  3rd Grade: <b>1:30 -1:40</b> 4th Grade: <b>1:40 -1:50</b> 5th Grade: <b>1:50-2:00</b>	10 mins
Math Worksheet - Calculating Wing Aspect Ratio and Wing Surface Area	<b>Mentor Instructions:</b> Students are expected to complete these worksheets individually and record their answers in their notebooks. The worksheets are grade specific. Mentors are expected to assist students with appropriate methods for solving the problems and ensure all students have the correct answers. This will prepare the students for the end of week competition. The first page of the worksheet gives the formulas needed to calculate the wing aspect ratio, mean chord, and rectangular wing surface area. It also has a very specific example that takes the students step by step. Note: Do a few more examples with the students with various measurements prior to them	30 mins

	<p>working independently.</p> <p><b>Student Instructions:</b> Calculate the Wing Aspect Ratio and the Surface Area of the wings on the airplane diagram. Use the ruler to measure length and height of the wing and use the formulas provided assist with the calculations. Refer to the example below for guidance.</p>	
Reflection Sheets - End of Day Activity	<b>Student Instructions:</b> Students will reflect on what they have learned for the day and will return to their K-W-L chart to fill in the last column.	10 mins
<b>Line Students up for Dismissal if Applicable</b>		
2:45 - 3:00	Clean Up & Dismissal	15 mins
3:00 - 3:30	Student Pick Up	30 mins
3:30 - 5:00	Mentor Debrief	1 hr./30 mins



## Day 3 Agenda - Teacher's Instructional Guide

Activity	Overview	Time
Breakfast	Breakfast	20 mins
<b>Instruction Begins</b>		
Attendance	Attendance sheets must be turned in no later than 9:00 am. Students who arrive after 9:00am must report to the SEEK office once your classroom attendance has been picked up and return with a late pass.	
Vocabulary Review	<p>Ice/ Breaker &amp; Activity</p> <p><b>Mentor Instructions:</b> Mentors should lead various vocabulary activities to spark enduring understanding. Mentors can create their own activities and ice breakers for the students. Vocabulary is crucial, particularly more for the Engineering Content &amp; Understanding competition and the Artistic Design competition. Students can complete the Vocabulary Word Search activity as an in-class competition.</p>	30 mins
<p>Engineering Content &amp; Understanding Oral Presentation Preparation</p> <p>Artistic Design Presentation Preparation</p> <p>Competition Preparation</p>	<p><b>Mentor Instructions:</b> Students will focus on the two competition presentations- Engineering Content &amp; Understanding and Artistic Design.</p> <p>Students create idea boards and blueprints for their presentations. This can be a large group class activity or small group activity.</p> <p>Students should be thinking about:</p> <ul style="list-style-type: none"> <li>• Themes</li> <li>• Designs</li> <li>• Skits</li> <li>• Materials needed - Students are expected to bring materials from home</li> <li>• Chants</li> </ul> <p>Students practice presenting and explaining the engineering process associated with the</p>	40 mins

	development of their toy; students create a central theme for their toy (i.e. Brand, business plan, community impact) for the presentation and explain how the theme connects to the toy. Later students will do a practice presentation with their classmates who will give them feedback for editing.	
<b>Instructional Time Check</b>		<b>1 hour 10 mins total</b>
Preparation for Bathroom Break	Mentors Line Students Up	5 mins
Staggered Bathroom Break	<p><b>Mentor Instructions:</b> Bathroom break will stagger for each grade with a max of 10 mins time for each grade. The order follows: 3rd (1st), 4th (2nd), 5th (3rd)</p> <p>3rd Grade: <b>9:45 -9:55</b>  4th Grade: <b>9:55 -10:05</b>  5th Grade: <b>10:05-10:15</b></p>	10 mins
Building Activity - Drones to the Rescue  <b>Trial 1. Quadcopter</b>	<p><b>Mentor Instructions:</b> Students will practice navigating the drone and record their data in the table. After the activity they should explain their role in the activity as well as answer the data &amp; observation questions.</p> <p><b>Students Instruction:</b> You have an opportunity to explore how a drone can effectively navigate through an obstacle course of hoops that in the future will be used to circulate throughout remote areas of the world after disasters, to transport goods, supplies and necessary item to bring comfort to those in need. Today, your team will test the drone model to determine who can navigate through an obstacle course of hoops the fastest.</p> <p><b>Trial 1. Quadcopter</b>  Use the graphic and instruction in your USA Toyz manual to explore the features and use of the Quadcopter. Then you will navigate the drone through an obstacle course of hoops. You will test it on the track you've made. You are testing for accurate stop at a specific meter and the fastest drone wins.</p>	1 hour 10 mins
<b>Instructional Time Check</b>		<b>1 hour 30 mins total</b>

Preparation for Lunch Break	Mentors Line Students Up	5 mins
Lunch/Recess/Bathroom Break	<p><b>Mentor Instructions:</b> Lunch time is approximately 20 mins with an approximate 30 min recess time. Students should be encouraged to use the restroom during their recess time.</p> <p>The order follows:  <b>3rd Grade: Lunch (11:00-11:20), Recess (11:20-11:55)</b>  <b>4th Grade: Lunch (11:20- 11:40), Recess (11:40 - 12:10)</b>  <b>5th Grade: Lunch (11:40 -12:00), Recess (12:00-12:30)</b></p>	1 hour 30 mins
<p>Building Activity - Drones to the Rescue</p> <p><b>Trial 2: Quadcopter Transporter</b>  Use the quadcopter to transport 2g of goods through an obstacle course of hoops.</p>	<p><b>Mentor Instructions:</b> Students practice transporting an object using the drone and record their data in the table. After the activity they should explain their role in the activity as well as answer the data &amp; observation questions.  <b>**Note:</b> The object that the drone transports can be 2g of modeling clay or any other small object</p> <p><b>Students Instruction:</b> You have an opportunity to explore how a drone can effectively navigate through an obstacle course of hoops that in the future will be used to circulate throughout remote areas of the world after disasters, to transport goods, supplies and necessary item to bring comfort to those in need. Today, your team will test the drone model to determine who can navigate through an obstacle course of hoops the fastest.</p> <p><b>Trial 2: Quadcopter Transporter</b>  Use the quadcopter to transport 2g of goods through an obstacle course of hoops.</p>	1 hour 30 mins
<b>Instructional Time Check</b>		<b>1 hour 30 mins total</b>
Preparation for Bathroom Break	Mentors Line Students Up	5 mins
Staggered Bathroom Break	<p><b>Mentor Instructions:</b> Bathroom break will stager for each grade with a max of 10 mins time for each grade. The order follows: 3rd (1st), 4th (2nd), 5th (3rd)</p> <p>3rd Grade: <b>1:30 -1:40</b></p>	10 mins

	4th Grade: 1:40 -1:50 5th Grade: 1:50-2:00	
Building Activity - Drones to the Rescue	<p><b>Mentor Instructions:</b> Students complete practice controlling the drone by having it hover in at a specific height at varied amounts of time. They also record their data in the table. After the activity they should explain their role in the activity as well as answer the data &amp; observation questions.</p> <p><b>Students Instruction:</b> You have an opportunity to explore how a drone can effectively navigate through an obstacle course of hoops that in the future will be used to circulate throughout remote areas of the world after disasters, to transport goods, supplies and necessary item to bring comfort to those in need. Today, your team will test the drone model to determine who can navigate through an obstacle course of hoops the fastest.</p> <p><b>Trial 3. Quadcopter Hovering</b> Use the remote control to fly the drone 3 feet to maintain a steady height for 10 sec, 15 sec, and 20 sec.</p>	1 hour 30 mins
Reflection Activity	<p><b>Mentor Instructions:</b> Students reflect on what went great as they prepared for the competition and what they still need to work on. They answer the 2 questions in the Reflection Activity.</p> <p><b>Student Instruction:</b> Answer the following questions about how your preparation for the competition is going.</p> <ol style="list-style-type: none"> <li>1. How did the team do on the Drone to the Rescue Challenge?</li> <li>2. What are some things you would improve next time?</li> </ol>	
<b>Line Students up for Dismissal if Applicable</b>		
2:45 - 3:00	Clean Up & Dismissal	15 mins
3:00 - 3:30	Student Pick Up	30 mins
3:30 - 5:00	Mentor Debrief	1 hr./30 mins

## Day 4 Agenda - Teacher's Instructional Guide

Activity	Overview	Time
Breakfast	Breakfast	20 mins
<b>Instruction Begins</b>		
Attendance	Attendance sheets must be turned in no later than 9:00 am. Students who arrive after 9:00am must report to the SEEK office once your classroom attendance has been picked up and return with a late pass.	
Competition Preparation - Group Work	<p><b>Mentor Instructions:</b> Students will use the Engineering Design Process to test their prototypes for each of the three physical competitions- Race Challenge (1, 2, 3) Students are expected to collect data, make observations and improvements to their designs. These teams are focusing on navigating the drone through an obstacle of hoops.</p> <p>Students in the Engineering Content &amp; Understanding and Artistic Design teams will practice their presentations.</p>	1 hour 10 mins
<b>Instructional Time Check</b>		1 hour 10 mins total
Preparation for Bathroom Break	Mentors Line Students Up	5 mins
Staggered Bathroom Break	<p><b>Mentor Instructions:</b> Bathroom break will stagger for each grade with a max of 10 mins time for each grade. The order follows: 3rd (1st), 4th (2nd), 5th (3rd)</p> <p>3rd Grade: <b>9:45 -9:55</b>            4th Grade: <b>9:55 -10:05</b>            5th Grade: <b>10:05-10:15</b></p>	10 mins
Engineering Content Oral Presentation	<b>Mentor Instructions:</b> Engineering Content presentation group will present in front of the class and will receive feedback from their classmates.	15 mins

Competition Preparation		
Artistic Design Presentation	<b>Mentor Instructions:</b> Artistic Design presentation group will display their poster to the class and will receive feedback from their classmates.	15 mins
Competition Preparation		
Group Work	<b>Mentor Instructions:</b> Students will be working on their individuals group's competition category in preparation for competition Friday.	40 mins
<b>Instructional Time Check</b>		1 hour 30 mins total
Preparation for Lunch Break	Mentors Line Students Up	5 mins
Lunch/Recess/Bathroom Break	<b>Mentor Instructions:</b> Lunch time is approximately 20 mins with an approximate 30 min recess time. Students should be encouraged to use the restroom during their recess time.  The order follows: <b>3rd Grade: Lunch (11:00-11:20), Recess (11:20-11:55)</b> <b>4th Grade: Lunch (11:20- 11:40), Recess (11:40 - 12:10)</b> <b>5th Grade: Lunch (11:40 -12:00), Recess (12:00-12:30)</b>	1 hour 30 mins
Group Work	<b>Mentor Instructions:</b> Students will be working on their individuals group's competition category in preparation for competition Friday.	1 hour 30 min
<b>Instructional Time Check</b>		1 hour 30 mins total
Preparation for Bathroom Break	Mentors Line Students Up	5 mins
Staggered Bathroom Break	<b>Mentor Instructions:</b> Bathroom break will stager for each grade with a max of 10 mins time for each grade. The order follows: 3rd (1st), 4th (2nd), 5th (3rd)	10 mins

	3rd Grade: 1:30 -1:40 4th Grade: 1:40 -1:50 5th Grade: 1:50-2:00	
Group Work	<b>Mentor Instructions:</b> Students will be working on their individuals group's competition category in preparation for competition Friday.	1 hour 30 mins
Reflection Activity	<p><b>Mentor Instructions:</b> Students reflect on what went great as they prepared for the competition and what they still need to work on. They answer the 2 questions in the Reflection Activity.</p> <p><b>Student Instruction:</b> Answer the following questions about how your preparation for the competition is going.</p> <ol style="list-style-type: none"> <li>1. What worked really well for your team as you prepared for the competition?</li> <li>2. What challenges did your team face today that you need to work on more for the competition.</li> <li>3. What does your team look forward to in the competition?</li> </ol>	
<b>Line Students up for Dismissal if Applicable</b>		
2:45 - 3:00	Clean Up & Dismissal	15 mins
3:00 - 3:30	Student Pick Up	30 mins
3:30 - 5:00	Mentor Debrief	1 hr./30 mins

## SEEK Competitions

**Race Challenge:** Student design teams will construct a drone that can effectively navigate through an obstacle course of hoops. The fastest drone wins.

- **Track Specs:** 9m long x 5m wide
- 1 classroom at a time

**Race Challenge 2:** Student design teams will construct a drone that can effectively navigate through an obstacle course of hoops. The fastest drone wins.

- **Track Specs:** 9m long x 5m wide
- 1 classroom at a time

**Supply Distribution:** Student design teams will construct a drone that can effectively land on launch pads accurately, the drone that can get through the track the fastest wins.

- **Track Specs:** 9m long x 5m wide
- 1 classroom at a time

Don't Forget Artistic Design and the Engineering Content/ Understanding Competitions. You can locate the rubrics in your manual.