



EXPEDITIONARY  
LEARNING

# **Grade 5: Module 2B: Unit 3: Lesson 4**

## **Expert Research Groups: How the Traffic Signal and Airplane Met Society's Needs, Part 3**



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**Long-Term Targets Addressed (Based on NYSP12 ELA CCLS)**

I can conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic. (W.5.7)  
I can gather relevant data from print and digital sources; I can summarize or paraphrase information in notes and finished work. (W.5.8)  
I can quote accurately from the text when explaining what the text says explicitly and when making inferences. (RI.5.1)  
I can draw on information from multiple print sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. (RI.5.7)

**Supporting Learning Targets**

- I can conduct research to take notes about how an invention was developed to meet society's needs.
- I can explain what people needed and how their needs were met, using quotes from the text.
- I can answer a question quickly, drawing on information from multiple sources.

**Ongoing Assessment**

- Graphic Novel Sketch, Part 1 (from homework)
- Expert Text note-catcher: Traffic Signal (traffic signal expert groups)
- Invention of the Airplane note-catcher (airplane expert groups)
- Answering Questions from Multiple Sources handout



Agenda	Teaching Notes
<ol style="list-style-type: none"><li>Opening<ol style="list-style-type: none"><li>Homework Review and Engaging the Reader (5 minutes)</li></ol></li><li>Work Time<ol style="list-style-type: none"><li>Determining the Gist: Expert Text 3 (10 minutes)</li><li>Second Read: Close Reading Guide: "Airplane" or Expert Text Note-catcher: "The Two-Fold Genius of Garrett Morgan" (30 minutes)</li><li>Drawing on Information from Multiple Sources to Answer Questions Quickly (10 minutes)</li></ol></li><li>Closing and Assessment<ol style="list-style-type: none"><li>Debrief and Review Learning Targets (5 minutes)</li></ol></li><li>Homework<ol style="list-style-type: none"><li>Graphic Novel Sketch, Part 2.</li><li>Independent reading.</li></ol></li></ol>	<ul style="list-style-type: none"><li>This lesson follows a pattern similar to Lessons 2 and 3. Students once again work in expert groups to determine the gist of a third article about the invention they are studying, either the traffic signal or the airplane. While the traffic signal groups complete their Expert Text note-catchers, the airplane expert groups are led through a close read of the article "Airplane" using the Close Reading Guide in the supporting materials.</li><li>During Work Time C, students work in triads to quickly locate answers to several questions using the articles they have read over the course of Lessons 2–4, which gives them practice with ELA Standard RI.5.7.</li><li>In advance:<ul style="list-style-type: none"><li>Review the Gallery Walk protocol (see Appendix) for Work Time A.</li></ul></li><li>Post: Learning targets, lesson vocabulary from expert texts.</li></ul>



Lesson Vocabulary	Materials
<p>conduct research, take notes, invention, developed, explain, needed/needs, met, quotes, drawing, multiple resources</p> <p>From “The Twofold Genius of Garrett Morgan”: apprentice, equipment, running, transportation, eventually</p> <p>From “Airplane”: unreliable, destination, accomplish, efficient, requirement</p>	<ul style="list-style-type: none"> <li>• Sticky notes (two per student)</li> <li>• Journals (begun in Unit 1, Lesson 1; one per student)</li> <li>• Index cards (seven per student)</li> <li>• “Airplane” (one per student in airplane expert groups and one to display)</li> <li>• “The Twofold Genius of Garrett Morgan” (one per student in traffic signal expert groups and one to display)</li> <li>• Group Norms anchor chart (begun in Unit 1, Lesson 1)</li> <li>• Expert Text anchor chart (begun in Lesson 2)</li> <li>• Invention of the Airplane note-catcher (one per student in airplane expert groups)</li> <li>• Invention of the Airplane Close Reading Guide (for teacher reference)</li> <li>• Expert Text Note-catcher: Traffic Signal (one per student in traffic signal expert groups)</li> <li>• Expert Text Note-catcher: Traffic Signal (answers, for teacher reference)</li> <li>• Traffic Signal task card (one per student in traffic signal expert groups)</li> <li>• Dictionaries (one per triad)</li> <li>• Vocabulary Strategies anchor chart (begun in Unit 1, Lesson 2)</li> <li>• Vocabulary Definitions: Lesson 4 (for teacher reference)</li> <li>• “Wright Brothers: Inventors of the Airplane” (from Lesson 2; one per student in airplane expert groups and one to display)</li> <li>• “The Invention of the Airplane” (from Lesson 3; one per student in airplane expert groups and one to display)</li> <li>• “Transportation, from the Soapbox Derby to the Jeep: First Automatic Traffic Signal” (from Lesson 2; one per student in the traffic signal expert groups and one to display)</li> <li>• “Garrett Morgan: Inventor Hero” (from Lesson 3; one per student in the traffic signal expert groups and one to display)</li> <li>• Document camera</li> <li>• Locating Answers Quickly anchor chart (one to display)</li> <li>• White board and dry erase marker (one per triad)</li> <li>• Graphic Novel Sketch, Part 2 (one per student)</li> </ul>



Opening	Meeting Students' Needs
<p><b>A. Homework Review and Engaging the Reader (5 minutes)</b></p> <ul style="list-style-type: none"><li>• Ask students to take out the Graphic Novel Sketch, Part 1 that they completed for homework.</li><li>• Review and clarify the directions for a Gallery Walk.</li><li>• Explain that as students silently view their classmates' Splash Page sketches during the Gallery Walk, they should identify praise for, and questions about, their classmates' work.</li><li>• Distribute two <b>sticky notes</b> to each student and tell them to record at least one "praise" and one "question."</li><li>• Have students display their Splash Page sketches by placing them on their desks or tables.</li><li>• Give students 2 or 3 minutes to silently review their classmates' work and record praises and questions.</li><li>• Refocus students' whole class.</li><li>• Cold call several students to share praise for a classmate's work. Invite several to ask questions about their classmates' sketches and provide an opportunity for the classmate to respond.</li><li>• Explain that sketches are a great way to demonstrate understanding of key ideas from the texts they read because creating visual representations of concepts allows students to share their thinking through imagery rather than text alone. Tell them that type of homework assignment also provides an opportunity to practice creating various parts of a graphic novel, such as the Splash Page. This helps prepare them for the final performance task, creating their own graphic novelette.</li></ul>	<ul style="list-style-type: none"><li>• Offer to scribe for students who struggle with the physical act of writing to capture their praises and questions.</li></ul>



Work Time	Meeting Students' Needs
<p><b>A. Determining the Gist: Expert Text 3 (10 minutes)</b></p> <ul style="list-style-type: none"> <li>• Ask students to take out their <b>journals</b> and sit with their triads.</li> <li>• Tell students they will work to determine the gist using the same strategy as in Lesson 3. They will look for and circle key terms as they read, and then try to incorporate at least one key term in their gist statements.</li> <li>• Display the key vocabulary terms for each expert research group:             <ul style="list-style-type: none"> <li>– Traffic signal expert groups: <i>apprentice, equipment, running, transportation, eventually</i></li> <li>– Airplane expert groups: <i>unreliable, destination, accomplish, efficient, requirement</i></li> </ul> </li> <li>• Distribute seven <b>index cards</b> to each student.</li> <li>• Ask them to quickly record each vocabulary word on its own index card.</li> <li>• Remind them that they will want to locate and circle their key terms as they read for gist, but that they will have more time to discuss and define the terms during their second read.</li> <li>• Display these directions for triads to follow as they read for gist:             <ol style="list-style-type: none"> <li>1. Read your expert text with your triad. Take turns reading aloud while other group members follow along silently.</li> <li>2. Circle key vocabulary terms as you notice them in the text.</li> <li>3. Discuss the gist of the text with your triad. Try to use at least one key term in your gist statement.</li> <li>4. Record the gist on the same page in your journal that you recorded the gist from Lesson 3.</li> <li>5. If time permits, begin discussing the meaning of key terms and record synonyms or definitions on the back side of your vocabulary cards.</li> </ol> </li> <li>• Clarify directions as needed.</li> <li>• Distribute <b>“Airplane”</b> to airplane expert groups and <b>“The Twofold Genius of Garrett Morgan”</b> to traffic signal expert groups.</li> <li>• Direct students to begin reading for gist. Circulate to offer support.</li> </ul>	<ul style="list-style-type: none"> <li>• Provide a physical version of vocabulary terms to triad groups to support students who have trouble seeing the board or tracking from board to paper.</li> <li>• Consider reducing the number of vocabulary terms for students who struggle with vocabulary, reading, or writing. Alternatively, consider providing some definitions for them or providing index cards with parts of the definition missing that they must fill in.</li> <li>• Consider providing a physical version of the gist discussion directions to triad groups who struggle to see the board or track from board to paper.</li> <li>• Consider providing small group support to students who struggle to navigate complex text. Offer a modified amount of the text that still allows them to offer meaningful thoughts to the discussion of vocabulary and gist.</li> </ul>



Work Time (continued)	Meeting Students' Needs
<ul style="list-style-type: none"> <li>After 5 or 6 minutes, cold call a few students from each group to share their gist statement with the whole class. Listen for responses such as:               <ul style="list-style-type: none"> <li>“Garrett Morgan was a successful businessman and inventor who created equipment that he thought people needed.”</li> <li>“Previous flying machines were unreliable, but the Wright brothers identified the requirements for a controlled plane and accomplished their dream of flying. Their invention has had a great impact on our lives.”</li> </ul> </li> </ul>	
<p><b>B. Second Read: Close Reading Guide: “Airplane” or Expert Text Note-catcher: “The Twofold Genius of Garrett Morgan” (30 minutes)</b></p> <ul style="list-style-type: none"> <li>Focus students’ attention on the first two learning targets:               <ul style="list-style-type: none"> <li>* “I can conduct research to take notes about how an invention was developed to meet society's needs.”</li> <li>* “I can explain what people needed and how their needs were met, using quotes from the text.”</li> </ul> </li> <li>Underline the key terms students are familiar with from previous units and lessons: <i>conduct research, take notes, invention, developed, explain, needed/needs, met, and quotes</i>. Point out that these are two of the same targets they worked on during the previous two lessons.</li> <li>Invite a few students to share out how they might restate each of these targets in their own words.</li> <li>Explain that in this lesson, expert groups studying the traffic signal will use the Expert Text note-catcher from Lesson 2 to capture notes about their invention, inventor, solution, and impact, then respond to the questions in the thought and speech bubbles. Airplane expert groups will participate in a teacher-directed close reread and note capture of the article “Airplane.”</li> <li>Say something like:               <ul style="list-style-type: none"> <li>* “Today, I will need the traffic signal expert groups to work more independently as I work with the airplane expert groups.”</li> </ul> </li> <li>Remind traffic signal triads that they can refer to the <b>Group Norms anchor chart</b> for ideas about how to work cooperatively, as well as the <b>Expert Text anchor chart</b> if they get stuck or need a reminder about how to complete various sections of their Expert Text note-catchers.</li> <li>Distribute <b>Invention of the Airplane note-catcher</b> to the airplane expert groups. Ask triads to read through each of the questions on their note-catchers together and restate each question in their own words to demonstrate that they understand what the question is asking.</li> <li>As airplane expert groups are reading and restating, distribute the <b>Expert Text Note-catcher: Traffic Signal</b> and <b>Traffic Signal task card</b> to the traffic signal expert groups.</li> </ul>	<ul style="list-style-type: none"> <li>Consider recording a strong example of a student restatement of the target to support all students, especially ELLs.</li> <li>Consider allowing students who struggle with the physical act of writing to work with a strong partner. They should contribute meaningfully to the work but record on only one note-catcher. Be sure to provide a copy of the note-catcher to both students as a resource in future lessons.</li> <li>Consider giving the airplane expert groups a task card of the second set of directions to allow them to work independently when you resume your work with another group.</li> </ul>



Work Time (continued)	Meeting Students' Needs
<ul style="list-style-type: none"><li>• Read the directions on the task card aloud to students and provide clarification as needed. Make sure they have access to print or online <b>dictionaries</b>. Ask them to begin.</li><li>• Return to work with the airplane expert groups. Invite a few students to share out their restatements of the questions on their note-catchers. Address misinterpretations as needed.</li><li>• Use the <b>Invention of the Airplane Close Reading Guide (for teacher reference)</b> to lead the airplane expert groups through their second read of the article "Airplane."</li><li>• When students in airplane triads have answered all but the final question on their note-catchers, give them these directions:<ol style="list-style-type: none"><li>1. With group members, read and restate the final question on your note-catchers.</li><li>2. Review your responses to the other questions on your note-catcher and information from the article to help you determine an answer to the last question.</li><li>3. Discuss your thinking with group members, then record a response to the final question.</li><li>4. Use context clues and other strategies to determine the meaning of key terms you recorded on index cards during Work Time A. On the back of your index cards, write a short definition or synonym and draw a picture of the meaning of each word.</li></ol></li><li>• Clarify any directions as needed. Remind the airplane expert groups to refer to the Group Norms anchor chart for ideas about how they can work together effectively to complete each task and the <b>Vocabulary Strategies anchor chart</b> for ways they can determine the meaning of unfamiliar words and phrases. Have dictionaries available for their use.</li><li>• As airplane expert groups get started, move back to work with the traffic signal expert groups. Stop them in their work to ask how many groups have written a response to the speech and thought bubble questions on their Expert Text note-catchers. If most of the groups have <i>not</i> completed these parts of the note-catcher, allow them 1 or 2 additional minutes to discuss their thinking about how to answer each question and then record their responses. Circulate to offer guidance.</li><li>• Once traffic signal experts have answered the thought and speech bubble questions, cold call a few to share their responses aloud. See <b>Expert Text Note-catcher: Traffic Signal (answers, for teacher reference)</b> for possible responses.</li><li>• Ask traffic signal expert groups to consider and discuss:<ul style="list-style-type: none"><li>* "How did quotes and paraphrased details in your notes help you answer the thought and speech bubble questions?"</li><li>* "How did you determine which information from the article was relevant?"</li></ul></li></ul>	<ul style="list-style-type: none"><li>• Use similar sentence frames as in Lesson 2 to support each student to respond to this prompt: "My quotes and paraphrased details in my notes helped me complete the thought and speech bubbles because _____" and "I know an idea is relevant when _____."</li></ul>





Work Time (continued)	Meeting Students' Needs
<ul style="list-style-type: none"> <li>• After 1 or 2 minutes, cold call a few students to share out. Listen for ideas like:             <ul style="list-style-type: none"> <li>– “I looked for words and phrases in the quotes and paraphrased details on my note-catcher that were related to key terms from the thought and speech bubble questions; I summarized related details to craft a response to the thought and speech bubble questions.”</li> <li>– “I referred to the prompts in each box to help me determine whether certain details were relevant, the kind of information that could be used to respond to the prompt accurately.”</li> </ul> </li> <li>• Focus students whole group. Invite a few to share out an example of how they used one of the strategies on the Vocabulary Strategies anchor chart to define an unknown word. Listen for them to describe how they used context clues, Greek or Latin roots, familiar parts of a word, and dictionaries to define key terms.</li> <li>• Allow students 2 or 3 minutes to mingle with members of other triads who are studying the same invention to share and compare the definitions, synonyms, and drawings of key terms they recorded onto index cards.</li> <li>• As time permits, allow students to make revisions to their vocabulary cards and note-catchers, based on new understanding gleaned from conversations with peers.</li> <li>• Collect students' completed vocabulary cards to review. See <b>Vocabulary Definitions: Lesson 4 (for teacher reference)</b> and the Teaching Note at the end of this lesson, after Homework.</li> </ul>	
<p><b>C. Drawing on Information from Multiple Sources to Answer Questions Quickly (10 minutes)</b></p> <ul style="list-style-type: none"> <li>• Ask students to take everything off their desks except for the three articles they have read about their invention and inventor. Use a <b>document camera</b> to display the titles of these articles to help them with this step. Then, ask them to return to their triad groups.             <ul style="list-style-type: none"> <li>* The airplane expert groups need: <b>“Wright Brothers: Inventors of the Airplane,” “The Invention of the Airplane,”</b> and <b>“Airplane.”</b></li> <li>* The traffic signal expert groups need: <b>“Transportation, from the Soapbox Derby to the Jeep: First Automatic Traffic Signal,” “Garrett Morgan: Inventor Hero,”</b> and <b>“The Twofold Genius of Garrett Morgan.”</b></li> </ul> </li> <li>• Display the <b>Locating Answers Quickly anchor chart</b>, keeping the questions covered.</li> <li>• Direct students' attention to the learning targets and read the third one aloud:             <ul style="list-style-type: none"> <li>* “I can answer a question quickly, drawing on information from multiple sources.”</li> </ul> </li> <li>• Help students focus on the terms <i>drawing</i>, <i>multiple</i>, and <i>sources</i>.</li> </ul>	<ul style="list-style-type: none"> <li>• Display the names of the three articles each expert triad needs to locate. Consider showing each one under the document camera to help students who struggle with organization locate their materials in a timely manner.</li> <li>• Display student-generated definitions of the terms <i>drawing</i>, <i>multiple</i>, and <i>sources</i> to support ELLs.</li> </ul>



Work Time (continued)	Meeting Students' Needs
<ul style="list-style-type: none"> <li>• Ask them to consider and review the meaning of each term in their triad groups.</li> <li>• After 1 or 2 minutes, cold call several students to share definitions. Encourage them to explain how they determined the meaning of each key word from the target. Listen for ideas such as:             <ul style="list-style-type: none"> <li>– “<i>Drawing</i> means to use as a resource. I remember that we learned about the many definitions for draw in an earlier lesson, and I used context clues to determine which meaning made the most sense in this sentence.”</li> <li>– “I remember that in math; <i>multiply</i> means when you add the same number more than one time. I think <i>multiple</i> and <i>multiply</i> have the same root, so I determined that <i>multiple</i> means more than one. When I tried that in the sentence, it made sense.”</li> <li>– “I remembered that <i>sources</i> are documents you can look at because we learned about that in an earlier lesson.”</li> </ul> </li> <li>• Ask students if any other terms from the learning target stand out to them. Listen for them to identify that the questions will need to be answered <i>quickly</i>.</li> <li>• Invite a few students to restate the target in their own words.</li> <li>• Explain that to work toward this target, triads will collaborate to identify which of their three articles would be best for answering a specific question quickly. When they have made their selection, students will write the title of the article on a white board and hold it up.</li> <li>• Distribute <b>white boards</b> and <b>dry erase markers</b> to each triad.</li> <li>• Reveal the first two questions on the Locating Answers Quickly chart.             <ul style="list-style-type: none"> <li>* Traffic signal expert groups: “How was Garrett Morgan’s traffic signal different from other signals that had been developed?”</li> <li>* Airplane expert groups: “Which of the Wright brothers flew the first flight?”</li> </ul> </li> <li>• Direct triads to identify and write on their white boards the name of the article that would be best for answering the question quickly.</li> <li>• After 1 minute, cold call students from a few groups to explain their answers. Listen for responses such as:             <ul style="list-style-type: none"> <li>– “We think that ‘Garrett Morgan: Inventor Hero’ would be the best article to answer this question quickly because there is a whole paragraph that describes earlier signals.”</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• To support students who struggle with taking turns and relinquishing control, consider having a specific order for turns with the white board to minimize arguments.</li> <li>• Consider dropping these questions off in strips to groups with members who have trouble seeing the board or tracking from board to paper.</li> </ul>



Work Time (continued)	Meeting Students' Needs
<ul style="list-style-type: none"><li>– “Our group thinks it would be easiest to use the text ‘Wright Brothers: Inventors of the Airplane’ because the sections in this text are labeled with questions and one of the questions is, ‘Who flew the first flight?’”</li><li>• Reveal the next two questions on the chart.<ul style="list-style-type: none"><li>* Traffic signal expert groups: “Which article would be best to help you describe the physical structure of Garrett Morgan’s traffic signal?”</li><li>* Airplane expert groups: “How do the features of a plane change based on its function?”</li></ul></li><li>• Give students 1 minute to write their responses on white boards.</li><li>• Then, cold call a few to explain how they made their selection. Listen for ideas like:<ul style="list-style-type: none"><li>– “The diagrams in the article ‘Transportation, from the Soapbox Derby to the Jeep: First Automatic Traffic Signal’ are the most helpful for quickly explaining the physical structure of the traffic signal.”</li><li>– “Our group decided that ‘Airplane’ was the best text to answer this question quickly because there is a whole section about airplane design that explains how designers can change a plane to make it better for one task or another.”</li></ul></li><li>• Reveal the final two questions from the Locating Answers Quickly chart and ask students to write their answers on their white boards.<ul style="list-style-type: none"><li>* Traffic signal expert groups: “How did Garrett Morgan earn money to pay for his education?”</li><li>* Airplane expert groups: “What experiences inspired the Wright brothers to build airplanes?”</li></ul></li><li>• After 1 minute, cold call several students to explain their choices. Listen for:<ul style="list-style-type: none"><li>– “Our group thinks that the article ‘The Twofold Genius of Garrett Morgan’ would be best for answering this question because it has the most details about his life.”</li><li>– We decided that ‘Wright Brothers: Inventors of the Airplane’ would help us find the answer most easily because the section about their childhood explains about the experiences that encouraged them to be interested in flying things.”</li></ul></li><li>• Praise students for their ability to draw on multiple sources to determine the best way to answer questions quickly.</li></ul>	



Closing and Assessment	Meeting Students' Needs
<p><b>A. Debrief and Review Learning Targets (5 minutes)</b></p> <ul style="list-style-type: none"><li>• Direct students to the learning targets and ask:<ul style="list-style-type: none"><li>* “How have you worked toward these targets during the past several lessons?”</li></ul></li><li>• After 2 or 3 minutes, cold call several students to share their thinking whole class. Possible responses could include:<ul style="list-style-type: none"><li>– “I worked on taking notes about how the traffic signal was developed to improve the safety of city streets by responding to prompts on my note-catcher.”</li><li>– “I identified quotes from each article I read that helped me explain how people’s needs were met. I recorded the quotes on my note-catcher and then paraphrased the ideas when I responded to the question in the thought bubbles.”</li><li>– “We looked back at all of the articles to pick which one would help us answer a question quickly.”</li></ul></li><li>• Explain that students will be able to demonstrate their progress on these targets as they take the Mid-Unit 3 Assessment during the next lesson.</li><li>• Distribute and review directions for the <b>Graphic Novel Sketch, Part 2</b>.</li></ul>	<ul style="list-style-type: none"><li>• Provide a sentence frame to support all students in responding to this prompt: “I have worked toward _____ by_____.”</li></ul>
Homework	Meeting Students' Needs
<ul style="list-style-type: none"><li>• Reread your article: “The Twofold Genius of Garrett Morgan” or “Airplane.” Complete the Graphic Novel Sketch, Part 2.</li><li>• Read independently for at least 15 to 20 minutes.</li></ul> <p><i>Note: Because students will need access to their note-catchers for homework, find a time before the end of the day to make copies of their Expert Text and The Invention of the Airplane note-catchers to gauge their ability to locate and record relevant notes (in the form of quotes and paraphrased details from the text). Make determinations about which students may need additional support to master these skills before taking the on-demand note-taking mid-unit assessment in Lesson 5.</i></p> <p><i>Review the definitions/synonyms/drawings on students' vocabulary cards to evaluate whether students may require additional support before they can independently use a variety of strategies to determine the meaning of unfamiliar words and phrases. Be prepared to return students' index cards in the next lesson.</i></p>	<ul style="list-style-type: none"><li>• Consider providing a copy of a strong model of a Splash Page sketch from the Lesson 3 homework to give students an idea of the level of quality you're looking for in this sketch.</li></ul>



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## Supporting Materials



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## Airplane

The airplane has had a greater impact on our lives than any other modern invention. The ability to fly has dramatically increased the speed at which we can travel and decreased the time it takes to receive mail, food, and other goods from far-off places. It has brought us into closer contact with people in other parts of the world, and it has drastically changed the way we wage war.

Yet, until the beginning of the 20th century, the idea of a practical flying machine was only a dream. Balloons and gliders had been flown before 1900, but they were unreliable and could not carry a person over a long distance and land at a chosen destination. It was not until Orville and Wilbur Wright invented and successfully flew the first powered, controllable aircraft that the dream of flight became a reality. On December 17, 1903, the Wrights' plane, the *Flyer*, took off at Kitty Hawk, North Carolina, and flew 120 feet (37 meters).

### Airplane Design

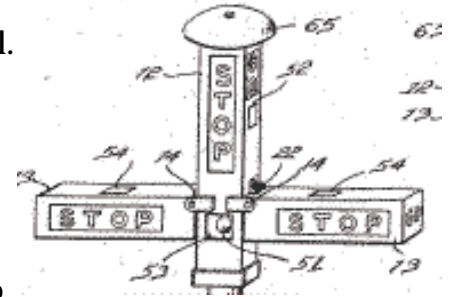
An airplane can fly at fast or slow speeds over long or short distances. It can carry hundreds of vacationers around the world or a single person from one side of a major city to the other. The designer of an airplane must keep in mind the task the airplane is to accomplish. Will the airplane fly great distances? If so, the designer will have to provide either very efficient power or the capacity to store a great amount of fuel. Should the airplane's structure be relatively light or heavy? That depends on the cargo it will carry. This might be two persons or a whole company of soldiers and equipment. A large airplane will mean more weight and more drag. As a result, larger engines and wings will be necessary to get it airborne. Crop dusters, aerobatic biplanes, personal transportation aircraft, and airliners all have different design requirements. The airplane designer has many choices to make, and modern technology can help with these decisions.



### The Twofold Genius of Garrett Morgan (excerpts)

Garrett Morgan was an African-American inventor who invented two very different and important things: the gas mask and the traffic signal. During his long life, he also became one of the most recognized and respected African-Americans in the country.

Morgan was born on March 4, 1877, in Paris, Kentucky. His parents were former slaves. As a child, he attended school and also worked on the family farm. When he was an older teen, he moved to Cincinnati to find work. He found it as an apprentice to a handyman, who paid young Garrett enough to hire a tutor and continue his studies.



Morgan made enough money to open his own sewing machine repair shop, which he did in 1907. He was so successful that he expanded his business two years later to include making clothes, using equipment that he had built himself.

The same skills that made Morgan a successful inventor and businessman also fired his curiosity and drove his inventions. He would see a need for something and then go about trying to find something that filled that need; if that something didn't exist, then he would make it himself. He had done this with his sewing equipment business, to great success. (He had 32 employees working for him.)

Morgan branched out again in 1920, starting a newspaper, the *Cleveland Call*. He made good money from running this newspaper, and he soon bought a home and a car. (Some historians say that he was the first African-American to own a car.)

The automobile was a relatively recent invention, and it was by no means the only method of transportation used by Americans. Many people still rode in horse-drawn carriages or rode bicycles or walked in the streets. People driving cars went much faster, of course, and accidents were commonplace.

Seeing this, Morgan decided to do something about it. He invented what would become the traffic light. Several people had invented different kinds of traffic signals by this time, but they weren't good enough for Morgan, who designed one that had some familiar features: a T-shaped pole that had a signal on the top, with three positions. These three positions were Go, Stop, and All-Stop. This last position applied to people coming from every direction, and was used to make sure that pedestrians could cross the street safely. Morgan received a patent for his device in 1923 and eventually sold it to General Electric. It was used throughout America until it was replaced by the traffic lights that are still used today.

He died in 1963 after a long and successful life. His two outstanding inventions live on.

"The Twofold Genius of Garrett Morgan." The Twofold Genius of Garrett Morgan. <<http://www.socialstudiesforkids.com/articles/ushistory/garrettmorgan.htm>>.



Invention of the Airplane Note-catcher

Directions: Refer to the article “Airplane” to help you respond to these questions.

<p>Whisper read Paragraph 1, then use details from the text to answer the questions on the right.</p>	<p>Locate and circle the word <i>increase</i> in this paragraph. Underline the words from the text that help you determine the meaning of <i>increase</i>. What does it mean?</p> <p>Locate and circle the word <i>decrease</i> in this paragraph. Underline parts of the word and/or words from the text that help you determine the meaning of <i>decrease</i>. What does it mean?</p>
<p>Reread Paragraph 2 aloud with group members; then use details from the text to answer the questions on the right.</p>	<p>Underline details that help you understand what some of the problems were with “flying machines” built before the 1900s. Paraphrase the details you underlined to explain the problems with these “flying machines.”</p> <p>How was the Wright brothers’ <i>Flyer</i> different from previous “flying machines”?</p> <p>Why do you think “powered, controllable aircraft” were able to do what earlier flying machines could not?</p>





Invention of the Airplane Note-catcher

Directions: Refer to the article “Airplane” to help you respond to these questions.

<p>Reread Paragraph 3 silently; then use details from the text to answer the questions on the right.</p>	<p>Underline details in the paragraph that help you understand what an airplane designer will have to do if the airplane will fly long distances. Paraphrase the details you underlined to explain what the designer must do.</p> <p>Sketch a picture to show what larger airplanes need to become airborne.</p> <p>Explain what airplanes do for people.</p>
<p>Review your answers to the above questions and the article to help you respond to the prompt on the right.</p>	<p>In your own words, explain how the Wright brothers’ invention of the airplane changed people’s lives.</p>



*What need or want inspired the development of this invention?*

*How were people's needs met, and by whom?*

**Expert Text Note-catcher: Traffic Signal**

**Background information about the INVENTION**

*Explain why people needed or wanted this invention.*

**Background information about the INVENTOR(S)**

*Explain the inventor(s) history, motivation to solve the problem, special skills, and/or preparation.*

**Information about developing a SOLUTION**

*Explain how the inventor(s) solved the problem.*

**Information about the IMPACT**

*Explain how this invention changed people's lives.*



Traffic Signal Task Card

1. Independently, reread the article “The Twofold Genius of Garrett Morgan.”
2. As you read, look for and underline details that respond to the prompt in each gray box of your note-catcher: background about the INVENTION; background about the INVENTOR(S); information about developing a SOLUTION; and information about the IMPACT.
3. With your triad, share the details you underlined and discuss:
  - \* “Is this information *relevant*?”
  - \* “Where should I record this information on my note-catcher (which gray box)?”
  - \* “Should I quote this information or paraphrase it on my note-catcher? Why?”
4. Record at least one or two relevant details in each box (make sure to record quotes and paraphrased information on your note-catcher).
5. Refer to your notes (quotes and paraphrased details) to help you respond to the thought and speech bubble questions. Remember to use key terms from the questions in your responses.
6. Once you have completed your note-catcher, work with group members to determine the meaning of key terms on your vocabulary cards, using context clues and other strategies. On the back on your index cards, write a synonym or definition and draw a picture to show the meaning of each word.



Invention of the Airplane Close Reading Guide  
(For Teacher Reference)

**Total Time:** 30 minutes

Directions	Questions	Teaching Notes
Whisper read Paragraph 1, then use details from the text to answer the questions on the right.	<p>Locate and circle the word <i>increase</i> in this paragraph. Underline the words from the text that help you determine the meaning of <i>increase</i>. What does it mean?</p> <p>Locate and circle the word <i>decrease</i> in this paragraph. Underline parts of the word and/or words from the text that help you determine the meaning of <i>decrease</i>. What does it mean?</p>	<p>Allow students 2 or 3 minutes to whisper read, circle, underline, and work with group members to determine the meaning of the word <i>increase</i>. Invite a few students to share out what they think <i>increase</i> means and which words or phrases they underlined to help them determine the meaning. Listen for:</p> <p><i>I think increase means to grow or become better; I underlined the article where it says the ability to fly has “dramatically increased the speed at which we travel,” which means we can get places faster than before.</i></p> <p>Allow students 2 or 3 minutes to whisper read, circle, underline, and work with group members to determine the meaning of the word <i>decrease</i>. Invite a few students to share out what they think <i>decrease</i> means and which words or phrases they underlined to help them determine the meaning. Listen for:</p> <p><i>I think decrease means takes less (time); I underlined where the article says the ability to fly has “decreased the time it takes to receive mail, food, and other goods” from far-away places.</i></p>



Invention of the Airplane Close Reading Guide  
(For Teacher Reference)

Directions	Questions	Teaching Notes
Reread Paragraph 2 aloud with group members, then use details from the text to answer the questions on the right.	<p>Underline details that help you understand what some of the problems were with “flying machines” built before the 1900s. Paraphrase the details you underlined to explain the problems with these “flying machines.”</p> <p>How was the Wright brothers’ <i>Flyer</i> different from previous “flying machines”?</p> <p>Why do you think “powered, controllable aircraft” were able to do what earlier flying machines could not?</p>	<p>Read the first question aloud. Give students 3 minutes to reread the paragraph and work with group members to locate and underline details that help them explain the problems with “flying machines” built before the 1900s. Cold call a few groups to share their thinking aloud. Listen for:</p> <p><i>Balloons and gliders were unreliable; they could not carry people long distances; they could not land at a “chosen destination.”</i></p> <p>Read the second question aloud, and then ask triads to locate and record a response. After 2 minutes, cold call a few students to share their thinking whole group. Listen for suggestions like:</p> <p><i>The Wright brothers’ Flyer was the first “powered, controllable aircraft.”</i></p> <p>Ask students to read the third question aloud and then restate it in their own words. Invite a few to share out their restatements. Then give students 1 minute to look back to the text to help them formulate a response to the question. Cold call a few to share their ideas aloud. Listen for:</p> <p><i>A powered, controllable aircraft would be reliable, able to take people long distances, and able to take people to specific destinations.</i></p>



Invention of the Airplane Close Reading Guide  
(For Teacher Reference)

Directions	Questions	Teaching Notes
Reread Paragraph 3 silently; then use details from the text to answer the questions on the right.	<p>Underline details in the paragraph that help you understand what an airplane designer will have to do if the airplane will fly long distances. Paraphrase the details you underlined to explain what the designer must do.</p> <p>Sketch a picture to show what larger airplanes need to become airborne.</p> <p>Explain what airplanes do for people.</p>	<p>Give students 2 or 3 minutes to locate, underline, and paraphrase details that explain what an airplane designer will have to do if an airplane will fly long distances. Once they have recorded their answers, cold call a few students to share their thinking whole group. Listen for:</p> <p><i>The designer will have to make sure there is efficient power or the capacity to store a lot of fuel.</i></p> <p>Ask students to locate details that help them understand what larger planes need to become airborne. Prompt them to try to determine the meaning of the word <i>airborne</i> by thinking about the meaning of familiar parts of this word: <i>air-</i> and <i>-borne</i>. After 1 minute, ask a few students to share their thinking aloud. Listen for:</p> <p><i>I think airborne means going up in the air.</i></p> <p>Direct students to locate details in the text that explain what larger planes need to become airborne, then to sketch a quick picture to show what larger airplanes need. Once students complete their sketches, ask a few to hold their sketches up and explain how their drawings depict what larger airplanes need to fly. Look and listen for them to show and explain:</p> <p><i>I drew a plane with a large engine and bigger wings because the article says that larger planes need larger engines and wings.</i></p>



Invention of the Airplane Close Reading Guide  
(For Teacher Reference)

Directions	Questions	Teaching Notes
		<p>Read the third question aloud to students, then ask them to go back to the paragraph to locate and list details that explain what airplanes do for people. After 2 or 3 minutes, cold call a few students to share out their responses. Listen for suggestions such as:</p> <p><i>Airplanes carry vacationers around the world; carry a single person from one side of a city to another; fly people great distances; carry cargo (people/soldiers and equipment); are used as “crop dusters, aerobatic biplanes, personal transportation aircraft.”</i></p>
<p>Review your answers to the above questions and the article to help you respond to the prompt on the right.</p>	<p>In your own words, explain how the Wright brothers’ invention of the airplane changed people’s lives.</p>	<p>Direct students to work with group members to review each of their responses to help them determine and record an answer to the synthesis question. After 3 or 4 minutes, cold call a few students to share their ideas whole group. Listen for answers similar to:</p> <p><i>When the Wright brothers invented the first powered, controllable airplane, they made it possible for people to travel great distances and/or to specific locations more; their invention made it possible for people to travel to far-off places quickly; and they made it possible for us to contact people in other parts of the world.</i></p>



Expert Text Note-catcher: Traffic Signal  
(Answers, for Teacher Reference)

*What need or want inspired the development of this invention?*

New cars that allowed drivers to go very fast made the streets unsafe and inspired the development of the traffic signal.

*How were people's needs met, and by whom?*

Garrett Morgan noticed how dangerous the roads were, so he invented a traffic signal that could tell drivers when to Go, Stop, and All-Stop. The last signal told drivers to stop for pedestrians to cross the street.

Background information about the  
INVENTION

*Explain why people needed or wanted this invention.*

- Cars were new, and they made the streets more dangerous.
- People in cars went much faster than people riding horses or walking, so they caused a lot of accidents.

Background information about the INVENTOR(S)

*Explain the inventor(s) history, motivation to solve the problem, special skills, and/or preparation.*

- Garrett Morgan was born on March 14, 1877, in Paris, Kentucky, to former slaves.
- He worked as an apprentice to a handyman and earned enough money to hire a tutor.
- He was a successful sewing machine repairman and business owner.
- "He would see a need for something and then go about trying to find something that filled that need; if that something didn't exist, then he would make it himself."
- He invented a gas mask and used it to rescue people who were trapped underground in an explosion.

Information about developing a SOLUTION

*Explain how the inventor(s) solved the problem.*

- Garrett Morgan invented "a T-shaped pole that had a signal on the top, with three positions. These three positions were Go, Stop, and All-Stop."
- The last position on his traffic signal told all drivers to stop so pedestrians could cross the street safely.
- He drew sketches of his plans.
- He received a patent for his invention in 1923.

Information about the IMPACT

*Explain how this invention changed people's lives.*

- Garrett Morgan's traffic signal made it much safer for people to drive and to cross the streets.
- "It was used throughout America until it was replaced by the traffic lights that are still used today."





Vocabulary Definitions: Lesson 4  
(For Teacher Reference)

<b>“The Twofold Genius of Garrett Morgan”</b>	<b>“Airplane”</b>
apprentice – trainee, learner, beginner	unreliable – not able to depend on; untrustworthy
equipment - tools	destination – predetermined end to a trip
running – managing, operating, in charge of	accomplish – achieve, get done, complete
transportation – a way of traveling	efficient – not wasteful; cost effective
eventually - finally; in the end	requirement – necessity, a must



Locating Answers Quickly anchor chart

Traffic Signal Research Group	Airplane Research Group
How was Garrett Morgan's traffic signal different from other signals that had been developed?	Which of the Wright brothers flew the first flight?
Which article would be best to help you describe the physical structure of Garrett Morgan's traffic signal?	How do the features of a plane change based on its function?
How did Garrett Morgan earn money to pay for his education?	What experiences inspired the Wright brothers to build airplanes?"



Graphic Novel Sketch,  
Part 2

**Directions:**

- Read and consider the information about the developing a SOLUTION to identify several details that explain how your inventor developed the invention.
- Use the panel provided to sketch an image that shows your inventor's process for developing the invention. Your sketch should include the relevant details you identified in Step 1.
- Include an information box that helps explain one of the steps the inventor took to develop the invention.
- Finish the sketch by adding different font sizes, styles, or colors to draw attention to the details or words that best help you explain how the invention was developed.