EXPLORING AIRMAIL TOUR

TEACHER’S GUIDE  GRADE 3- GRADE 6

College Park Aviation Museum | MNCPPC
1985 Cpl. Frank Scott Drive | College Park, MD 20740
www.CollegeParkAviationMuseum.com
Revised August 2014
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*Tours Available: Monday – Friday 10am to 3pm*

*Education tours must be scheduled in advance by calling 301-864-6029.*

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Dear Educators,

The College Park Aviation Museum will immerse your students in the science and history of flight through an interactive tour and hands-on activities. Through the Exploring Airmail Tour, Students will learn why airmail matters, the technological hurdles of early airmail operations, and College Park’s central role in the history of airmail.

Upon arrival, your students become the newest recruits in the United States Postal Service Airmail. They will receive a brief introduction to the history of airmail before exploring documents, artifacts, and airplanes used by the Postal Service between 1918 and 1921. Students will learn about important figures from the history of airmail that helped create the world we live in today. They will also simulate the daily routine of airmail pilots during hands-on activities like wearing cold weather gear, reviewing pilot rules, and using navigational equipment.

Both the museum program and the classroom activities in this educational packet align with Common Core and state curriculum standards. The pre-visit materials provide a history of airmail through 1918, while your museum educator will focus on 1918 to 1921, when the Post Office’s first regularly-scheduled airmail routes operated out of College Park Airport. It is followed by a worksheet that introduces students to parts of the airplane. Later, they will use this knowledge to explore the engineering process as they propose modifications to the airmail planes.

This packet also includes engaging post-visit activities and readings. The post-visit reading continues the story of airmail from 1921 to 1926. Science activities include students exploring how weather conditions affected the early airmail pilots’ performance. A math activity combines students learning about the economic factors impacted airmail flight with reinforcing knowledge of navigational aids. Overall, these activities allow students to apply historical concepts they learned at the Museum to their own lives. The College Park Aviation Museum staff looks forward to hosting your group and exploring this fascinating aspect of American and local history.

Cheers,

Rob Verbsky, PhD
Assistant Director
FIELD TRIP INFORMATION

REGISTRATION REQUIREMENTS
- Advanced registration is required for all group tours and programs.
- Group reservations require a minimum of 10 people.
- Groups larger than 100 will be scheduled over multiple time slots or days.
- Tentative dates must be confirmed within 5 business days. Afterwards, unconfirmed dates can be offered to other groups.

To schedule a tour:
By Phone- Contact the Education Department at 301-864-6029
By Fax - fax the registration form to 301-927-6472
By Email- CPAM.Educators@pgparks.com

CANCELLATION AND CHANGE POLICY
48 hours notice is required for cancellations or schedule changes. We will be glad to reschedule your program for a later date. In the case of inclement weather or school closures, we will gladly contact you to reschedule.

ADMISSION FEES
Museum admission is $2.00 per student. School staff are free. We require a student to adult ratio of 10:1, in order to ensure a healthy and safe learning environment for your group. All adults over this requirement will be charged the group rate of $3.00 each.

ARRIVAL & DEPARTURE
Please arrive 15 minutes before your scheduled program to allow time for restroom use and check in. Upon arrival, please check in with the front desk. If you are running late, please contact the museum at 301-864-6029.

Because of construction, arrival and departure procedures have changed. Buses should load and unload at the far end of the old 94th Aero Squadron Restaurant parking lot (5240 Paint Branch Parkway), which is next to the museum. A museum representative will meet your group there.

PAYMENT
Payment is required on the day of your visit. The museum accepts cash, checks, Mastercard, and Visa.

LUNCH FACILITIES
Because of construction, our eating facilities are in flux. If your group wishes to eat lunch at the museum, please let us know so we can determine if we can accommodate your group. Please be mindful that there is NO FOOD AND DRINK ALLOWED INSIDE THE MUSEUM. We apologize for the inconvenience.

SPECIAL NEEDS
To better prepare our educators for your students and to best facilitate the learning process, please list any special needs that we should be aware of. For our hearing impaired guests, the museum is able to provide a sign language interpreter with at least 72 hours of notice.

PHOTOGRAPHY
Taking photographs of your experience is greatly encouraged. Feel free to bring a camera with you.
SCHOOL GROUP BEHAVIOR EXPECTATIONS

Teachers: Please review these expectations with your students and chaperones.

Museums are fragile environments and school groups are larger than typical museum groups. Following museum behavior expectations is essential to the success and enjoyment of the learning experience. We reserve the right to ask a school group to leave the Museum due to behavior issues.

- **No food, drink, or gum in museum galleries.** The Museum provides plenty of food for thought as well as a feast for the eyes.
- **Large bags are not allowed in the galleries.** For the safety of the objects, visitors should leave backpacks and other large bags in the museum lobby.
- **Running, pushing, and roughhousing are not allowed in the museum.** Appropriate museum behavior is necessary to avoid bumping into or damaging artifacts.
- **Keep a safe distance between you and the objects.** This helps to avoid accidentally touching or bumping artifacts.
- **Do not touch.** Your touch may not seem like much, but even the slightest contact can damage the surface of objects, rust metal, or leave fingerprints.
- **Only use pencils while writing or sketching.** If an accident should occur, a pencil mark is easier to remove than pen or marker. Please avoid pointing at museum objects while holding a pencil or other items in your hand.
- **No leaning on walls or cases** (either to write or for physical support). This helps keep pictures on the walls and objects secure in their display case. Please feel free to sit on the benches or on the floor as you talk, write, or draw.
- **Use quiet voices in the museum.** We want to respect other groups or visitors.
- **Stay with your group at all times.** This is for teachers, chaperones, and students. We require adult supervision at all times and all we encourage adult participation during field trips.
- **Limit cell phone usage.** Please set a good example by not using your cell phone during programming. Make sure your cell phone is off or silenced during your visit.
- **Chaperone small groups in the Museum Store.** To best serve you and other visitors, we ask that you break into groups of 15 or fewer when visiting the store.

We rely on the cooperation of teachers and chaperones to maintain appropriate behavior and keep students together during your museum experience. Please make sure that all adults accompanying your group are aware of their responsibilities.

Thank you for observing these rules to help keep our museum safe for everyone! Enjoy your visit!
For students who have visited the College Park Aviation Museum for our Changes in Transportation tour in earlier grades, Exploring Airmail is a great follow-up experience. The Airmail tour is also appropriate for students who have never visited before and are studying transportation. Students will investigate the workings of the airmail service that operated out of the College Park Airport from 1918 to 1921. They will learn about airplanes and other artifacts, read primary sources about the airmail service, and use navigation instruments to explore the museum.

Your tour will contain the following components:

1. A historical overview of the College Park Airport’s role in airmail

   During this portion of the tour, students will learn about the brave men and women who flew mail to and from College Park between 1918 and 1921. Students will begin with a brief overview of the College Park Airport, followed by an in-depth exploration of several of the colorful personalities who flew at the airfield during the airmail years. They will learn about occurrences such as the first Airmail Flight, the Airmail Strike of 1918, the effect of World War I on the development of aviation, and aviators including Katherine Stinson, the first female to fly mail for the Post Office. This information will be presented alongside two Curtiss planes that demonstrate the rapid evolution of plane mechanics and design.

2. An examination of objects in the Museum’s collection relating to the airmail service:

   Here the students will learn about the multitude of factors that pilots had to consider when making their flights. They will explore primary sources by reading the rules for airmail pilots and interpreting what these rules meant. Students will also examine a weather board to understand the physical risks that pilots took as “neither snow nor rain nor heat” would prevent airmail deliveries. Finally, the museum educator will lead the students in a discussion about specific artifacts; including an altimeter, tachometer, and air pressure gauge to increase students’ understanding of airplane design, the physics of flight, and historical navigational tools.

3. An interactive navigational activity that will take students through the Museum:

   During the early days of airmail, pilots relied on landmarks to chart their routes. After a discussion of the purposes the navigational aids and parts of a compass and compass rose, students will learn the importance of headings and directions for pilots. During the activity, students will simulate pilot movement as they travel through the Museum, using a compass to write down landmarks as they travel from plane to plane. This will give students a chance to explore more areas of the Museum as they calculate their journeys.
**Math (Maryland State Curriculum Standards)**

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<tbody>
<tr>
<td><strong>1.B.2</strong> Identify, write, solve, and apply equations and inequalities</td>
<td><strong>1.A.2.</strong> Identify, describe, extend, and create non-numeric growing or repeating patterns</td>
<td><strong>1.B.1.</strong> Write and identify expressions</td>
<td><strong>1.B.1.</strong> Write and evaluate expressions</td>
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<td><strong>1.A.2</strong> Identify, describe, extend, and create non-numeric growing or repeating patterns</td>
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<td><strong>1.B.1</strong> Write and identify expressions</td>
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<td><strong>7.A.1.</strong> Apply a variety of concepts, processes, and skills to solve problems</td>
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<td><strong>3.C.1.</strong> Apply measurement concepts</td>
<td><strong>3.B.1.</strong> Measure in customary and metric units</td>
<td><strong>3.C.2.</strong> Calculate equivalent measurements</td>
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<td><strong>3.C.1.</strong> Apply measurement concepts</td>
<td><strong>3.C.1.</strong> Apply measurement concepts</td>
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<tr>
<td><strong>4.A.1</strong> Collect, organize, and display data</td>
<td><strong>4.B.2</strong> Describe a set of data</td>
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<td><strong>6.C.1.</strong> Analyze number relations and compute</td>
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<td><strong>6.B.1</strong> Apply number relationships</td>
<td><strong>6.C.1.</strong> Analyze number relations and compute</td>
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<td><strong>7.B.1.</strong> Measure in customary and metric units</td>
<td><strong>7.D.1.</strong> Relate or apply mathematics within the discipline, to other disciplines and to life</td>
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<td><strong>7.D.1.</strong> Relate or apply mathematics within the discipline, to other disciplines and to life</td>
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**Math (Common Core Standards)**

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<tr>
<td><strong>2.OA.1.</strong> Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings, and equations with a symbol for the unknown number to represent the problem.</td>
<td><strong>4.OA.2</strong> Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison. satisfied by math activity</td>
<td><strong>5.NBT.5</strong> Fluently multiply multi-digit whole numbers using the standard algorithm</td>
<td><strong>6.RP.1</strong> Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.</td>
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<tr>
<td><strong>2.NBT.3</strong> Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.</td>
<td><strong>4.OA.3</strong> Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.</td>
<td><strong>5.NF.5</strong> Interpret multiplication as scaling (resizing) by: a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.</td>
<td><strong>6.RP.3</strong> Use ratio and rate reasoning to solve real-world and mathematical problems</td>
</tr>
<tr>
<td><strong>4.NBT.1</strong> Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represent in the place to its right</td>
<td><strong>5.MD.1</strong> Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step real world problems</td>
<td><strong>5.MD.5</strong> Fluently divide multi-digit numbers using the standard algorithm.</td>
<td><strong>6.NS.2</strong> Fluently divide multi-digit numbers using the standard algorithm.</td>
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## Reading and Language Arts (Common Core Standards)

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<tr>
<td><strong>RI1</strong> Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.</td>
<td><strong>RI1</strong> Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.</td>
<td><strong>RI1</strong> Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.</td>
<td><strong>RI1</strong> Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.</td>
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<td><strong>RI3</strong> Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.</td>
<td><strong>RI3</strong> Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.</td>
<td><strong>RI3</strong> Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.</td>
<td><strong>RI3</strong> Analyze in detail how a key individual, event, or idea is introduced, illustrated, and elaborated in a text (e.g., through examples or anecdotes).</td>
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<tr>
<td><strong>RI4</strong> Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 3 topic or subject area.</td>
<td><strong>RI4</strong> Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area.</td>
<td><strong>RI4</strong> Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.</td>
<td><strong>RI4</strong> Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings.</td>
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<tr>
<td><strong>RI7</strong> Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur)</td>
<td><strong>RI7</strong> Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.</td>
<td><strong>RF3</strong> Know and apply grade-level phonics and word analysis skills in decoding words.</td>
<td><strong>R17</strong> Integrate information presented in difference media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.</td>
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<td><strong>RI9</strong> Compare and contrast the most important points and key details presented in two texts on the same topic</td>
<td><strong>RF3</strong> Know and apply grade-level phonics and word analysis skills in decoding words.</td>
<td><strong>RF4</strong> Read with sufficient accuracy and fluency to support comprehension.</td>
<td><strong>SL1</strong> Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others’ ideas and expressing their own clearly. <strong>SL1.c</strong> Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under discussion.</td>
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<tr>
<td><strong>RF3</strong> Know and apply grade-level phonics and word analysis skills in decoding words.</td>
<td><strong>RF4</strong> Read with sufficient accuracy and fluency to support comprehension.</td>
<td><strong>SL1</strong> Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others’ ideas and expressing their own clearly.</td>
<td><strong>SL2</strong> Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.</td>
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Reading and Language Arts (Common Core Standards) - Continued

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<tr>
<th>RF4</th>
<th>SL1</th>
<th>W1</th>
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<tr>
<td>Read with sufficient accuracy and fluency to support comprehension</td>
<td>Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher led) with diverse partners on grade 4 topics and texts, building on others’ ideas and expressing their own clearly.</td>
<td>Write opinion pieces on topics or texts, supporting a point of view with reasons and information.</td>
<td>Write arguments to support claims with clear reasons and relevant evidence.</td>
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<td>Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher led) with diverse partners on grade 3 topics and texts, building on others’ ideas and expressing their own clearly.</td>
<td>Write opinion pieces on topics or texts, supporting a point of view with reasons and information.</td>
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W1 Write opinion pieces on topics or texts, supporting a point of view with reasons.

Common Core History/Social Studies, and Science Standards begin in Grade 6.

Reading in History/Social Studies (Common Core)

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<tr>
<td>RH.6-8.1 Cite specific textual evidence to support analysis of primary and secondary sources.</td>
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<tr>
<td>RH.6-8.2 Determine the central ideas or information of a primary or secondary source; provide an accurate summary of the source distinct from prior knowledge or opinions.</td>
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<tr>
<td>RH.6-8.3 Analyze how and why individuals, events, or ideas develop and interact over the course of a text.</td>
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<tr>
<td>RH.6-8.6 Identify aspects of a text that reveal an author’s point of view or purpose (e.g., loaded language, inclusion or avoidance of particular facts)</td>
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Reading in Science/Technology

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<tr>
<td>RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements or performing technical tasks.</td>
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<tr>
<td>RST.6-8.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grade 6-8 texts and topics.</td>
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### Social Studies (Maryland State Curriculum Standards)

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<tr>
<td><strong>3.A.1</strong> Use geographic tools to locate places and describe the human and physical characteristics of those places</td>
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<td><strong>3.D.1.</strong> Explain why and how people adapt to and modify the natural environment and the impact of those modifications</td>
<td><strong>3.A.1.</strong> Use geographic tools to locate places and describe the human and physical characteristics in early world history</td>
</tr>
<tr>
<td><strong>4.A.1</strong> Explain that people must make choices because resources are limited relative to economic wants for goods and services in Maryland, past and present</td>
<td><strong>4.A.1</strong> Explain that people must make choices because resources are limited relative to economic wants for goods and services in Maryland, past and present</td>
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<td><strong>3.D.1.</strong> Analyze why and how people modify their natural environment and the impact of those modifications</td>
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<td><strong>6.A.1</strong> Use appropriate strategies and opportunities to increase understandings of social studies vocabulary</td>
<td><strong>6.A.1</strong> Use appropriate strategies and opportunities to increase understandings of social studies vocabulary</td>
<td><strong>6.A.4</strong> Use strategies to demonstrate understanding of the text (after reading)</td>
<td><strong>6.A.1</strong> Use appropriate strategies and opportunities to increase understandings of social studies vocabulary</td>
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<td><strong>6.A.4</strong> Use strategies to demonstrate understanding of the text (after reading)</td>
<td><strong>6.A.4</strong> Use strategies to demonstrate understanding of the text (after reading)</td>
<td><strong>6.B.1</strong> Use informal writing strategies, such as journal writing, note taking, quick writes, and graphic organizers to clarify, organize, remember and/or express new understandings</td>
<td><strong>6.A.4</strong> Use strategies to demonstrate understanding of the text (after reading)</td>
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<td><strong>6.B.1</strong> Use informal writing strategies, such as journal writing, note taking, quick writes, and graphic organizers to clarify, organize, remember and/or express new understandings</td>
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<td><strong>6.D.1.</strong> Identify primary and secondary sources of information that relate to the topic/situation/problem being studied</td>
<td><strong>6.B.1</strong> Use informal writing strategies, such as journal writing, note taking, quick writes, and graphic organizers to clarify, organize, remember and/or express new understandings</td>
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<td><strong>6.F.1</strong> Interpret information from primary and secondary sources</td>
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### Science (Maryland State Curriculum Standards)

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<td>2.C.1. Recognize and describe that water can be found as a liquid or a solid on the Earth’s surface and as a gas in the Earth’s atmosphere.</td>
<td>2.E.2. Recognize and describe that each season has different weather conditions</td>
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<td>5.A.2. Explain that changes in the ways objects move are caused by forces.</td>
<td>5.C.3. Cite evidence supporting that forces can act on objects without touching them. <strong>6.B.1 Recognize and describe that people in Maryland depend on, change, and are affected by the environment.</strong></td>
<td>5.A.1. Describe the motion of objects using distance traveled, time, direction, and speed.</td>
<td>5.C.3. Identify and describe magnetic fields and their relationship to electric current.</td>
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THE BEGINNINGS OF AIRMAIL

During the Prussian-Franco War in 1871, Prussia (now Germany) surrounded the city of Paris. The Germans blocked all roadways in and out of Paris. People then realized one way to communicate was through the skies. From September to January 1871, 66 hot air balloons carrying over two million letters left from Paris. Balloons were hard to control and many ended up far off track. However, some balloons made it to where they were supposed to go. This was the first time in history mail had been sent by air.

The United States first used planes to carry mail on June 13, 1910. A pilot named Charles Hamilton flew from Long Island to Philadelphia. He carried a letter from the governor of New York to the governor of Pennsylvania. However, this was just a one-time occurrence, and there was no regular schedule to deliver mail by plane in the United States. Many people did not believe that planes were reliable enough to ensure fast delivery, so Congress was reluctant to put aside money for airmail. Finally, in 1918, the Post Office convinced Congress that they could reliably deliver mail by plane. The Assistant Postmaster Otto Praeger asked the Army if they would help him fly mail. The Army first flew mail on May 15, 1918 from Washington D.C. to New York. The age of air mail had begun!

THE ARMY FLIES THE MAIL

This is how the Army ran airmail: One plane would leave from Potomac Field in Washington, D.C. At the same time, another plane would leave from Belmont Field in Long Island, New York. They would meet at Bustleton Field in Philadelphia, Pennsylvania. In Philadelphia, they dropped off mail, picked up new mail and refueled. They would make the full trip, with the Potomac Field Plane continuing on to New York and the New York plane finishing at Potomac Field.

At first, there were many problems with airmail. The Army and the Post Office did not always see eye-to-eye. The Army was fighting in World War I. The pilots with the most experience were sent to Europe, so only new pilots flew the mail. Many of these pilots were disappointed to be flying the mail instead of flying in the war. They also did not have the experience necessary to fly in all weather conditions, so they cancelled flights when the weather was bad. The Army believed that the Post Office did not understand the difficulties of flying in bad weather, while the Post Office thought the Army cancelled flights because they were not committed to flying the mail. It was time for a change.

THE POST OFFICE FLIES THE MAIL, 1918-1926

In August of 1918, the Post Office began flying the mail. Otto Praeger appointed Benjamin Lipsner to head the first civilian airmail service. A civilian is anyone who is not in the military. Though many of the first civilian airmail pilots were veterans of the Army, they now worked for the Post Office. Airmail pilots earned $4,000 a year. At the time, most people earned about $1,500 a year. Pilots made a lot of money because they had a dangerous job, especially airmail pilots who had to fly in extreme weather.

When the Army flew the mail, they flew out of Potomac Airfield in Washington, D.C. However, the Post Office wanted to use a larger airport. They moved their D.C. area airfield a few miles north to College Park, Maryland. On August 12, 1918, pilot Max Miller made the first regularly-scheduled civilian airmail flight by the Post Office from College Park to Philadelphia. Until the Post Office established a route from New York to California in 1921, College Park was an important hub in the airmail service. During your tour at the College Park Aviation Museum, you will learn about important airmail pilots who flew from College Park.
**AIRPLANE**

An airplane is a vehicle heavier than air, powered by an engine, which travels through the air as air passes over and under its wings.

**FUSELAGE**

The fuselage is the central body of an airplane, designed to accommodate the crew, as well as the passengers and/or cargo.

**COCKPIT**

In airplanes used for general aviation, the cockpit is usually the space in the fuselage for the pilot and passengers; in some aircraft it is just the compartment where the pilot flies the plane. Most airmail planes had open cockpits, which exposed pilots to the elements but allowed them to see better.

**LANDING GEAR**

The landing gear includes the wheels underneath the airplane and supports the plane while on the ground.

**PROPELLER**

A propeller is a rotating blade on the front or back of the airplane. The engine turns the propeller, which moves the airplane through the air.

**WINGS: UPPER WING & LOWER WING**

Wings are the part of the airplane that provide lift and support the entire weight of the aircraft and its contents while in flight. During the years of airmail (1918-1926) most planes used to fly mail were biplanes. This meant that they had two wings, an upper wing and a lower wing.

**AILERONS**

Ailerons are the outward moveable sections of an airplane’s wings. They move in opposite directions (one up, one down). They are used while making turns to control roll or bank.

**RUDDER**

The rudder is the moveable vertical section of the tail, which controls lateral (side-to-side) movements.

**ELEVATOR**

The elevator is the moveable horizontal section of the tail, which controls vertical (up and down) movements.

**TAIL**

The rear portion of the fuselage of an aircraft.
The Post Office faced many hurdles as they expanded airmail service. First, Congress did not vote to give the Post Office enough money to build airfields in every city. Whenever the Post Office wanted to open a stop in a new city, they had to convince that city’s government and private investors to set aside money to build an airfield! In 1920, newly elected President Harding appointed Will Hays as the next Postmaster General. Hays decided to streamline the airmail service routes to maximize the usefulness of planes. He shut down the airmail station in College Park so that money and staff could be diverted to flying the cross-country route.

During the early to mid-1920s, the Post Office made many important innovations that improved the safety, speed, and reliability of its airplanes. Pilots, mechanics, engineers, and politicians collaborated to find solutions for problems. By 1925, the Post Office had set up a lighted airway from New York to San Francisco so that airmail could fly through the night, which cut travel times in half. At the same time, engineers experimented with modifying existing planes and making new planes entirely—including an all-metal plane.

As people became used to planes flying above them, the public became interested in travelling by air. A woman who lived in Chicago asked the Post Office if she could send her children home from Colorado by airmail, and a man in San Francisco purchased enough stamps to cover his entire body and asked to be flown in an airmail plane to New York.

The government made huge advances to improve air transportation during the years they controlled airmail. However, private companies who designed airplanes and private airlines were still struggling. In 1925, Congress voted to give contracts to carry the mail to private companies. This gave a boost to emerging companies such as Boeing, who designed a plane that would carry twelve passengers soon after they received their first airmail contract. In 1926, private companies began carrying the mail for portions of the route, and by 1927 airmail was completely in private control.

While operating the airmail service, the government was able to sponsor experiments in night flying, radio equipment, and new types of planes. Though airmail was only run by the government for a brief period, it had a lasting effect on aviation innovation and the airmail station at College Park.
TEACHER INSTRUCTIONS

In this activity students will receive a handout detailing the different planes that the Post Office used to deliver mail between 1918 and 1926. Students will be asked to evaluate factors such as speed, safety and economics and suggest modifications to each plane.

OBJECTIVES

Students will compare and contrast aircraft in order to decide which aircraft would be the most reliable for the Post Office to buy. At the end of the activity, students will be asked to suggest modifications to each plane.

SKILLS AND STANDARDS

Engages reading and language arts, science and social studies. Students will also follow in the first three steps of the engineer design process, as they identify problems, identify criteria and constraints, and brainstorm solutions.

INSTRUCTIONS

1. Warm-Up: Distribute the worksheet with the airplane descriptions as well as the question and brainstorming sheet and have students silently read about each plane.

2. Engage students in a class discussion about the benefits and detractors of each specific plane. For each plane, list two beneficial aspects and two problems. Create a pro and con chart as a class from this list.

3. Using material learned on the Airmail Tour or material found in this packet, ask students what factors the Post Office considered when choosing planes. Then, ask the students to rank these factors in order of importance on the worksheet. Remind the students that one key difference between airmail and general aviation was that airmail was required to stick to a strict schedule and fly each day, regardless of weather conditions.

4. Have students select which plane would be the most effective. Ask them to write a two sentence explanation of why they picked this plane on the worksheet.

5. Inform the students that engineers were constantly modifying early planes to improve performance. Ask the students to predict some modifications that the engineers made by brainstorming possible solutions to the problems they identified in step #2. Encourage students to answer with specific questions from the state curriculum about design constraints, such as "Does it work?" "Could I make it work better?" and "Could I have used better materials?"

6. Ask students to share some possible solutions that they generated. Inform the students that while the Post Office used all three planes, they came to rely on mainly the deHavilland planes. The Post Office modified the deHavilland planes to improve safety by moving the cockpit and using more durable materials such as plywood to construct the planes.
**DEHAVILLAND DH-4H**
- Could carry 500 pounds of mail
- 90 miles/hour cruising speed
- Went for 400 miles without stopping
- Cockpit was located extremely close to engine, which was very dangerous if the plane crashed
- Was made of flimsy materials and very inexpensive

**CURTISS JN-4**
- Could carry 300 pounds of mail
- 75 miles/hour cruising speed
- Went for 200 miles without stopping
- The plane often shook in the air, which made navigation instruments unreliable
- Many planes available and inexpensive to purchase

**STANDARD AERO COMPANY JR-1B**
- Could carry 180 pounds of mail
- 100 miles/hour cruising speed
- Could fly for 280 miles without needing to refuel
- Compass was often affected by vibrations of plane
- Planes were specifically created for airmail, making them more expensive
WHICH PLANE WOULD YOU PICK?

Questions & Brainstorming

*Use the provided plane descriptions to think about the design and purpose of the airmail planes when answering the questions below.*

Rank the factors of the plane based on what you think is important. (1. is most important, 4. is least important). Consider: Speed, Safety, Weight of the Mail, and Cost.

1.  
2.  
3.  
4.  

If you worked for the Post Office, which of these planes would you pick? Write two sentences identifying the plane and explaining why you selected it.

_______________________________________________________________________________________
_______________________________________________________________________________________
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Airplane mechanics and engineers were constantly reevaluating their designs. For the plane that you selected, what improvements would you make? For this activity, use the **engineering design process**! Keep in mind **criteria** and **constraints**. Your **criteria** are the requirements you need for your plane—what makes a plane successful? Think about safety and speed. Your **constraints** are practical concerns that stop you from building the best plane possible. Will your plane be too expensive to make if you use stronger materials? Will your navigational tools not work if your plane goes too fast? Write down one change you would make to the plane that you picked above and explain why.

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People who deliver mail have always taken pride in completing their duties no matter the weather, and airmail pilots were no different. Following the creed that “neither wind nor rain” could stop the mail from coming through, airmail pilots often had to deal with difficult weather conditions. During the following activities, students will learn the science behind some of the weather that airmail pilots flew through.

OBJECTIVES
Students will engage with the scientific method as they explore the science of weather through two demonstrations. In the first activity, students will be introduced to matter as they observe that air takes up space. The students will build on this understanding in the second activity, where they learn about how changes in the state of matter affect weather. Activities may be conducted either in groups or as demonstrations, depending on time considerations and grade level. Teachers may adapt this lesson based on the ability level of their students by omitting the first activity to make the lesson more advanced, or by omitting the second activity to simplify the lesson.

ACTIVITY ONE: DOES AIR TAKE UP SPACE?
This experiment introduces students to the idea that air is matter by allowing them to observe that air takes up space.

MATERIALS
- Empty fish tank or clear plastic container
- Clear plastic cup
- Small napkin
- Dropcloth (to protect work surface)

INSTRUCTIONS
1. Distribute worksheet for activity. Before the demonstration, ask students what senses they use to experience air. Ask them if they believe that air takes up space and explain to them what a hypothesis is as they write down their predictions about whether or not air takes up space on their worksheets.
2. Prepare a table for water spillage by covering it with newspapers or a drop cloth.
3. Fill an aquarium or other large container with water.
4. Crumple a napkin and stuff it into a plastic cup.
5. Turn the cup upside-down and plunge it completely into the water. Do not tilt the cup.
6. Remove the cup from the water, and extract the napkin.
7. Observe whether the napkin is wet or dry.

Discussion Questions: After the experiment, reveal through discussion that the napkin stayed dry because air trapped in the cup prevented water from entering the cup. Explain to students that air is a mixture of gasses that make up the Earth’s atmosphere. Explain that air impurities allow us to detect the presence of air, such as how smoke contains particles we can see and smell. Facilitate a follow-up discussion by asking students to brainstorm examples of where air takes up space, such as balloons and basketballs. Discuss ways to store air and activities that require people to store air, such as space travel and scuba diving.
Write a hypothesis.

*A hypothesis is a guess or prediction about what the experiment will demonstrate as it occurs. Do you think that air and water can take up the same space, or does air need its own space?*

________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________

Materials

- Empty fish tank or clear plastic container
- Clear plastic cup
- Small napkin
- Dropcloth (to protect work surface)

Procedure:
1. Prepare a table for water spillage by covering it with newspapers or a drop cloth.
2. Fill an aquarium or other large container with water.
3. Crumple a napkin and stuff it into a plastic cup.
4. Turn the cup upside-down and plunge it completely into the water. Do not tilt the cup.
5. Remove the cup from the water, and extract the napkin.

Observation:
What happens to the napkin? Does it get wet or stay dry? ________________________________
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
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Conclusion:
Why do you think that this happened? Write a conclusion, or answer based on your observations from the experiment, about what happened.
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ACTIVITY TWO: WARM AND COLD AIR

In this activity, you will conduct a simple demonstration exploring the actions of warm and cold air and talk about how this relates to weather.

MATERIALS

- Empty fish tank or clear plastic container
- Blue food coloring
- Eyedropper
- Ice cubes
- 2 cups ice cold water
- Hot water
- Funnel
- Duct tape
- Measuring cup

INSTRUCTIONS

1. Tape a funnel to the inside of an empty fish tank so the narrow end is just below the rim.
2. Place 4-5 ice cubes in the funnel.
3. Pour hot water in the fish tank until it is half full.
4. Add five drops of blue food coloring to two cups of cold water in a measuring cup.
5. Slowly pour about ¼ cup of the cold water over the ice in the funnel. At this point, instruct students to stop to answer the first observation question on their worksheet.
6. Pour another ¼ cup of cold water into the funnel. Repeat two more times.

DISCUSSION QUESTIONS

After the experiment, ask the students the following questions: What is happening? Why do you think the cold blue water sinks to the bottom and why does it stay there? Which is heavier: cold or warm air? What happens when cold and warm air meet? What weather conditions are caused by cold air and warm air coming together?

Scientific Concepts: Cold air is much heavier than warm air. Cold air is more dense than warm air. Air is made of molecules. and when they are heated, they move faster and they move further apart. When the weather is colder, the molecules move closer together. Since the molecules of cold air are more densely-packed, a given unit of cold air is heavier than the same amount of warm air.

The amount of water vapor in the air also affects how heavy the air is. The more water vapor there is in the air, the less dense the air is. Cold, dry air is much heavier than warm, humid air. This is why you see the steam rising off of a boiling pot of water on the stove. A baseball will also travel further on warm, humid day than it would on a cold, dry day. This is because the ball will encounter less drag and friction when traveling through warm air, because warm air is less dense.

What does this mean for weather? As a warm air mass approaches a colder air mass, the warm air slides up and over the cooler air, because the warmer air is lighter. As warm and cold masses of air reach each other, moisture in the air condenses to cause rain.
Scientific Concepts - Continued for 5th and 6th Grades

Warm and Cold Air – Weather Fronts

Weather fronts mark the boundaries between air masses. You often hear weathermen and women talking about the movements of warm and cold fronts during their weather reports. On different sides of a front, the air masses may have large temperature differences, and often also have different wind directions and humidity. The movements of fronts cause changes in weather conditions, and can be the cause of rain, clouds, snow, and other types of weather.

Follow Up Activities (For 5th and 6th grades):

Look at the national weather map in a daily newspaper or on a weather website. Using the following information, explain how cold fronts and warm fronts are represented in weather forecasts.

How are different fronts represented on weather maps

Red semicircles represent warm fronts.

Blue triangles represent cold fronts.

What does a warm front mean?
The warm air at the Earth’s surface behind the warm front flows upward over the colder air ahead of the warm front. This causes clouds and precipitation, as long as there is enough upward air motion, and moisture in the air.

What does a cold front mean?
The cold air advances into the warmer air ahead of the front. Where the two air masses meet, if the air contains enough moisture, rain can occur. If the air is also unstable, thunderstorms can develop.
Experiment Worksheet

Activity Two: Warm and Cold Air

Write a hypothesis about what will happen when you pour the cold blue water into the hot water.

________________________________________________________________________________________
_______________________________________________________________________________________
_______________________________________________________________________________________

Materials
- Empty fish tank or clear plastic container
- Blue food coloring
- Eyedropper
- Ice cubes
- 2 cups ice cold water
- Hot water
- Funnel
- Duct tape
- Measuring cup

Instructions
1. Tape a funnel to the inside of an empty fish tank so the narrow end is just below the rim.
2. Place 4-5 ice cubes in the funnel.
3. Pour hot water in the fish tank until it is half full.
4. Add five drops of blue food coloring to two cups of cold water in a measuring cup.
5. Slowly pour about ¼ cup of the cold water over the ice in the funnel. Stop and answer the first observation question.
6. Pour another ¼ cup of cold water into the funnel. Repeat two more times.

Observations
What do you notice about the blue water? What do you think will happen when more blue water is added?
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________

Conclusion
What does this experiment tell us about weather? How would this affect airmail pilots?
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________

Activity Two: Warm and Cold Air
TEACHER INSTRUCTIONS

*In this activity, students will use a scaled map of the airmail route to complete a series of mathematical calculations. Student calculations will include miles travelled, gallons of gas needed, and price of airmail stamps, among other airmail-related problems. Their calculations will ultimately lead them to figuring out how much profit each airmail flight could have made under ideal conditions.*

**OBJECTIVES**

In using math to understand the variety of factors in the airmail service, students will understand the real life application of mathematical and problem solving skills.

**SKILLS AND STANDARDS**

Engages math and social studies skills. Uses computational skills applying a variety of concepts, processes, and skills to solve problems. Map reading skills foster understanding of scale and distances.

**MATERIALS**

- Map (Could be per student, pair, group, etc.)
- Worksheet (One per student)
- Ruler
- Calculator (Based on the needs and capabilities of the students in multiplication and long division)
- Writing utensil

**INSTRUCTIONS**

1. Warm-up: Distribute worksheet, map, and other materials. Conduct a discussion on why it was important for pilots to understand math when considering delivering the mail. Math was used to plot distances in destination, to plan the time of flight departure and arrival, and to figure the cost of delivery.
2. Engage the students in understanding the purpose and use of the map. Early pilots did not have GPS systems or complex navigational aids, so they had to rely on maps and landmarks when planning their routes. Also make note of the cities on the map. There are several states that are not included on the delivery route. Make sure the students know that these states had lower populations than their counterparts, so the mail was less likely to be delivered their as quickly or frequently.
3. The origin and end of the airmail flight is not set on the worksheet. For younger grades the instructor may pre-choose the destinations so that the entire class will have consistency and match in their calculations. For older grades the students may choose their destinations, but the computations will vary based on the distance.
4. Have the students first record the distance between the two chosen points from the map on their worksheet. Then, based on the provided scale, have them convert the inches into miles.
5. Next calculate the times for mail delivery based on what is listed on the sheet. Students may require the use of a calculator.
6. Finally, have the students figure the cost of the airmail delivery to better understand the economics behind the airmail service.
7. End with a general discussion and review to ensure the students knowledge of the importance of math calculations to the airmail service.
Delivering the Mail: Pre-Flight Checklist

Congratulations! You have been accepted for a position with the United States Postal Service Airmail. You have already gone over the history of airmail and the equipment you will be using on the job, so now it is time to plan your first flight! You will be responsible for the trip from _______________ to _______________. Using the information and tools provided, answer the following questions in order. Each question builds off of the previous one, so take care in getting the answer.

First, use your ruler to measure the distance from _______________ to _______________.

**Distance (in inches):**
__________________________________________.

The scale of this map is .5:200. That means that half an inch on the map is equal to 200 miles in real life. To compute the real miles for your leg of the mail route, multiply the distance you measured in half inches by 200 (inches by 400).

**Distance (in miles):**
_____________________.

Your pilot will be flying the Curtiss Jenny. The Jenny could fly 75 miles per hour. How long will it take for the mail to reach its destination?

_________ hours

If you took off from ____________ at 9 AM, at what time would you arrive at your destination?

_________AM/PM

When the airmail first began, it cost $.24, or twenty-four cents, to send one ounce of airmail. A Curtiss Jenny could hold 7,840 ounces of mail. If the Jenny were filled to capacity, how much would its cargo of mail be worth?

$______________

It cost, on average, $64.80 per hour to fly the mail. How much would it cost to fly the mail on your leg of the trip?

$______________

THINK ABOUT IT!
Will you make a profit on your portion of the trip, or a loss?

HELPFUL HINT:
Set up a proportion!
75 miles = __ miles
TAKING IT FURTHER

At the College Park Aviation Museum, students will study airmail in a historical context. Once they return to the classroom, encourage them to explore the modern use of airmail. We have created a list of short classroom activities to encourage students to relate what they learned in their field trip to their daily lives.

ACTIVITY: AIRMAIL TODAY

Create a list of objects in the classroom that were created outside of the United States. In order to illustrate for students how cargo shipping affects cost, access http://ircalc.usps.gov/ as a class and enter various international locations to see different shipping prices. Discuss potential economic benefits and detractors of international production.

ACTIVITY: AIRMAIL vs. EMAIL

Ask students to obtain their parent’s permission and assistance to go through their parents’ mail. Have students write down short descriptions of three pieces of mail as homework. To protect their parents’ privacy, encourage them to use general terms, such as “Phone company bill” or “postcards” rather than specific companies.

Then, instruct students to ask their parents what types of mail they receive by email. If necessary, suggest specific questions that students may ask their parents, such as if they receive business correspondence by mail or if they receive any bills via email. The following day in class, encourage group brainstorming and a class discussion when you create a Venn Diagram of what is received by mail and what is received by email. Stemming from the class discussion, generate a list of reasons people prefer mail as well as a list of reasons why people prefer email.

ACTIVITY: INTERNATIONAL ADDRESSES

Ask students to think about sending mail internationally. The address on a piece of mail for the United States may be formatted differently than mail for other countries. Have students write an address label for the United States and another country of your choosing. Use this website http://bitboost.com/ref/international-address-formats.html#Formats to look at examples for international addresses.

“WHAT SMALL SACRIFICE HAVE I MADE TO BE USEFUL TO THE CAUSE”

Being an airmail pilot was a very dangerous job, and many pilots risked their lives flying the mail. However, the effects of their flights improved the safety and efficiency of airplanes, and it is partially because of them that commercial aviation exists today. Relay to your students other historical examples of people who have risked their lives for science—such as Benjamin Franklin in his lightning experiments and Marie Curie with her radium experiments. Then, ask your students to think of examples from the present day of people who take risks, ranging from spending time away from their family to safety hazards when they are at work. Are any of these people scientists? Encourage students to think about a variety of jobs and where they take place; from geologists who study volcanoes to astronauts in outer space. If time allows, create a chart of these scientific careers and then divide the students into small groups to conduct research on these careers. Finish this activity with oral “report backs” on what the students learned.
FAD TO FUNDAMENTAL: AIRMAIL IN AMERICA
Online exhibit available at: http://www.postalmuseum.si.edu/airmail/
This online exhibit was prepared by the Smithsonian’s Postal Museum, and tells the history of airmail from 1911 to 1926. It provides historic information about airmail history and airmail planes, primary-source photographs, and activities and interactive games about airmail.

KATHERINE STINSON, THE FLYING SCHOOLGIRL
by Debra L. Winegarten
This chapter-book for young readers is a biography of Katherine Stinson. Stinson was a female aviator who convinced the Post Office to allow her to fly airmail for two days from College Park to New York.
This book is 100 pages and suitable for grades 4-7. It contains many beautiful primary-source photographs and full-page illustrations.

FLYING THE MAIL
by Donald Dale Jackson
This chapter book for young readers examines the personalities of many proud pilots, other figures, and planes, that flew for the US Air Mail Service.
The book contains a multitude of photographs in its 170 pages. Suitable for students grade 5-7.

AIRFIELD
by Jeanette Ingold
This historical novel tells the story of a young girl named Beatty, whose father is an airmail pilot during the 1930s. Beatty helps the mechanics at the airfield, and in the process, Beatty befriends a woman pilot who tells her more about her mother, who died before she was born.
This chapter book is 160 pages and suited for grades 6 and higher. It is available through Kindle and Amazon’s website.

COMMON CORE EXEMPLAR TEXTS (related to flight, weather and museums)

Grades 2-3:
Christina Rossetti. “Who Has Seen the Wind”
Eve Merriam. “Weather”

Grades 4-5:
Carl Sandburg. “Fog”.
Madelyn Wood Carlisle. Let’s Investigate: Marvelously Meaningful Maps!