



# **SOAR for STEM Program**

## **2019-2020SY Educator Guide**



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# SOAR for STEM Grades 3-5 Program Outline

Dear Educator,

Congratulations! You and your students have been selected to participate in the New England Air Museum's **SOAR for STEM** program for the 2019-2020 school year. SOAR for STEM is comprised of three phases: Pre-Visit Classroom Learning, the SOAR for STEM Field Trip, and Post-Visit Family Learning.

The first step in this process is confirming your field trip date with us and booking your buses with your district's transportation coordinator. Please mention your visit is part of the SOAR for STEM program when booking your bus so we are billed accordingly.

## Phase I: Pre-Visit Learning in Your Classroom

- Distribute copies of the **Student Notebook** to your students. This document is available for download through the **Digital Resources Portal**.\*
- Guide students through the **Pre-Visit Lesson** using your **Pre-Visit Lesson Kit**. This kit will be delivered to your school by museum staff 2-4 weeks prior to your visit.
- Administer the **Pre-Visit Assessment** to your students.
- **Bring Student Notebooks and Pre-Visit Assessments with you on the day of your field trip, as they will be used during the field trip lesson.**

## Phase II: New England Air Museum SOAR for STEM Field Trip

- Students will participate in a series of hands-on demonstrations, guided explorations and focused investigations as they learn about forces and motion, aviation science, and aerospace history. Review your **Confirmation Letter** for your arrival time/schedule.

## Phase III: Post-Visit Learning with Families

- Distribute **SOAR for STEM Complimentary Admission Passes** and **SOAR for STEM Family Flyers** to your students. You will receive these items during your visit along with a self-address stamped envelope for returning your Post-Visit Assessments to us. Encourage students to visit the museum with their families using their passes.
- Administer the **Post-Visit Assessment** to your students.
- **Mail completed Post-Visit Assessments in the self-addressed stamped envelope along with any student thank you notes and testimonials you wish to share with funders.** Student and Educator testimonials are vital to supporting our fundraising efforts for this program.
- Complete the **SOAR for STEM Educator Survey** that will be emailed to you.
- Instruct your transportation coordinator to invoice your district for your bus fees.

\*You may access the **Digital Resources Portal** using the user name and password found in your **Introductory Letter** here: <http://neam.org/ed-soar-for-science.php>. If you have any questions, please don't hesitate to contact me. Otherwise, we look forward to hosting you and your students at the museum as part of SOAR for STEM!

Sincerely,

Amanda Goodheart Parks, Ph.D.

Director of Education, New England Air Museum

(860) 623-3305 x313 [agparks@neam.org](mailto:agparks@neam.org)

# SOAR for STEM Grades 3-5 Curriculum Alignments

## Next Generation Science Standards

- **3-PS2-1 Motion and Stability: Forces and Interactions:** Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.
- **4-PS3-1 Energy:** Use evidence to construct an explanation relating the speed of an object to the energy of that object.
- **5-PS2-1 Motion and Stability: Forces and Interactions:** Support an argument that the gravitational force exerted by Earth on objects is directed down.
- **3-5-ETS1-3 Engineering Design:** Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

## Common Core Standards

- **CCSS.ELA-Literacy.W.3.8-5.8:** Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories.
- **CCSS.ELA-Literacy.SL.3.1.b-d,4.1.b-d, 5.1.b-d:** Follow agreed-upon rules for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the topics and texts under discussion).
- **CCSS.ELA-Literacy.L.3.4-5.4:** Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade level reading and content, choosing flexibly from a range of strategies.

## Connecticut Social Studies Frameworks

- **Grade 3 Theme:** The Impact of Science, Technology, and Innovation on the Development of Connecticut: How have science, technology, and innovation affected the development of towns and cities in Connecticut (aerospace, insurance, manufacturing, etc.)?
- **Grade 4 Theme:** Defining Regions: Discover patterns related to various themes to define a region and define factors that make a region unique.
- **Grade 5 Theme:** The Role of Connecticut in U.S. History: Evaluate the political, economic, and social impact of key Connecticut industries on the state and national economies.

## Massachusetts Science, Technology, and Engineering Standards:

- **3-PS2-1:** Provide evidence to explain the effect of multiple forces, including friction, on an object. Include balanced forces that do not change the motion of the object and unbalanced forces that do change the motion of the object.
- **4.3-5-ETS1-3:** Plan and carry out tests of one or more design features of a given model or prototype in which variables are controlled and failure points are considered to identify which features need to be improved. Apply the results of tests to redesign a prototype
- **5-PS2-1:** Support an argument with evidence that the gravitational force exerted by Earth on objects is directed toward Earth's center.

## Massachusetts English Language Arts and Literacy Standards:

- **3-5-SL-4:** Report on a topic, text, or solution to a mathematical problem, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace and using appropriate vocabulary.

## Massachusetts Social Studies Standards:

- **3-5-SL-Content Areas:** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on history/social science topics, building on others' ideas and expressing their own clearly.

# SOAR for STEM Grades 3-5

## Pre-Visit Lesson

### Materials:

- \*1 set of Foam Flyer Templates
- \*1 sample Foam Flyer
- \*1 foam plate per student
- \*1 penny per student
- SOAR for STEM Student Notebooks
- Scotch tape and scissors

\*Provided in SOAR for STEM Pre-Visit Kit which will be delivered to your school 2-4 weeks ahead of your scheduled field trip.

### Procedure:

- **Pre-Lesson Prep:** Using the Foam Flyer templates, trace the flyer design onto the foam plates. You should have one traced plate per student.
- Distribute traced plates and pennies to students. Instruct students to carefully cut out the two pieces as traced, including the slots and tab. If your students struggle with fine motor skills, you may complete this step in advance of your lesson.
- Instruct students to slide the smaller tail piece into the larger wing piece as shown on the sample flyer. Secure the tail to the wing using tape if needed.
- Instruct students to place their penny behind the wing tab, fold down the tab, and tape it into place. Refer them to the sample as needed.
- Move students into an open area to test the flyers. Allow each student to throw their flyer individually. Be sure to ask them to observe what happens after they throw.
- Return students to the classroom. Instruct them to record their test flight data (i.e. write down what happened during their flight) in the **Test Flight Observations** box on Page 2 of the **Student Notebook**.
- Instruct students to make a change to the design of their foam flyer. Examples of design changes include taping or folding the flaps on the wing up or down; moving the penny to a different location; removing the penny entirely; using scrap foam to build new sections; cutting the wing into a different shape.
- Instruct students to write down their design change in the **Design Change** box on Page 2 of the **Student Notebook**. Move students into an open area to test fly the flyers. Ask them to observe what happens to their foam flyer during their flight.
- Return students to the classroom. Instruct them to record their second flight data in the **Second Flight Observations** box on Page 2 of the **Student Notebook**.
- Lead the students in a whole group discussion about the impact their design changes had on their foam flyer's flight. Tell the students they will be using this same engineering process of design, test, record, modify, and test during their museum visit.

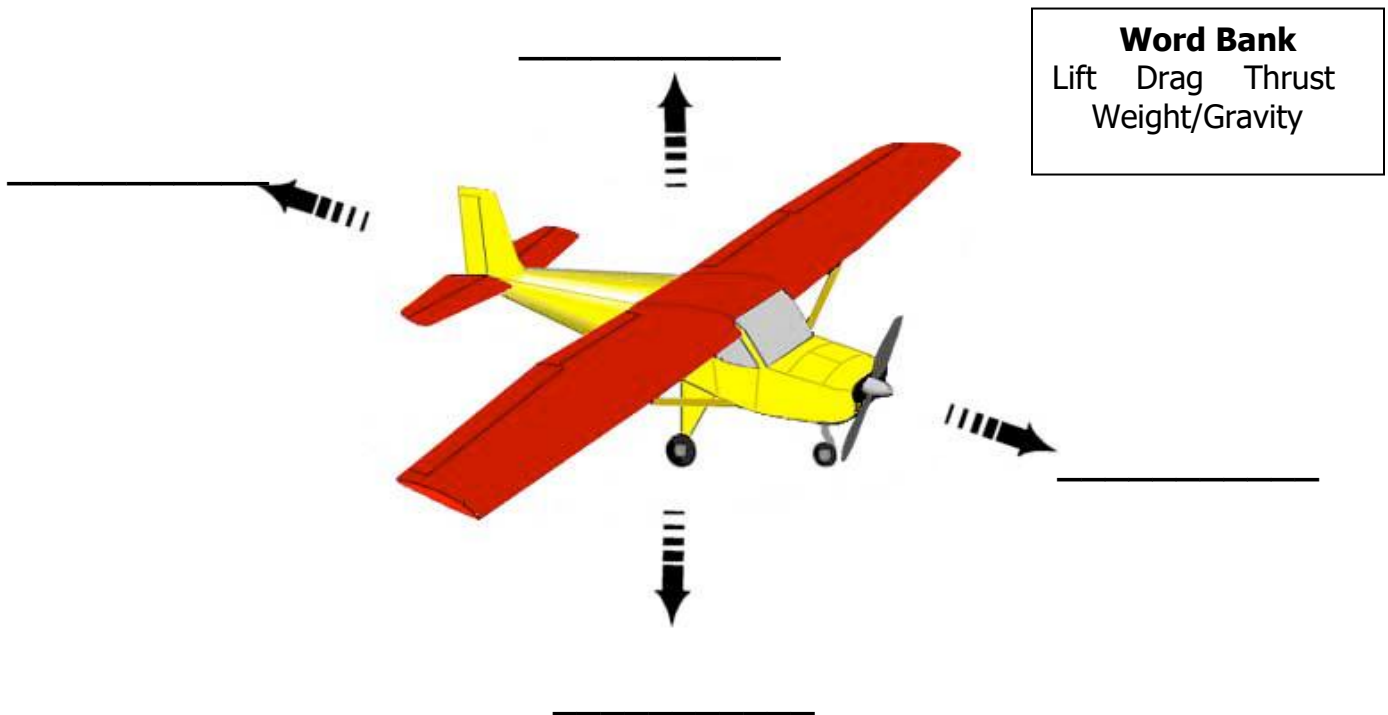
# SOAR for STEM Grades 3-5 Pre-Visit Assessment

## Teachers:

- Distribute copies of this **Pre-Visit Assessment** to students. Explain this assessment is meant to measure their knowledge ahead of their museum visit and will NOT be graded. Students may have difficulty answering some of the questions. That is normal!
- **Collect Pre-Visit Assessments and bring them with you during your field trip!**

**First Name:** \_\_\_\_\_ **School:** \_\_\_\_\_

Label the four forces of flight that act on an airplane on the diagram using the word bank.



1. Weight (the measurement of Gravity) is what type of force? **Push or Pull**
2. Lift is an example of what type of force? **Push or Pull**
3. Drag is an example of what type of force? **Push or Pull**
4. Thrust is an example of what type of force? **Push or Pull**
5. An airplane's wings create what force? \_\_\_\_\_
6. An airplane's jet engine or propeller creates what force? \_\_\_\_\_

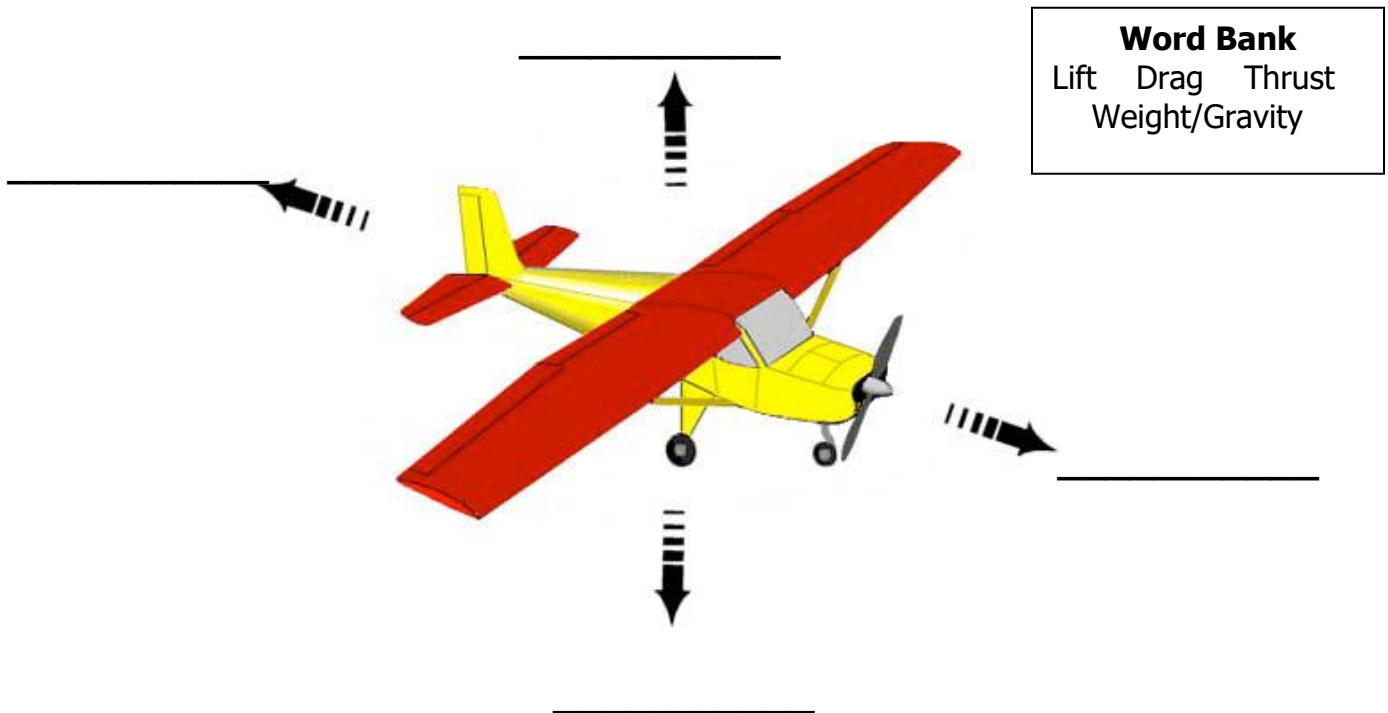
# SOAR for STEM Grades 3-5 Post-Visit Assessment

## Teachers:

- Distribute copies of this **Post-Visit Assessment** to students. Explain this assessment is meant to measure what they learned during their field trip and will NOT be graded.
- **Collect Post-Visit Assessments and mail them in the self-addressed stamped envelope you received during your field trip**

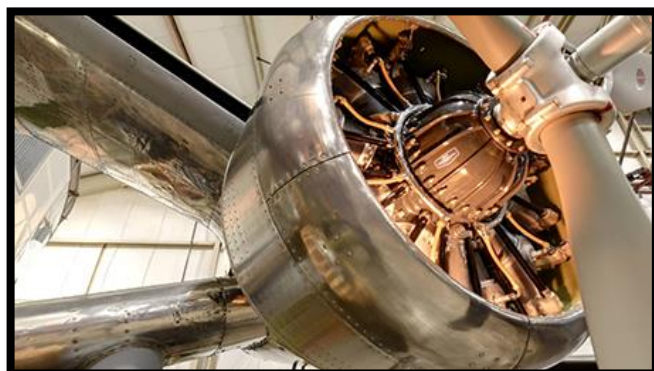
**First Name:** \_\_\_\_\_ **School:** \_\_\_\_\_

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4. Thrust is an example of what type of force? **Push or Pull**
5. An airplane's wings create what force? \_\_\_\_\_
6. An airplane's jet engine or propeller creates what force? \_\_\_\_\_

# SOAR for STEM Digital Resources Portal



As part of your SOAR for STEM experience, you are encouraged to access the **SOAR for STEM Digital Resources Portal** for additional resources on a variety of topics including:

**Classroom Activities & Demonstrations**

**Primary Source Multimedia**

**Aviation & Aerospace Reference Materials**

**Professional Development Opportunities for Educators**

**Youth Aviation & Aerospace Organizations**

**...and much more!**

To access the **SOAR for STEM Digital Resources Portal**:

1. Visit our website at [www.neam.org](http://www.neam.org).
2. Click the Learn tab
3. Click SOAR for STEM
4. Enter the user name and password provided in your Introductory Letter.

**Questions? Need assistance accessing the portal?**

Contact Amanda Goodheart Parks, Ph.D.

Director of Education

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