



OKLAHOMA
Aeronautics

AEROSPACE EDUCATION TOOLKITS



OKLAHOMA
CareerTech

Compiled by
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and
Oklahoma Department of Career and Technology Education**

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INTRODUCTION

Oklahoma is aviation. Aerospace is Oklahoma's second-largest industry. (Energy is the largest.) Tinker Air Force Base is the largest single-site employer in the state and contributes more than \$3 billion to the state's economy each year. In fact, Oklahoma's economy soars on aerospace careers. Oklahoma is

- A major waypoint on the timeline of America's aviation history through the achievements of Wiley Post, Bessie Coleman, Clyde Cessna, Shannon Lucid, Thomas P. Stafford and many other pioneers of the sky with ties to the state.
- Home to the Mike Monroney Aeronautical Center, the premier training center for the Federal Aviation Administration and Oklahoma's fourth-largest employer.
- A national hub for aerospace innovation that features some of the world's most successful aerospace companies.
- Home to more than 1,000 aviation and aerospace enterprises that employ more than 120,000 Oklahomans, including Boeing, NORDAM, American Airlines, Spirit AeroSystems and Tinker Air Force Base.
- Recognized as a national center for the maintenance, repair and overhaul of both military and civilian aircraft.
- Home to aerospace and defense industries that produce some \$27 billion in sales and \$19 billion in exports each year.
- Dedicated to recognizing centers of workforce excellence that target the state's key ecosystems, including aviation and aerospace.

A key to Oklahoma's rising trajectory as an aerospace leader is the state's central location as a crossroads of the nation. Within the state, the aerospace industry reaches multiple points of the compass with centers of operation in Ardmore in the south, Fort Sill in the southwest, Oklahoma City in the center, Tulsa in the northeast and across western Oklahoma. In addition to the state's central location, other selling points for aerospace in Oklahoma are its institutions of higher education and their two-year, four-year and certificate programs; its multiple military bases; and its statewide career and technology education system.

The many and varied career opportunities in the Aviation & Aerospace Pathways are getting the attention not only of workforce professionals, but of educators at all levels. Teachers, administrators, parents and students are recognizing the importance of the aerospace workforce to the prosperity of the state and to the personal success of its residents. The Oklahoma Department of Career and Technology Education in partnership with the Oklahoma Aeronautics Commission has developed aerospace education toolkits for teachers who are interested in launching strong aerospace education programs in their classrooms. Enhancing career pathways in aviation and aerospace expands the talent horizon for Oklahoma employers and propels the state forward in sustaining and growing the aerospace industry.

USING THE AEROSPACE EDUCATION TOOLKITS

The aerospace education toolkits offer teachers a variety of ready-to-use activities that support the diversity of career opportunities in the Aviation & Aerospace Pathways. The toolkits serve multiple purposes:

- To use validated, STEM-informed activities available to educators from content expert organizations.
- To introduce teachers to the wealth of existing resources that support aviation and aerospace education.
- To offer a template that teachers can apply to activities they discover or develop.

Each toolkit focuses on one activity that teachers may use with students at a particular grade level. A chart maps the contents of each activity. It also gives the teacher an overview of the activity and where to find the activity online from the source organization. Most of the toolkits are available online, while some feature complete activities within the toolkit.

The chart for each toolkit plots the major features of the activity:

Student Activity: This is the focus of the toolkit. It is at least one complete activity or lab for students to complete that relates to a topic relevant to aviation/aerospace. It may include related worksheets.

Lesson Plan or Procedure: These are the steps or instructions for the teacher to use to deliver the activity.

Activity Evaluation or Rubric: These are answers to the activity or a rubric or other tool for evaluating students' results.

Suggested Activities: These are additional or extension strategies for the teacher that relate to the topic/activity.

Glossary: This is a list of the vocabulary terms and their definitions that relate to the activity and/or associated concepts.

Teacher Background or Concepts: This is any background information for the teacher that explains key concepts relating to the topic/activity, provides the aerospace context for the activity or otherwise helps prepare the teacher for the topic/activity.

Student Background or Concepts: This is any background information for the student about theory and concepts related to the topic/activity. It may be separate handout files or a text section within the larger topic/activity.

Standards Alignment: These are education or industry standards that align with the topic/activity.

In addition to the chart that maps the activity, each toolkit includes supplemental components for the teacher and for students. These may include the following:

Teacher Instructions — These are step-by-step directions to the teacher for using the components in the toolkit (in addition to the guidance provided by the activity developer).

Teacher Background Information — These are fact sheets that prepare the teacher with additional content about the topic or that provide additional context for the activity.

Student Handouts — These are printable resources for students to use. Some provide additional content related to the activity. Other student handouts are worksheets for individual or group work.

Formative Assessments — These are optional tools for the teacher to gather information about student learning. One example is the “A-Z Review” handout provided in some toolkits. Teachers can use other types of formative assessment as well, such as entrance and exit tickets, concept maps and graffiti walls.

Summative Assessments — These include rubrics to evaluate student performance on specific activities, such as giving a presentation or designing a poster.

Teacher Activity Reflection Worksheet — These are tools for the teacher to use to evaluate the activity, its delivery and student performance.

The aerospace education toolkits get Oklahoma teachers and students off the ground quickly by taking advantage of existing content expertise and instructional design. Many of the activities are detailed, while some are more fundamental. By glancing at the chart in each toolkit, the teacher may determine whether opportunities exist for incorporating additional resources that the teacher already uses, such as formative assessments, evaluation rubrics, game-based instructional strategies and extension activities.

Teachers are welcome to use the toolkits as an aid for navigating existing activities and as a blueprint for creating new activities that support Oklahoma’s Aviation & Aerospace Pathways.



LIST OF TOOLKITS

TOOLKIT		SOURCE	GRADE(S)
1	Bend That Bar	TeachEngineering.org	5-7
2	Birds, Fish & Airplanes	Oklahoma Department of Career and Technology Education	K-3
3	Finding the Center of Gravity	NASA	6-8
4	Build Your Own Weather Station	NOAA	6-8, 9-12
5	Small UAV Safety	NASA	6-8
6	Let's Build a Tabletop Airport	NASA	2-4
7	Aiming High for Careers	Oklahoma Department of Career and Technology Education	6-8, 9-12
8	Pioneers of the Sky	Oklahoma Department of Career and Technology Education	6-8, 9-12
9	Four Forces of Flight	NASA	6-8
10	Why Aircraft Fly	Oklahoma Department of Career and Technology Education	1-3
11	Where in the Air	NASA	9-12
12	Construct a Rotor Motor	NASA	6-8