

TITLE:

Jammin' Jets

GRADE LEVEL:

3-5

SUBJECT AREA:

Mathematics, Grade 3-5

FLORIDA SUNSHINE STATE STANDARDS:

Florida Sunshine State Standards

MA.B.1.2.1: uses concrete and graphic models to develop procedures for solving problems related to measurement including length, weight, time, temperature, perimeter, area, volume, and angle.

MA.B.1.2.2: solves real-world problems involving length, weight, perimeter, area, capacity, volume, time, temperature, and angles.

MA.B.4.2.2: selects and uses appropriate instruments and technology, including scales, rulers, thermometers, measuring cups, protractors, and gauges, to measure in real-world situations.

MA.E.3.2.1: designs experiments to answer class or personal questions, collects information, and interprets the results using statistics (range, mean, median, and mode) and pictographs, charts, bar graphs, circle graphs, and line graphs.

NCTM Mathematics Standard:

Representation Standard: Use representations to model and interpret physical, social, and mathematical phenomena.

Connections Standard: recognize and apply mathematics in contexts outside of mathematics.

Problem Solving Standard: apply and adapt a variety of appropriate strategies to solve problems

DESCRIPTION/ABSTRACT OF LESSON:

A large open space is required for this activity. Students should be instructed to blow only into their own straw and to launch their jets away from each other. Set up a runway using tape measures for the students to launch their jets.

<http://www.avkids.com/lounge/teachersguide.htm>

OBJECTIVES:

Students will use thrust as the main force while manipulating the design of an aircraft to increase the distance.

TEACHER MATERIALS/TECHNOLOGY CONNECTION:

For modeling: 2 straws with different diameters, masking tape, scissors, index cards, rulers, tape measures, and a copy of *Jammin' Jets* Student Data Sheet (1 for each student)

STUDENT MATERIALS/TECHNOLOGY CONNECTIONS:

2 straws with different diameters, masking tape, scissors, index cards, rulers, tape measures, and a copy of *Jammin' Jets* Student Data Sheet (1 for each student)

DURATION:

60 min

ESSENTIAL QUESTIONS/KEY VOCABULARY:

Essential Questions:

When using thrust to fly a Jammin' Jet, how do changes to the design affect the distance it can travel?

Key Vocabulary: thrust, fuselage, wings, nose, stabilize

GROUPING FOR INSTRUCTION:

Construct the Jammin' Jets individually then work in groups of four to complete the activity.

LESSON LEAD/OPENING:

Read aloud Joanna Cole's *The Magic School Bus Taking Flight* (based on *The Magic School Bus*). This book is 15 pages, recommended for grade level 2–4. Also, pick passages from Belinda Recio's *Inventor's Workshop: Flight*. This book is recommended for grade level 3-6.

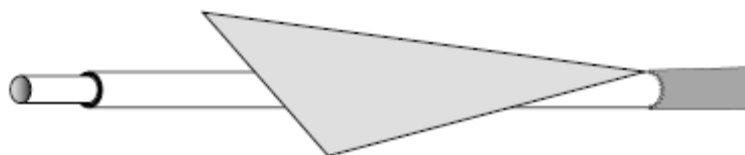
Background Information: Airplane designers try to increase airplane thrust by making more powerful jet engines and propellers

STEPS TO DELIVER LESSON:

1. Hand out materials to each student.
2. Wrap a piece of tape around the front end of the straw with the larger diameter so that the opening is taped shut.



3. Allow the children to experiment by placing wings on different parts of the straw.
4. Insert the smaller straw into the larger straw, leaving an inch at the end of the smaller straw.



5. Demonstrate thrust by blowing into the smaller straw. This projects the jet forward.
6. If the front of the jet rises, wrap some tape near the front of it until it flies level. If the front of the jet falls, wrap some tape around the straw just behind the wings.
7. Students can practice flying the different jets within their group.
8. Choose the best jet and fly three trails recording the distance on the Student Data Sheet.

GUIDED PRACTICE:

Discussion:

1. What force was used to propel your Jammin' Jet?
2. Did your jet fly in a straight line?
3. What changes did you make to help your jet fly straighter?
4. What design feature increased the distance?

INDEPENDENT PRACTICE:

Students are responsible to answer the discussion questions on their own before class discussion of responses.

DIFFERENTIATED INSTRUCTION:

Extensions:

1. Students use their best design in a Jammin' Jets rally. The jets can compete against each other to see which one will fly the longest distance.
2. Different levels of thrust can be applied to see how this affects the stability of the plane.

LESSON CLOSURE:

Culminating Activity:

Set up a target (hula-hoop with paper plate inside) and see which jet can land closest to the center of the target by adjusting the amount of applied thrust.

Award five points for jets that land in the hula-hoop and ten points for landing on the paper plate.

ASSESSMENT:

Participation and responses to questions on data sheet

RESOURCES:

Title: *Inventor's Workshop: Flight*

Author: Belinda Recio

Number of Pages:

Grade Level: 3–6

Review: This inventor's kit comes with all the materials necessary to construct a diamond kite, snake kite, two types of gliders, and a parachute. *Inventor's Workshop: Flight* is a fully illustrated guide to inventive thinking, problem solving, and flying creations. The kit even comes with information on how you can patent your own flying machine and obtain a legal document that proves it's your invention.

Rating: 🍎 🍎 🍎 🍎

Color Illustrations: No

Color Photos: No

B&W Illustrations: Yes

B&W Photos: No

Publisher: Running Press

ISBN: 0762403462



Title: *The Aircraft Encyclopedia*

Author: Roy Braybrook

Number of Pages: 188

Grade Level: 5 to advanced

Review: This book is similar to *A Field Guide to Airplanes*, except it has several color illustrations and photos. It is full of facts and statistics covering a wide variety of planes, including military, commercial, and private. This book would also be useful for identifying various aircraft.

Rating: 🍎 🍎 🍎

Color Illustrations: Yes

Color Photos: Yes

B&W Illustrations: Yes

B&W Photos: Yes

Publisher: Aladin Paperbacks

ISBN: 0671553372



Title: *How Do Airplanes Fly?*

Author: C.E. Thompson

Number of Pages: 32

Grade Level: 2-4

Review: This straightforward book explains many of the major principles of flying, and answers many questions that are often posed by young people interested in flying, such as “How does the pilot turn left or right?” or “How does the pilot land the plane?” or “What happens when a plane takes off?”

Rating: 🍎 🍎 🍎 🍎 🍎

Color Illustrations: Yes

Color Photos: Yes

B&W Illustrations: Yes

B&W Photos: No

Publisher: Troll

ISBN: 0590897403 OOP see Troll version



Title: *The Berenstain Bears Fly-It! Up, Up, and Away*

Author: Stan & Jan Berenstain

Number of Pages:

Grade Level: 2-3

Review: *Fly-It!* is a really cool book. It is one in a series of books that gives experiments to try out through most of the book. The story starts with the kids on a trip to the Bearsonian Institution, where they meet up with Professor Actual Factual who explains the principles of flight. From there, the kids create several airplanes that they fly using the information they learned at the museum.

Rating: 🍎 🍎 🍎 🍎 🍎

Color Illustrations: Yes

Color Photos: No

B&W Illustrations: No

B&W Photos: No

Publisher: Random House

ISBN: 0679973176



Title: *The Magic School Bus Taking Flight*
(Based on *The Magic School Bus*)

Author: Joanna Cole

Number of Pages: 15

Grade Level: 2–4

Review: If your students enjoy *The Magic School Bus* TV shows, then they'll really enjoy this story. As in the show, Ms. Fizzle takes the kids on a field trip, this time to a model airplane show. Their wild adventure begins after they are shrunk inside one of the model airplanes. From this, they learn about the principles of flight while trying to win the air show contest. A great adventure!

Rating: 🍎 🍎 🍎 🍎 🍎

Color Illustrations: Yes

Color Photos: No

B&W Illustrations: No

B&W Photos: No

Publisher: Scholastic

ISBN: 0590738712



Title: *Amelia Earhart: Challenging the Skies*

Author: Susan Sloate

Number of Pages:

Grade Level: 4–6

Review: This is a good biographical resource for Amelia Earhart. The book describes her many achievements that helped to spur the growth of commercial aviation and furthered the cause of women's rights. The book captures the excitement of Amelia Earhart's life and the mystery of her disappearance.

Rating: 🍎🍎🍎🍎

Color Illustrations: No

Color Photos: No

B&W Illustrations: No

B&W Photos: Yes

Publisher: Fawcett Books

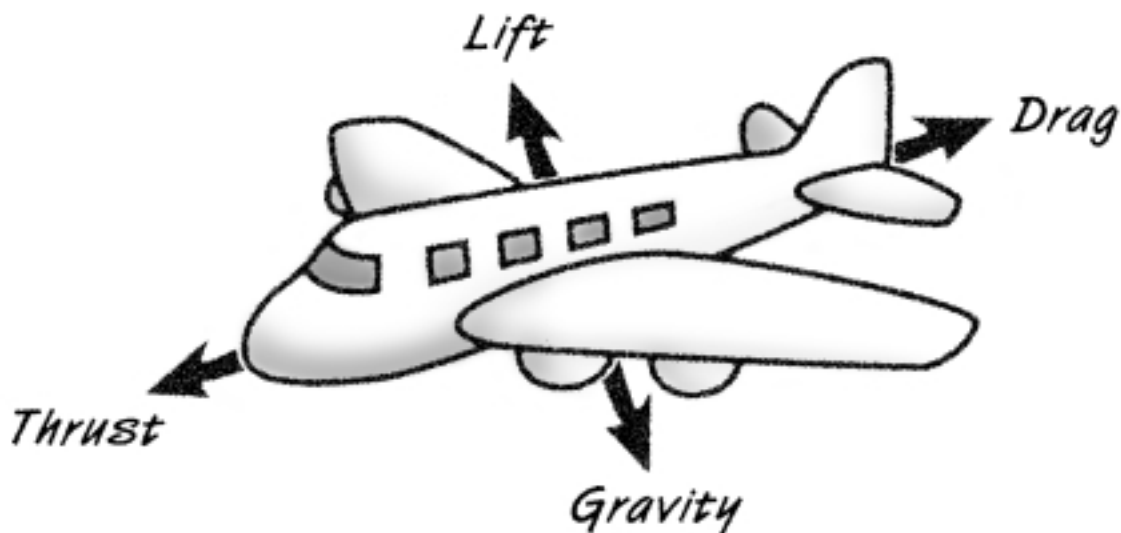
ISBN: 0449903966



The Four Forces of Flight

An aircraft in straight and level flight is acted upon by four forces: *lift*, *gravity*, *thrust*, and *drag*. The opposing forces balance each other; lift equals gravity and thrust equals drag.

Any inequality between thrust and drag, while maintaining straight and level flight, will result in acceleration or deceleration until the two forces again become balanced.



Drag: The air resistance that tends to slow the forward movement of an airplane.

Gravity: The force that pulls all objects towards the earth.

Lift: The upward force that is created by the movement of air above and below a wing. Air flows faster above the wing and slower below the wing, creating a difference in pressure that tends to keep an airplane flying.

***Thrust:* The force that moves a plane forward through the air. Thrust is created by a propeller or a jet engine.**

*Student Data Sheet****Jammin' Jets***

Captain: _____

DISTANCE TRAVELED

Trial 1	Trial 2	Trial 3	Average

Diagram and label your best design.

What changes to the jet's design were most successful?

Why do you think these changes were successful?
