AIR & SPACE
STEM Outreach

STEM Activity

Paper Airplanes

GRADES: K-12

TIME: 30-45 minutes

OBJECTIVE:

Allow students to complete the engineering design process of planning, designing, building and testing a paper airplane and complete a series of challenges.

MATERIALS:

- Paper
- Scissors (optional)
- Stop watches (optional)
- Measuring tapes (optional)
- Coins or small weights (optional)

OTHER RESOURCES:

- *Video: Mobility Science 101: Do You Even Lift?*

STANDARDS:

- 3-5-ETS1-1 - Engineering Design
- MS-PS2 - Motion and Stability: Forces and Interactions
- HS-PS2-1 - Forces and Interactions

VOCABULARY:

- Lift: the force that holds an airplane in the air, caused mostly by the wings
- Drag: tends to slow an object, it's caused by friction and differences in air pressure
- Thrust: created by engine or propeller, moves an aircraft in the direction of the motion
- Weight: pulls the plane towards the Earth, caused by gravity

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INSTRUCTIONS:

1. Challenge your students to create a paper airplane that will fly through the air!
2. Optional: Use a range of challenges suitable for the grade level(s) to guide their design:

- Longest flight: use a stopwatch - the Wright Brothers first flight was 12 seconds!
- Heaviest load: use coins or small weights - a C-5 can fly with 840,000 lbs. of cargo
- Furthest flight: use tape measures - US Air Force's KC-46A Pegasus Aircraft flies 16,000 miles non-stop
- Most accurate: use a target in the room as the goal for a safe landing

Students will use the engineering design process to plan, design, build, and test their paper airplane designs. Allow them to create original designs, or feel free to provide templates and instructions (print pages 3-5 for different templates).

*Recommended: for younger grade levels (K-2) have a range of examples of paper airplanes made ahead of time that the students can use to experiment with in case there is not enough time for them to try to create their own!

REFLECTION:

- *How did your predications change with each experiment?*
- *How does Bernoulli's Principle allow an airplane to fly?*
- *What are the forces acting on a plane in flight?*

Fold #5

Fold #3

Airplane #1

Fold #1

Fold #2

Fold #4

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Fold #7
upward

Fold #3

Airplane #2

Fold #5

Fold #1

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Fold #2

Fold #4

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Fold #6
upward

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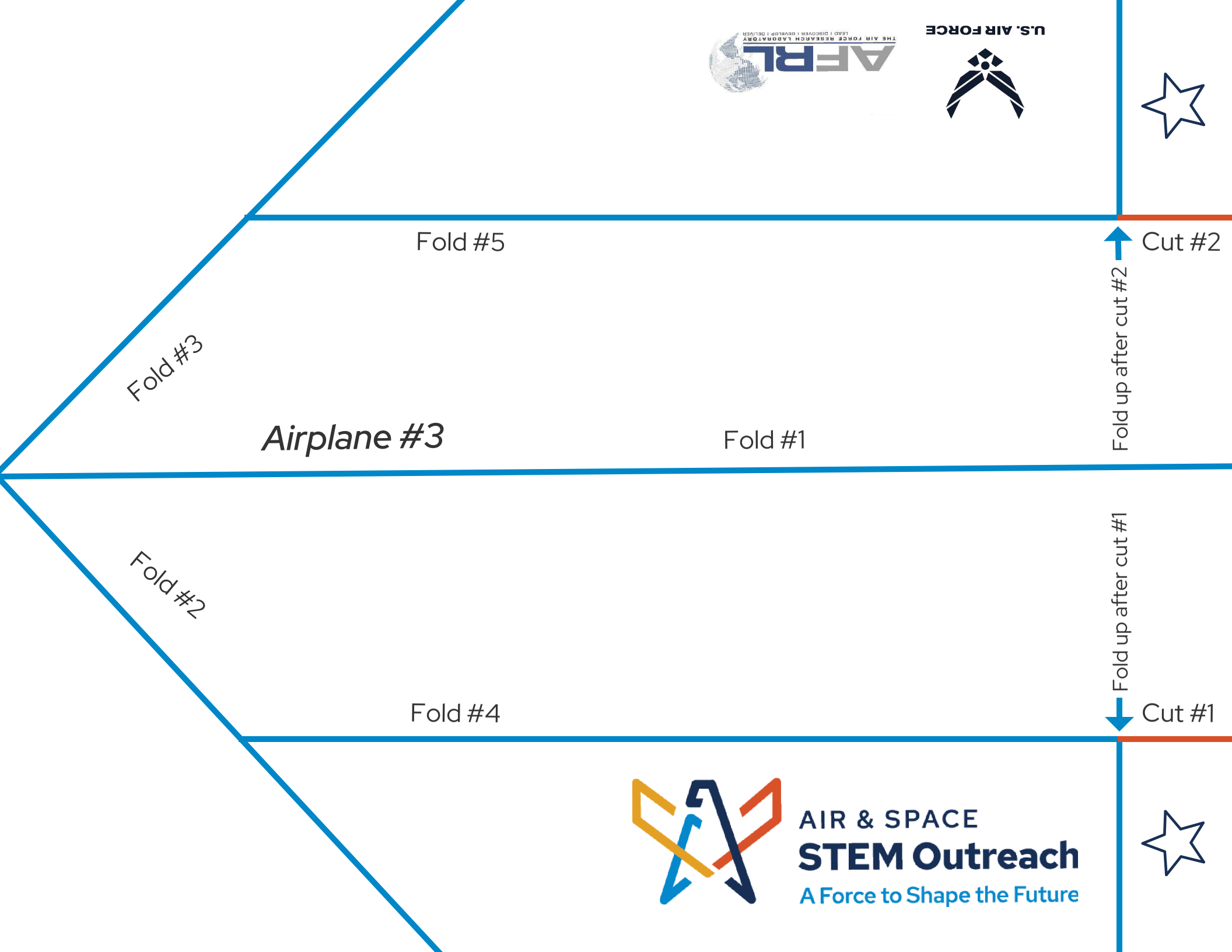
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LEAD | DISCOVER | DEVELOP | DELIVER
Fold #5
Cut #2
Fold up after cut #2
Fold #3
Airplane #3
Fold #1
Fold #2
Fold #4
Fold up after cut #1
Cut #1
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