

# CAN YOU FIX THIS PLANE?

Name: \_\_\_\_\_

Materials Needed: Paper and Tape

Engineers have designed planes that can do loops and tricks, but the first planes created had to fly straight.

Background information: Airplanes are subjected to 4 different forces: Drag, Gravity, Thrust, and Lift.

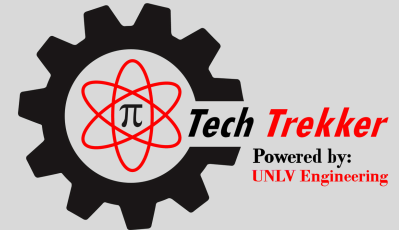
## SCENARIO:

You have to travel from McCarran Airport in Las Vegas to Sydney Airport in Australia (about 8,000 miles apart), and you cannot deviate from your flight path. Your current plane is damaged as it does not fly straight. You need to fix your plane to allow it to get to its destination without going too far, sinking into the ocean, or deviating from its path.

# UNLV

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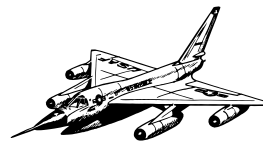
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## BRAINSTORM

Write down your ideas in this box

What kind of planes have you seen in real life? How can you adjust a damaged plane so that it flies straight?



## LIMITATIONS AND CONSTRAINTS



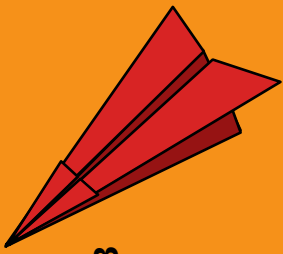
- (1) Your plane needs to land at a certain spot (marked with tape) 8 feet away.
- (2) You cannot crunch up the paper. For example, you cannot make a paper ball.
- (3) Time limit: After building, you have 5 minutes to practice
- (4) You have 1 final throw that counts for test and evaluate





## DESIGN

Draw and plan what you are going to change about your paper plane. Come up with **3 different changes** you believe may make your plane landing more accurate. Don't forget to include markings of where you will be folding your paper.



**Design A:**

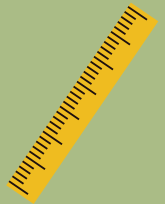
**Design B:**

**Design C:**



## BUILD

Now that you have planned out what changes you are going to make to your paper plane, choose the adjustment you think is the best and have fun folding!



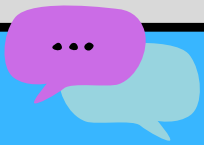
## TEST AND EVALUATE

### STEPS:

- 1) Measure and mark 8 feet with a piece of tape
- 2) Lay a long piece of tape perpendicular to the mark to see how you need to keep your plane straight.
- 3) Test your design by throwing your plane

How far did your paper plane land from the mark?

Did your design stray from the straight line?



## SHARE SOLUTION

Time to share your results with your classmates! Think about which of your classmates made the best change to their planes and why you think your classmates' changes were able to or not able to make their planes go straight.

## REDESIGN

Draw and mark your new design in this box:

What were the issues with your changes? How do you improve your plane to make it better?





## BUILD + RETEST AND REEVALUATE

Make changes to your plane and then test it with the same steps as before. Have fun!



How far did your paper plane land from the mark this time?

Did your design stray from the straight line this time?

## SHARE SOLUTION

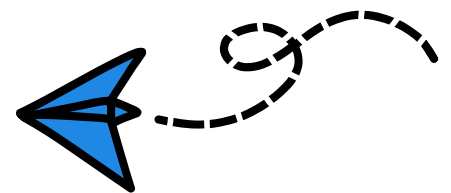
Once again, it's time to share your result with your classmates! This time, think about what your classmates did differently than before. Which classmates made the best changes, and why do you think these changes worked the best?



## EXPLAIN

### COMMUNICATE THE SOLUTION

Write any final thoughts or extra notes here:



## EXTENSION



Next time you see a plane in real life, think about how it was designed so it can fly properly. Try to spot the differences in the different planes you see. Take a picture if you can!

