

**HOOK THEM IN...**

(Please view all clips and images before screening to ensure that the content is appropriate for your students)

Students may have already seen the recent full length movie Paper Planes

Paper Planes HD Full Movie.

https://www.youtube.com/watch?v=NMSW_0uosPc

This shorter clip demonstrates a wide range of paper planes and the obvious fascination a large number of people have to build, fly and watch paper planes.

Paper Airplane World Championship - Red Bull Paper Wings 2015

<https://www.youtube.com/watch?v=SUygakRMrxo>

There are a range of You tube clips for different models of plane. Some of the unusual ones are:

The Cylindrical Plane

https://www.youtube.com/watch?v=pRTuXCG_O2U

The Boomerang Plane

<https://www.youtube.com/watch?v=aT2oZl1VI64>

<https://www.youtube.com/watch?v=ioCRhJJeWhU>

**ENGAGE THEM...****Cardboard Boomerangs from Recyclables**

This link takes you to a booklet that has some useful information about cardboard boomerangs.

https://www.nostarch.com/download/SnipBurn_project18.pdf

Construct them from the different materials that students can find eg. pizza boxes, cereal packets, office cardboard etc.

Have a test flight and ask students, "What do you wonder? What questions do you have?"

**CHALLENGE THEM ...**

Determine the design, materials and throwing technique for the "best paper plane ever".

This may require a trial and some research from the class to determine which prototypes will be used in the investigation. Students will want to use their own design if they have one, but it is also valuable to have all groups test a common design so that the class shares, compares and compiles information for discussion. Groups may investigate different

variables. If there is another class(es) conducting the same investigation, it may be appropriate to have a Flight Test to determine the ultimate paper plane.

Interpret the challenge

What do you want to investigate? What information is helpful/no use? What factor(s) will you be exploring? What will you need to consider in order to conduct a valid experiment?

Establish that the students are aware if testing a single variable such as the material used to make the plane that other factors must remain constant eg the thrower, the design, the weather conditions.

Model and Plan

Do you have an idea? How might you start? What equipment will be helpful?

Depending on the question, students will need different measuring instruments. Whether they are using tape measures, stop watches, protractors, they need to ensure the measurements are made in a consistent and accurate manner to reduce error. These details need to be recorded in their final report.

How many trials will be necessary? Are there different ways that you could do that? What do you think would be most efficient and effective way to test the plane?

The number of trials necessary, will depend on how much variation there is in the data they collect. A possible indicator might be that the mean or median is not varying significantly with each trial.

In this investigation, some disastrous results should be considered. If the plane performs inconsistently, it may not be competitive in the Flight Test and this is an important consideration. The disastrous result may be discarded if there is some justification such as thrower error or inconsistent weather.

Solve and Check

How will you summarise, display and analyse the data? What do you think the most important feature of a good paper plane is? Is there another way that you could have solved this problem? Could you test the planes in a different way?

Besides distance, other factors such as flight time, consistency or accuracy in direction might also be measures of a good plane.

Reflect

What was your most efficient method? Did other people solve this problem in a different way? Is there something that you would do differently next time? Was there another factor you think you should have tested?

In designing the ultimate plane, the class might combine findings of different investigations to choose the best design, the best material etc. This assumes that the best material for one design will naturally be the best for all.



RESOURCES

NCTM Illuminations

Long distance aeroplanes <https://illuminations.nctm.org/Lesson.aspx?id=1262>

Dan Meyer

Printer Paper <http://www.101qs.com/2207-printer-paper>