

'Flippers' Lesson

- ✓ Put last week's data on the board regarding results of the 'height' test. Which flew higher, the cork or the stopper? (*Cork*).
- ✓ Discuss possible variables that led to the different results.
 - Why might we have had the two anomalies?
 - What variables may have caused the cork to go the highest in nearly all of the trials? (*MASS*)
- ✓ Set a 'Flipper' standard
- ✓ Discuss how many trials we should do to make sure our evidence is conclusive. (*At least 3*).
- ✓ Pose a question to make a simple conclusion/relationship statement:
 - 'We discovered the cork went the highest. What was the biggest reason why it flew higher than the stopper?' (*WEIGHT/MASS*).
 - So we can conclude that 'The ___ *lighter* ___ an object, the ___ *higher* ___ it will fly when all other variables are controlled.'

- ✓ Discuss that we are going to be doing another investigation using the variable 'Mass'.
- ✓ Compare materials list from the last investigation to the new investigation.
- ✓ Ask- 'What is our manipulated variable?'- (*objects being launched*)
 - What are our controlled variables?- (*base, flipper stick*).

- ✓ Show the 10 and 20 cm aluminum foil balls.
- ✓ Review what we learned about the cork and stopper as far as which one could fly the highest. Review our reasoning behind why this was true.
- ✓ Introduce new investigation
- ✓ Ask- 'Which ball has the most mass? (*20 cm*) Why would you predict that? (*More foil= more mass*)
- ✓ **PREDICT**- 'If we were to test for height, which ball would you predict would go the highest? Be sure to explain your thinking.'- Record in science journals.

Do the Science

- ✓ Discuss predictions. Explain that today's investigation is slightly different.
- ✓ **NEW QUESTION:** 'Which ball will travel the farthest when launched from the same system? 10 or 20 cm?' Predict and support answers in journals. (*Set up new Table of contents entry*).
- ✓ Refer back to target 'Make a record data chart'. Have class discuss what information we would need to make a chart for this data. Work as a group to design one that would work.
- ✓ Discuss and share as a whole group.
- ✓ Hand out the chart I created.
- ✓ Refer back to the 'standards chart'. Ask if there is anything new in this investigation that we are taking data of. (*measurement*). Add 'accurate measurement' to the chart. Show the standard of how to measure distance the ball travels.
- ✓ Split into partner pairs. Give 5-10 minutes to investigate and gather data.
- ✓ Collect group data on a class tally chart.
- ✓ Ask 'Does our evidence show that there is a relationship between the mass of the ball and how far it can be flipped?' Discuss why or why not.
- ✓ *Hopefully, we will discover that the relationship between the mass of the foil ball and the distance it flies is: the lighter the ball, the farther it will fly. If the class doesn't conclude this, we'll figure something out!*
- ✓ **IF TIME:**
- ✓ Ask class to think about other ways we could manipulate our system to launch the same ball of foil even further. (*If class has trouble, I'll bring CJ's idea to their attention from last week*).
- ✓ Introduce angle braces; show how to set them up.
- ✓ Review the parts of the system we will use for the next investigation.
- ✓ Ask- Considering the new variable we introduced to the system, and knowing that all other variables need to stay the same for our controlled experiment, 'Does anyone have an idea for a new investigative question?' (*Does the angle from which the 10 cm ball is flipped affect how far a 10 cm ball will travel?*)

Do the Science

- ✓ Ask what a data chart might look like for this investigation. Prompt students to look at their previous chart but to remember that we changed variables. Tell students we will **not be using the 40-degree mark** to launch.
- ✓ Allow students to work in groups to create a graph.
- ✓ Share. Pass out the graph I created.
- ✓ **PREDICT.** ‘Do you think the angle from which the 10 cm ball is flipped will affect how far it will travel? Remind students to be specific!
- ✓ Allow 10 minutes to investigate and record data.
- ✓ Share out as a group on a class tally chart.
- ✓ Write a conclusion based on our results.