STEMIFYING EXPLORATIONS IN MATHEMATICS K - 5

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Goals for Today:

- Engage in hands-on, interactive investigations that promote the engineering design process, incorporate mathematics, incorporate the science and engineering practices, and infuse STEM.

- Identify strategies and receive resources to facilitate the LSSM and the LSSS Physical Science performance expectations in the elementary classroom.

- Learn strategies for “stemifying” your mathematics and science lessons.

WELCOME!
PUTTING THE PRACTICES INTO ACTION!
1. Asking questions (for science) and defining problems (for engineering)
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations (for science) and designing solutions (for engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information
STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.
LET'S TAKE A CLOSER LOOK

ACTIVITY
WHAT DO ENGINEERS DO?

Turn and Talk to a partner and discuss the following question: What do engineers do?
THE ENGINEERING DESIGN PROCESS
WHAT DOES THIS LOOK LIKE IN THE CLASSROOM?
PART 1: WHAT HAPPENS TO THE MOTION OF A TWIRLY BIRD WHEN THE DESIGN CHANGES?

- Use the twirly bird pattern, scissors and one paper clip to construct a standard twirly bird.
- Fly the twirly bird and record your observations about its motion.
Your engineering challenge for today is to determine what happens to the motion of a twirly bird when the standard design is changed.
The first twirly bird is our standard system.

This is the system we'll compare to other systems when we change different variables.

A variable is anything we can change in the system that might affect the outcome (how the twirly bird flies).

Turn and talk to a partner and discuss something we could change that might affect how the twirly bird moves.
PART 2 – TESTING ONE VARIABLE

- In your science notebook, make a record of the variable you plan to change (wing length or number of paper clips).
- Record the focus question:
  - What happens to the motion of the twirly bird if I _______?
- Make a prediction about how the change will affect the twirly bird.

- Conduct the design test:
  - Construct your new twirly bird
  - Conduct your investigation:
    - Fly both twirly birds (the standard bird and the “modified” bird) at the same time from the same height.
    - Make three drops
    - Record your findings.
CLAIMS AND EVIDENCE

- Claim: I think ...

- My evidence is: I believe this will happen because ...
Let’s Reflect!

- Turn and Talk
What mathematics and science concepts were explored in the twirly bird challenge?

Standards for Mathematical Practice:

- Which practice (s) did you use in the twirly bird challenge?

Science and Engineering Practices:

- Which practice (s) did you use in the twirly bird challenge?

LET’S REFLECT: CONNECTIONS TO LSSM AND LSSS
PUTTING THE PIECES TOGETHER

- **Science** – addressed forces and how they act on objects.
- **Technology** – generating design ideas that match constraints and communicating design through a three-dimensional representation.
- **Engineering** – The task has an aerodynamics engineering context.
- **Mathematics** – focus on measurement (linear and time) and geometry (location, direction, and transformation of shapes).
STATION TIME!

Use this time to complete at least two station activities. Answer the following questions for each activity you complete.

- What big ideas in science/math are addressed by the activity?
- What science and engineering practices did you observe?
- What standards for mathematical practice did you observe?
LET’S DEBRIEF!
MAKING CONNECTIONS

- iSTEM column in the Teaching Children Mathematics Journal published by the National Council of Teachers of Mathematics (NCTM)
  www.nctm.org

- The NSTA Learning Center on the National Science Teachers Association (NSTA) website
  www.nsta.org

- www.Pbskids.org/zoom
QUESTIONS
THANK YOU!