



S.T.E.M.

Essentials

The Nitty-Gritty of Teaching STEM

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TM



Next Generation Science Standards (NGSS)

Grades K- 2: ENGINEERING DESIGN

K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool

K-2-ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem

Grades 3-5: ENGINEERING DESIGN

3-5--ETS1-1: Define a simple design problem reflecting a need or a want that included specified criteria for success and constraints on materials, time, or cost.

3-5--ETS1-2: Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

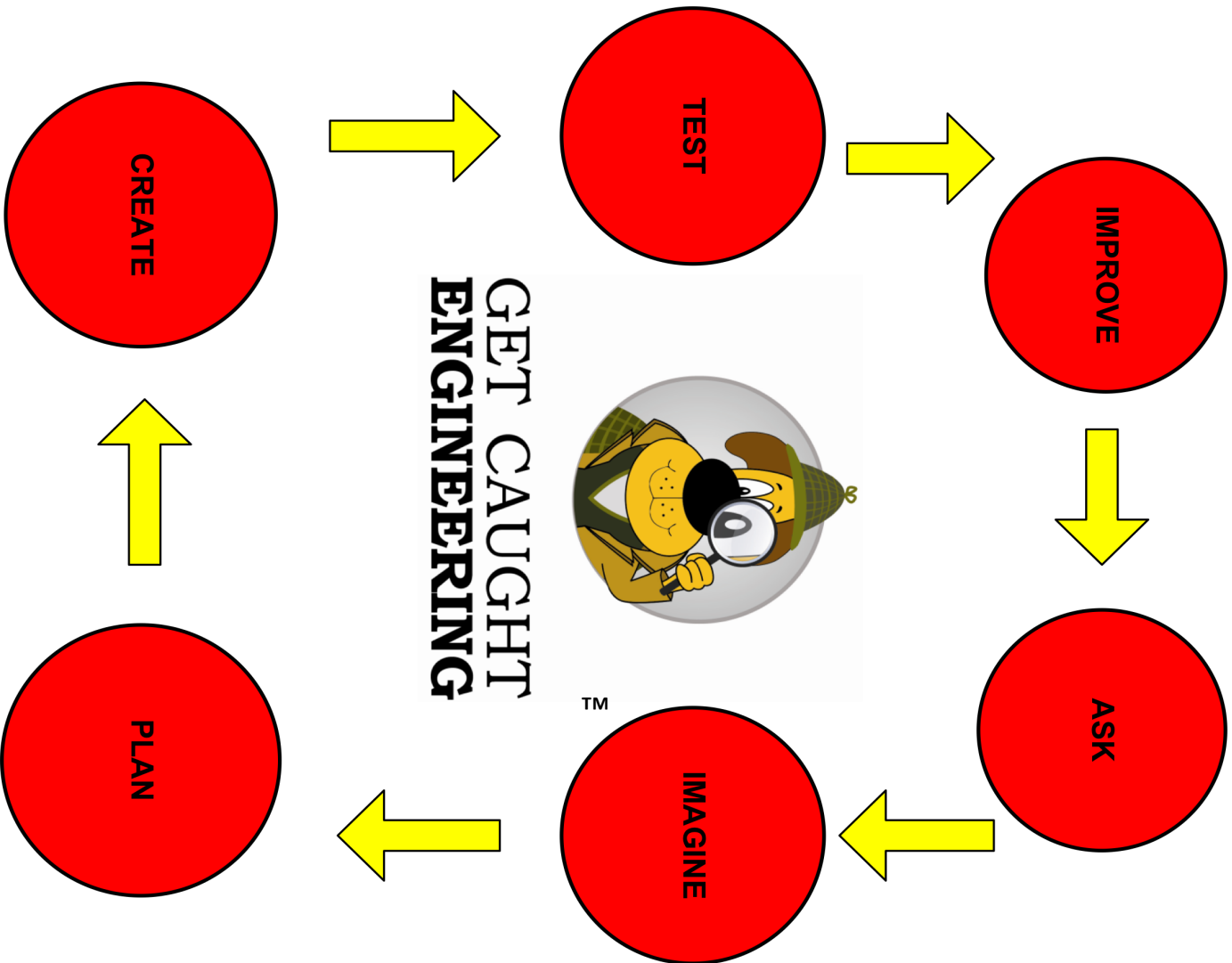
3-5--ETS1-3: Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.



What does the E in STEM stand for? Engineering!

Engineers use math and science skills to solve problems by designing, building, testing, and collaborating. The Engineering Design Process is a flexible cycle that guides the creative process. The six steps are:

- **ASK:** What is the problem? What are your constraints?
- **IMAGINE:** Brainstorm solution ideas and share with your group. Pick the best one to try and proceed to a plan.
- **PLAN:** Draw your idea. What materials will you need?
- **CREATE:** Build your design
- **TEST:** What works? What doesn't? What could work better?
- **IMPROVE:** Adapt, improvise, and go back through the cycle again until you are satisfied with your results.



Facilitator

- ◆ **Supervises and makes sure that all group members are on task**
- ◆ **Encourages participation**
- ◆ **Has final say in arguments**

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Reporter

- ◆ **Records detailed notes on ideas and progress**
- ◆ **Revises notes as needed from tests of prototype**

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Materials Manager

- ◆ **Gets materials and tools for group**
- ◆ **Makes sure materials are kept neat**
- ◆ **Supervises clean up**

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Presenter

- ◆ **Presents finished work to class**
- ◆ **Leads discussion of group's work**

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Reader

- ◆ **Reads the problem to the group**
- ◆ **Leads discussion of ideas**

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Time Keeper

- ◆ **Monitors the time**
- ◆ **Helps to keep the group on task**

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Inquiry Questions

What are some different things you could try?

What would happen if you...?

What might you try instead?

What will you do next?

Tell me about your materials?

Tell me what happened?

What does this make you think of?

What will you do next after you finish this part?



Suggested list for donations for a Maker Center or a STEM center

gallon sized zip lock bags
index cards 3x5
masking tape
Duct tape
unwrapped straws
large washers (and/or sand and/or pennies)
paper or plastic cups
aluminum foil
twine
Craft sticks
tongue depressors
stirring sticks
rubber bands, various sizes
felt
cotton, other light cloth material
plastic garbage bags, tall kitchen
jumbo or large paper clips
plasticine, clay or play dough
cotton balls
plastic spoons and forks
12" pipe cleaners, sometimes called chenille strips
filter paper, various sizes – larger is best or coffee filters
tissue paper
Rulers
Glue sticks and white glue
Plastic shoebox-sized boxes
Ping-Pong balls
Wire
Tools: wrenches, screw drivers, and pliers

Recyclables:

Clean Styrofoam plates, trays, plastic strawberry containers, other small plastic containers, old CDs, twist on plastic bottle caps (from soda and water bottles), pieces of cardboard (sides of a cereal box work great!), cardboard tubes, clean TP tubes, paper towel tubes.

Get Caught Engineering

Starting a STEM Program at your school? We have many helpful STEM and engineering lessons that will get you off to a good beginning.

We have put together 15 pages of general information that will provide an overview for teachers and a generic student notebook that could be used with any engineering project

<http://www.teacherspayteachers.com/Product/Ready-SetSTEM-An-Introductory-Packet-to-Start-A-STEM-Classroom-1210120>

The STEM-A-THON includes 12 engineering activities as well as a collection of Get Caught Engineering materials for a center or bulletin board. Activities use recyclable and easy to find materials. Perfect for the small STEM budget!

<http://www.teacherspayteachers.com/Product/Back-to-School-STEM-A-THON-Get-Caught-Engineering-for-a-Year-1313732>

We have chosen twelve of our most popular engineering lessons that can be integrated into many different subject areas from math to literature to history, as well as science. We have included student handout packets, detailed teacher notes, design process posters, and rubrics. They range from 60 minute activities to lessons that will take several hours.

<http://www.teacherspayteachers.com/Product/Get-Caught-Engineering-All-Year-Long-Twelve-STEM-Lessons-for-Your-Class-820886>

Visit our TPT store to find many more STEM and Engineering activities for grade K-8 :

<http://www.teacherspayteachers.com/Store/Get-Caught-Engineering-Stem-For-Kids>

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Thank You

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getcaughtengineering@gmail.com

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Get Caught Engineering has lots of STEM resources for your classroom.

A Website and Blog: <http://www.getcaughtengineering.com>

A Facebook page: <https://www.facebook.com/GetCaughtEngineering>

A Pinterest page: <https://www.pinterest.com/getcaughtenging/>



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For updates on new STEM activities, posters, task cards and handouts for students and a monthly STEM newsletter for teachers please follow our store at:
<https://www.teacherspayteachers.com/Store/Get-Caught-Engineering-Stem-For-Kids>

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Why Engineering?

Engineering for children? Really?

Exciting activities that combine math, science, reading and writing?

Lessons that promote planning and problem solving?

Strategies that develop perseverance and patience?

Teacher friendly instruction that easily integrates into one's units?

Get Caught Engineering does all that and more, providing a unique application for S.T.E.M.

Get Caught Engineering was created to inspire elementary students to explore the world of engineering and apply the design process to problem solving. After investigating what is already available in this area, we found there are some great materials but they are either dedicated to gifted and talented classes, for after school programs, or are lengthy units that are too expensive or too time consuming. **Get Caught Engineering** has been developed to introduce all children to engineering concepts in a teacher friendly approach that easily integrates into subject areas. Simple low cost materials, lesson templates, and teacher tips all add up to user friendly activities that will inspire children to consider engineering as a cool career choice, and a reason to pursue math and science classes during their school years.

The engineering profession is concerned within ten years there will not be enough engineers to meet America's needs. Studies show that the time to inspire students' interest in these fields is at the elementary level. Through introductory engineering lessons, elementary level teachers can plant the seeds of inspiration for future engineers for our country.

Questions? Need an engineering lesson to fit your curriculum? Want some ideas for engineering resources?

Please contact Wendy Goldfein and Cheryl Nelson at Getcaughtengineering@gmail.com

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