

# S.T.E.M.

Starter Kit  
for Elementary  
Classrooms

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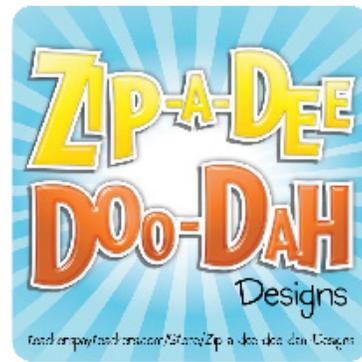


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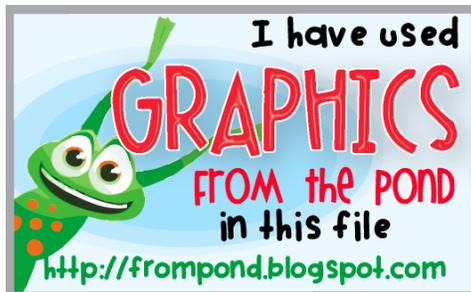


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# about this packet

This packet was created to help elementary school teachers with the STEM process. I am not an expert on STEM by any means! I have taught STEM for two years as a 3rd grade teacher and one year as a 1st grade teacher.

I have experienced the process of implementing STEM from the "ground up" as my public elementary school served as a STEM pilot school. In March of 2013, we officially became the first K-3 school in the state of Georgia to be awarded STEM certification. After several years and much hard work, we went from teachers asking, "What is STEM?" to Kindergarten students being able to communicate the design process with confidence and accuracy!

I am passionate about STEM because I have seen how it changes the environment of a classroom. I have seen the students who never pass a spelling test, students who do not speak English, the "behavior" students, you name it, feel successful at school and with themselves because of STEM. I have seen how the confidence gained from STEM spills over into reading, math, and writing.

This packet does not have all the answers. I like to think about the information presented here as "the stuff I wish I knew about STEM" when I first started. I hope the information will be helpful to you in creating a successful STEM experience for you and your students!

\*Disclaimer- This product is not endorsed by the DOE.

# S.T.E.M.

## Cheat Sheet of Definitions for Beginners

STEM

STEM stands for science, technology, engineering, and mathematics.

STEM  
components

STEM should involve problem-based and performance-based activities.

Design brief

A design brief is a STEM lesson plan.

Blueprint

A blueprint is a brainstorming sheet that is used after the problem has been presented to the class. The student or group of students use the blueprint sheet to think, plan, and decide on ways to solve the problem.

Components  
of a  
STEM  
activity

- problem to solve
- collaboration among students
- design challenge
- communication of findings
- reflection of solutions
- opportunity to redesign

# S.T.E.M.

## misconceptions about S.T.E.M.

### Misconception

### Fact

"Stem is only for older grades."

STEM involves students in solving real-world problems. Students of all ages need to learn how to solve problems.

"I do a lot of science experiments and hands-on activities in my classroom so that means I am doing STEM."

STEM is NOT students simply doing a hands-on activity. STEM is about students having time to solve problems in a creative way.

"I can't add another subject or curriculum to my day. There isn't enough time to add something else."

STEM is NOT meant to be a separate segment of your day. STEM can easily be integrated into EVERY subject. You can also take almost any lesson you are already planning on doing and make minor changes to make the lesson a STEM activity.

# S.T.E.M.

## misconceptions about S.T.E.M. cont.

Misconception

Fact

"I can't afford to buy all these materials for the projects."

Most STEM activities can be done using household throw away items (paper tubes, tissue boxes, cereal boxes, etc.) You can also place students in groups or with partners to cut down on supplies needed. Also, since every STEM product should look different from student to student, you don't have to stress out trying to make sure every student has exactly two red pipe cleaners, a green marker, and an empty tissue box.

"Stem will only work with gifted students."

This is completely untrue! If only your higher students are "getting" STEM then there is something wrong with your delivery, not with the students' ability.

# CLASSROOM SET UP CHECKLIST

Do you have an area designated for STEM supplies that students bring into the classroom? (ex. plastic bucket, shelf or space in a closet)	
Do you have materials that will be used frequently (glue sticks, scissors, markers, etc.) in an area that is easy for the students to access without needing adult help?	
Are frequently used materials organized in a way that students understand how to return them correctly? (pictures of materials on tubs, color-coated, etc.)	
Do you have a "missing pieces" or "lost and found" bucket for random glue stick lids, pencils, etc? Do you have a place for scrap paper to be stored?	
Do you have a method for getting students' attention? Note- students become VERY engaged in what they are doing during STEM so some signals that are normally very effective at other times may not work as well during STEM. Giving a 5 minute warning before clean up is helpful.	
Have you practiced how to clean up and stop working during a STEM activity several times? This is one of the MOST difficult aspects of STEM for students. Practice this by having students take out a journal and tell them to draw a house or another random picture. Give them a minute or so and then use your signal to gain their attention and tell them to stop. Teach them it is okay to not feel like they are done and praise the ones who stopped working the first time you asked.	
Will everyone in your class participate in clean up or will you appoint a "clean up crew"? Do the students who are not apart of clean up crew know what they should do during clean up time? (lay head down, listen to music)	
Do your students understand the role of the teacher and student during STEM? (students job = solve/create, teacher's job = monitor/provide feedback)	
Do your students know that it is not their job to point out copycats, students using materials incorrectly, etc? Tattling can easily DERAILED a great STEM activity.	
If the project will be continued another day/week, do you have a place for the student projects to be stored? (hallway, shelf, table, etc)	

# DESIGN BRIEF FACTS & INFO

A design brief is a STEM lesson plan.

Most design briefs last 2-4 sessions.

A session is usually considered a 45 minute session.

Sample of what occurs in each session:

## **Session 1-**

Introduce problem and criteria to students. Students may sketch ideas or brainstorm with a group on ways to solve the problem.

## **Session 2-**

Students choose one of their ideas and start working to solve the problem.

## **Session 3-**

Students continue working on the solution. Revising may start to happen as students find better ways to solve the problem.

## **Session 4-**

Students share ideas with the class, small group, or buddy and reflect on what they learned. Did they solve the problem? Did they try different solutions? How did they decide which solutions worked the best? What would they do different next time?

It is not necessary to give each student a copy of the design brief as long as it is displayed or referred to throughout the STEM activity. In 3rd grade, I would have students copy down the problem and criteria in a spiral writing journal/science notebook. We also used these to write a couple of sentences to reflect on the process. In 1st grade, I would simply display the lesson on the smart board and refer back to it as needed. In 1st grade, the reflection was done more orally than written. However, both ways of reflection can be used as you see fit.

Most likely these 45 minute sessions will take place during the science segment of your day, but keep in mind that STEM activities can be done in any subject.

Pick one day a week as your "STEM day" to work on your design briefs. Students will know when they will get to finish their projects without having to ask.

# SAMPLE DESIGN BRIEF

**Subject:** Back to school      **Suggested Sessions:** 1-2      **Grade level:** K-3

**Title:** What's Your Name?

**Standard:** 1L1 Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

**Background/Problem:** We have spent the past week getting to know everyone in our class, but there are so many names to remember and \_\_\_\_\_(teacher's name) is calling students by the wrong name!

**Design Challenge:** \_\_\_\_\_(teacher's name) needs your help to remember your name! Design and create a name tag for you to wear to help others remember your name.

**Criteria:**

**Each name tag must:**

- have your first name written clearly
- have correct capital and lowercase letters
- include at least one design or picture that tells others about yourself
- include at least 3 different colors
- be able to stay on your body without it being held with your hands

**Constraints:** You may only use the materials provided.

**Materials:**

- markers
- index cards
- crayons
- construction paper
- yarn or string
- glue

**Tools:** scissors, ruler, hole puncher

# SAMPLE DESIGN BRIEF

**Subject:** Back to school

**Suggested Sessions:** 1-2

Sessions suggested tell about how long it is expected to complete the brief from start to finish.

**Title:** What's Your Name

Most STEM activities involve several standards. Unless your administrator tells you otherwise, I would just pick one standard that relates to the activity the most.

English conventions of speaking.

**Standard:** 1L1 D English grammar

**Background/Problem:** We have spent the past everyone in our class, but there are so many and \_\_\_\_\_ (teacher's name) is calling students by the wrong name!

Backgrounds/Problems are always more fun if you can involve your name, school's name, or principals name.

**Design Challenge:** \_\_\_\_\_ (teacher's name) needs you to help her remember your name! Design and create a name tag to wear to help others remember your name.

Design challenge is where you tell the students exactly what it is they will be trying to do. Think of it in terms of this is where you will use verbs such as "design" "create" etc.

**Criteria:**

**Each name tag**

It is important to go over the criteria several times especially with younger students. You can even stop a session a couple of times and remind the students of what has to be included.

clearly increase letters picture that colors...

have your name clearly include a picture that include at least 3 colors... be able to stay on your body without it

Constraints are limitations you have to keep in mind while completing the design process. Often constraints are limited resources.

**Constraints:** You may only use the materials \_\_\_\_\_

**Materials:**

markers

The tools are items students can use to create their project, but they cannot be apart of the project. Tools are most often going to be where the technology aspect comes into play.

Going over the materials is helpful to get students to start thinking about what they are going to use to solve the problem. They do not have to use all the materials in their project. During the brainstorming part of STEM, students can make a list of the materials they will use to solve the problem. I would encourage my students to draw how they were going to solve the problem and then label materials to be used around the drawing. This will hopefully prevent materials from being used the wrong way.

**Tools:** scissors, ruler, hole puncher

# Steps for S.T.E.M. Success



## 1. Ask:

What have others done?  
What are the constraints?

## 2. Imagine:

What are some solutions?  
Brainstorm ideas  
Choose the best idea

## 3. Plan:

Draw a picture  
Make a list of materials

## 4. Create:

Create your design  
Test your design



## 5. Improve:

Reflect and share findings  
Make changes to make it better  
Retest!

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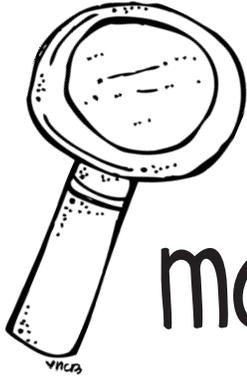
Create your design  
Test your design



## 5. Improve:

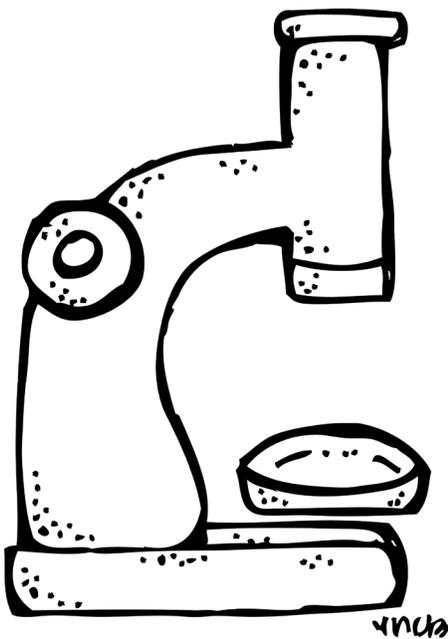
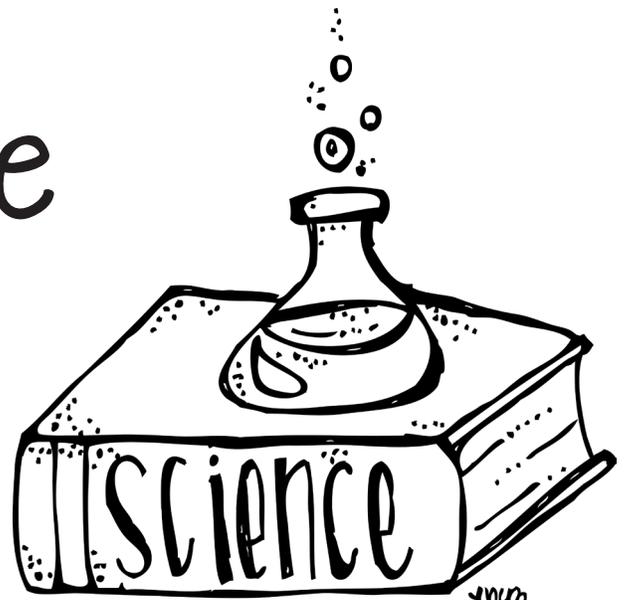
Reflect and share findings  
Make changes to make it better  
Retest!

# S.T.E.M. Rules



1. Use the materials correctly.

2. Always be working!



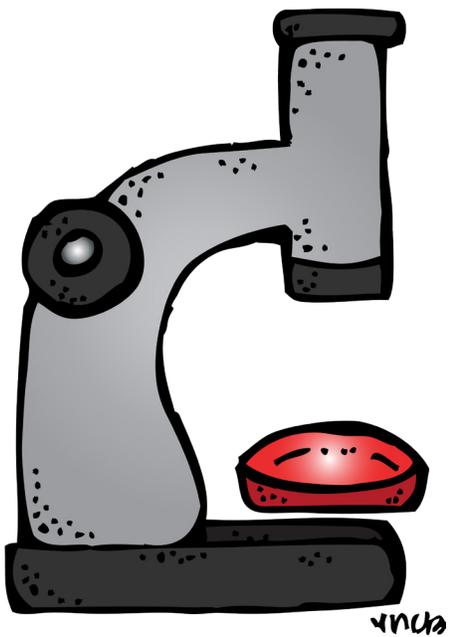
3. Don't say, "I'm done!"

# S.T.E.M. Rules



1. Use the materials correctly.

2. Always be working!



3. Don't say, "I'm done!"

Name \_\_\_\_\_



## Super Choices vs. Hurtful Choices

Directions: Cut out the boxes below. Read each box and decide if the student is showing super STEM behavior or hurtful behavior. Paste them under the correct heading.

Super STEM Behavior

Hurtful STEM Behavior

Sarah is not finished with her project so she decides to keep working after her teacher asks the class to stop working.

Shania sees that Emma is having a hard time building a door on her house project. Shania offers to help her hold the house while Emma tracing the door.

Mark can't get his project to work! He doesn't give up and keeps trying different ways to solve the problem!

Freddy thinks that Mark is the best artist in his class so he gets Mark to do his project for him.

Cody looks over and sees that Darius is using the same color marker that he is using! Cody yells "Copycat!"

Kathy is bored waiting on her classmates to finish so she cuts a piece of construction paper into tiny pieces while she waits.

John sees that Caymon needs a glue stick. "Here, you can use mine" he says.

Jada stops working the first time her teacher asks and starts cleaning up the materials right away.

Name \_\_\_\_\_

## Following STEM Rules

Directions: Read each rule below. Write or draw a picture to show what it means to follow the rule.

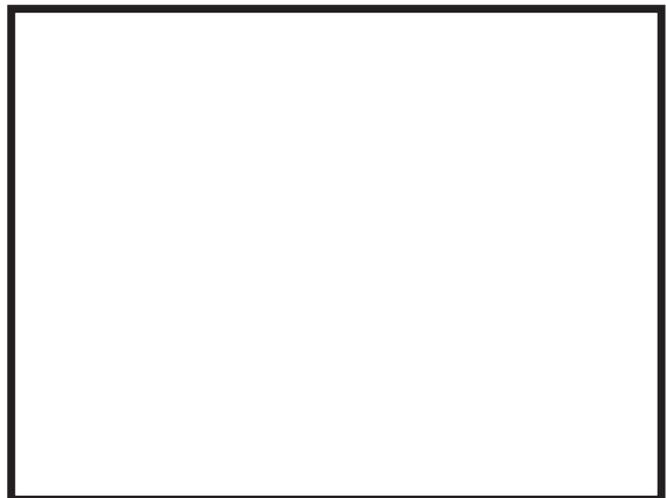
Use the  
materials  
correctly



Always be  
working!



Don't say,  
"I'm done!"



Dear Parents,

Throughout the school year your child will be participating in STEM activities, STEM stands for Science, Technology, Engineering and Mathematics. The goal of STEM is to provide students with real-world problem solving opportunities. STEM allows students to think outside the box with project-based learning. Your child will be working on many exciting STEM projects this year!

Below is a list of household materials that we will be using to create our STEM projects. If you are willing to donate any of the items below then you can send them to the classroom with your child at anytime throughout the year. Thank you in advance for helping our class collect these items for STEM! Please let me know if you have any questions.

Save these items for STEM!

cereal boxes      paper towel tubes  
tissue boxes      paper grocery sacks  
oatmeal boxes      colored tissue paper  
shoe boxes with or without lids

scrap pieces of cloth

## Summary

I hope this packet has been helpful to you! Please leave feedback and let me know what you think or about your STEM experience.

Follow my store to receive updates about when new STEM products are posted!



Good luck on your STEM journey!