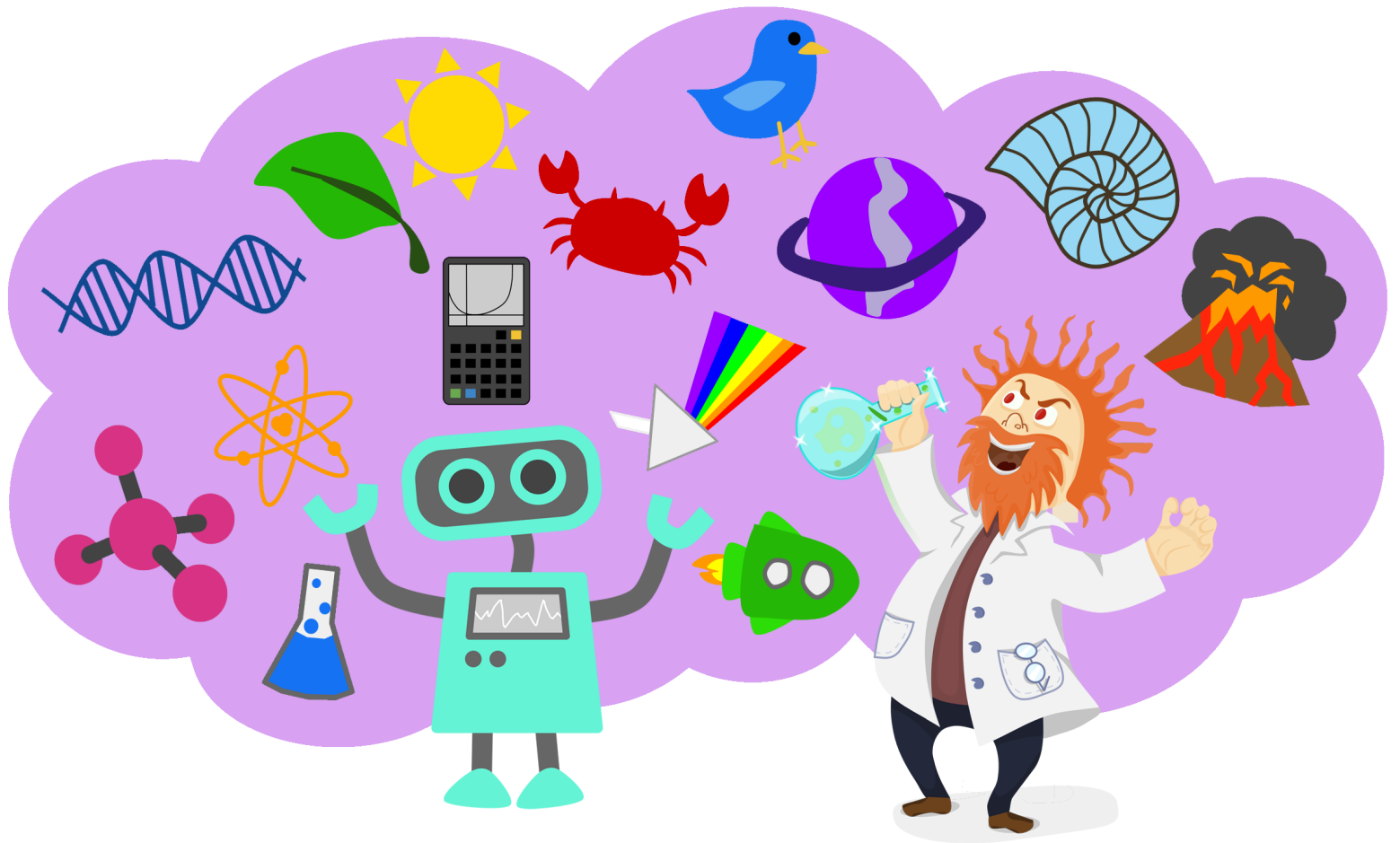


50 More STEM Labs

SCIENCE EXPERIMENTS FOR KIDS



- *50 NEW hands-on, fun science experiments for kids!
- *Each comes with rules and grading rubrics!
- *Supports learning in STEM fields!
- *Use them over and over again!

CONTENTS:

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WHAT IS THIS BOOK ABOUT?

STEM is an acronym for Science, Technology, Engineering, and Mathematics. Recent shifts in education have favored these subjects, primarily because we have a shortage of workforce in these particular areas, which is really quite sad for a number of reasons. These can be some of the most interesting things to study in school, provided they are taught in a fun, interesting, and hands-on fashion. They also lead to some of the best-paying technical jobs, too!

All of the labs within promote these 4 fields. You will find a strong emphasis on designing a project, testing it, measuring the results, and reflecting upon what worked and did not work. The projects are also labeled at the bottom with a series of categorical tags, so you can find similar projects to work on, allowing students to build upon prior knowledge gained in doing these projects! Of course, you can do them in any order you wish, but it can be fun to do a set of similar projects.

Since this is an educational volume, developed in my years teaching science in public schools, grading rubrics for each assignment are provided. There are some general suggestions and guidelines for each project, but it has deliberately been left without too much detail to allow the projects to be adapted to your classroom’s individual needs.

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Alphabetical Mission Listing - Page 1

1. Bayou Fanboats (**Balloons, Boats, Buoyancy, Distance, Speed, Water**)
2. Ben Franklin's Kites (**Fliers, Foil, Height, String, Wind**)
3. Cable Cars I (**Cable Cars, Plastic Straws, Scavengers, String, Weight**)
4. Cable Cars II (**Cable Cars, Capacity, Plastic Straws, Scavengers, String, Water**)
5. Cantilever Catastrophe I (**Cantilevers, Length, Materials Strength, Paper**)
6. Cantilever Catastrophe II (**Cantilevers, Length, Materials Strength, Plastic Straws**)
7. Cantilever Catastrophe III (**Cantilevers, Length, Materials Strength, Pipe Cleaners**)
8. Cantilever Catastrophe IV (**Cantilevers, Length, Materials Strength, Popsicle Sticks, Toothpicks**)
9. Cantilever Catastrophe V (**Cantilevers, Foil, Length, Materials Strength**)
10. Claymore Tower (**Clay, Height, Towers**)
11. Clean Sweep (**Bridges, Materials Strength, Pipe Cleaners, Weight**)
12. Coin Collection (**Coins, Scavengers, Sorting**)
13. Construction Chaos I (**Accuracy, Gears, Levers, Pulleys, Scavengers**)
14. Construction Chaos II (**Accuracy, Gears, Levers, Pulleys, Scavengers**)
15. Construction Chaos III (**Accuracy, Gears, Levers, Pulleys, Scavengers**)
16. Copper Road (**Coins, Paper, Time, Tracks**)
17. Discus (**Coins, Distance, Throwers**)
18. Frisbees (**Distance, Fliers**)
19. Glass Bottom Boats (**Boats, Marshmallows, Pipe Cleaners, Plastic Wrap, Water, Wind**)
20. Golden Arches I (**Arches, Height, Paper**)
21. Golden Arches II (**Arches, Height, Plastic Straws**)
22. Golden Arches III (**Arches, Foil, Height**)
23. Golden Arches IV (**Arches, Height, Pipe Cleaners**)
24. Golden Arches V (**Arches, Height, Popsicle Sticks, Toothpicks**)
25. Golden Arches VI (**Arches, Clay, Height**)

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Alphabetical Mission Listing - Page 2

26. The Irrigator (**Plastic Straws, Scavengers, Time, Tracks, Water**)
27. Kitetastrophe! (**Fliers, Foil, Height, Paper, Plastic Wrap, String, Wax Paper, Wind**)
28. Lead Sinker (**Boats, Buoyancy, Ping Pong Balls, Scavengers, Water, Weight**)
29. Leaning Tower of Pasta (**Height, Marshmallows, Pasta, Towers**)
30. Look Out Below! (**Fliers, Scavengers, Time**)
31. Lost Your Marbles (**Marbles, Ping Pong Balls, Scavengers, Sorting**)
32. Make it Rain (**Balloons, Distance, Popsicle Sticks, Rubber Bands, Throwers, Water**)
33. Marshmallow Mayhem (**Crashes, Marshmallows, Scavengers**)
34. Marshmallow Snowman Pileup (**Cars, Crashes, Marshmallows, Tracks**)
35. Nice Cold Drink (**Scavengers, Sorting, Water**)
36. The Old Swimming Raft (**Boats, Buoyancy, Ping Pong Balls, Scavengers, Water, Weight**)
37. Pin the Tail on the Balloon (**Balloons, Crashes, Scavengers**)
38. Ping Pong Madness (**Cardboard Tubes, Paper, Ping Pong Balls, Time, Tracks**)
39. Ping Pong Mortars (**Cardboard Tubes, Height, Ping Pong Balls, Throwers**)
40. The Pipeworks (**Height, Pipe Cleaners, Towers**)
41. Pneumatic Cannon (**Balloons, Cardboard Tubes, Distance, Ping Pong Balls, Throwers**)
42. Pump You Up (**Cardboard Tubes, Dead Lift, Materials Strength, Weight**)
43. Rain Marbles Down on Them! (**Distance, Marbles, Popsicle Sticks, Rubber Bands, Throwers**)
44. Splashing Around (**Gears, Rotation, Scavengers, Water**)
45. Tear the Trampoline I (**Materials Strength, Plastic Wrap, Trampolines, Weight**)
46. Tear the Trampoline II (**Materials Strength, Trampolines, Wax Paper, Weight**)
47. Tear the Trampoline III (**Materials Strength, Tissue, Trampolines, Weight**)
48. Tear the Trampoline IV (**Materials Strength, Paper, Trampolines, Weight**)
49. Tubular Balls (**Accuracy, Cardboard Tubes, Distance, Ping Pong Balls, Tracks**)
50. Wheel of Fortune (**Gears, Rotation, Rubber Bands, Scavengers**)

CONTENTS:

Mission Categories Listing

- Accuracy
- Arches
- Balloons
- Boats
- Bridges
- Buoyancy
- Cable Cars
- Cantilevers
- Capacity
- Cardboard Tubes
- Cars
- Clay
- Coins
- Crashes
- Dead Lift
- Distance
- Fliers
- Foil
- Gears
- Height
- Length
- Levers
- Marbles
- Marshmallows
- Materials Strength

- Paper
- Pasta
- Ping Pong Balls
- Pipe Cleaners
- Plastic Straws
- Plastic Wrap
- Popsicle Sticks
- Pulleys
- Rotation
- Rubber Bands
- Scavengers
- Sorting
- Speed
- String
- Throwers
- Time
- Tissue
- Toothpicks
- Towers
- Tracks
- Trampolines
- Water
- Wax Paper
- Weight
- Wind

CONTENTS:

Categorical Mission Listing - Page 1

Accuracy

1. Construction Chaos I
2. Construction Chaos II
3. Construction Chaos III
4. Tubular Balls

Arches

1. Golden Arches I
2. Golden Arches II
3. Golden Arches II
4. Golden Arches IV
5. Golden Arches V
6. Golden Arches VI

Balloons

1. Bayou Fanboats
2. Make It Rain
3. Pin the Tail on the Balloon
4. Pneumatic Cannon

Boats

1. Bayou Fanboats
2. Glass Bottom Boats
3. Lead Sinker
4. The Old Swimming Raft

Bridges

1. Clean Sweep

Buoyancy

1. Bayou Fanboats
2. Lead Sinker
3. The Old Swimming Raft

Cable Cars

1. Cable Cars I
2. Cable Cars II

Cantilevers

1. Cantilever Catastrophe I
2. Cantilever Catastrophe II
3. Cantilever Catastrophe III
4. Cantilever Catastrophe IV
5. Cantilever Catastrophe V

Capacity

1. Cable Cars II

Cardboard Tubes

1. Ping Pong Madness
2. Ping Pong Mortars
3. Pneumatic Cannon
4. Pump You Up
5. Tubular Balls

Cars

1. Marshmallow Snowman Pileup

Clay

1. Claymore Tower
2. Golden Arches VI

Coins

1. Coin Collection
2. Copper Road
3. Discus

Crashes

1. Marshmallow Mayhem
2. Marshmallow Snowman Pileup
3. Pin the Tail on the Balloon

CONTENTS:

Categorical Mission Listing - Page 2

Dead Lift

1. Pump You Up

Distance

1. Bayou Fanboats
2. Discus
3. Frisbees
4. Make It Rain
5. Pneumatic Cannon
6. Rain Marbles Down on Them!
7. Tubular Balls

Fliers

1. Ben Franklin's Kites
2. Frisbees
3. Kitetastrophe!
4. Look Out Below!

Foil

1. Ben Franklin's Kites
2. Cantilever Catastrophe V
3. Golden Arches III
4. Kitetastrophe!

Gears

1. Construction Chaos I
2. Construction Chaos II
3. Construction Chaos III
4. Splashing Around
5. Wheel of Fortune

Height

1. Ben Franklin's Kites
2. Claymore Tower
3. Golden Arches I
4. Golden Arches II
5. Golden Arches II
6. Golden Arches IV
7. Golden Arches V
8. Golden Arches VI
9. Kitetastrophe!
10. Leaning Tower of Pasta
11. Ping Pong Mortars
12. The Pipeworks

Length

1. Cantilever Catastrophe I
2. Cantilever Catastrophe II
3. Cantilever Catastrophe III
4. Cantilever Catastrophe IV
5. Cantilever Catastrophe V

Levers

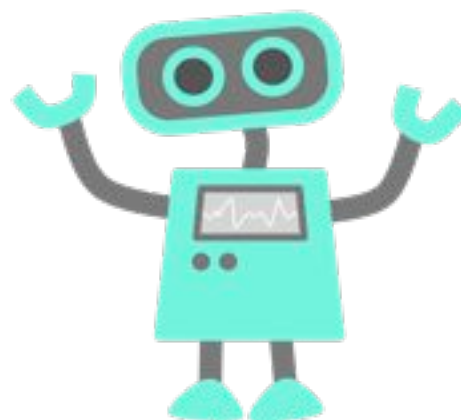
1. Construction Chaos I
2. Construction Chaos II
3. Construction Chaos III

Marbles

1. Lost Your Marbles
2. Rain Marbles Down on Them!

Marshmallows

1. Glass Bottom Boats
2. Leaning Tower of Pasta
3. Marshmallow Mayhem
4. Marshmallow Snowman Pileup



CONTENTS:

Categorical Mission Listing - Page 3

Materials Strength

1. Cantilever Catastrophe I
2. Cantilever Catastrophe II
3. Cantilever Catastrophe III
4. Cantilever Catastrophe IV
5. Cantilever Catastrophe V
6. Clean Sweep
7. Pump You Up
8. Tear the Trampoline I
9. Tear the Trampoline II
10. Tear the Trampoline III
11. Tear the Trampoline IV

Paper

1. Cantilever Catastrophe I
2. Copper Road
3. Golden Arches I
4. Kitetastrophe!
5. Ping Pong Madness
6. Tear the Trampoline IV

Pasta

1. Leaning Tower of Pasta

Ping Pong Balls

1. Lead Sinker
2. Lost Your Marbles
3. The Old Swimming Raft
4. Ping Pong Madness
5. Ping Pong Mortars
6. Pneumatic Cannon
7. Tubular Balls

Pipe Cleaners

1. Cantilever Catastrophe III
2. Clean Sweep
3. Glass Bottom Boats
4. Golden Arches IV
5. The Pipeworks

Plastic Straws

1. Cable Cars I
2. Cable Cars II
3. Cantilever Catastrophe II
4. Golden Arches II
5. The Irrigator

Plastic Wrap

1. Glass Bottom Boats
2. Kitetastrophe!
3. Tear the Trampoline I

Popsicle Sticks

1. Cantilever Catastrophe IV
2. Golden Arches V
3. Make It Rain
4. Rain Marbles Down on Them!

Pulleys

1. Construction Chaos I
2. Construction Chaos II
3. Construction Chaos III

Rotation

1. Splashing Around
2. Wheel of Fortune

Rubber Bands

1. Make It Rain
2. Rain Marbles Down on Them!
3. Wheel of Fortune

CONTENTS:

Categorical Mission Listing - Page 4

Scavengers

1. Cable Cars I
2. Cable Cars II
3. Coin Collection
4. Construction Chaos I
5. Construction Chaos II
6. Construction Chaos III
7. The Irrigator
8. Lead Sinker
9. Look Out Below!
10. Lost Your Marbles
11. Marshmallow Mayhem
12. Nice Cold Drink
13. The Old Swimming Raft
14. Pin the Tail on the Balloon
15. Splashing Around
16. Wheel of Fortune

Sorting

1. Coin Collection
2. Lost Your Marbles
3. Nice Cold Drink

Speed

1. Bayou Fanboats

String

1. Ben Franklin's Kites
2. Cable Cars I
3. Cable Cars II
4. Kitetastrophe!

Throwers

1. Discus
2. Make It Rain
3. Ping Pong Mortars
4. Pneumatic Cannon
5. Rain Marbles Down on Them!

Time

1. Copper Road
2. The Irrigator
3. Look Out Below!
4. Ping Pong Madness

Tissue

1. Tear the Trampoline III

Toothpicks

1. Cantilever Catastrophe IV
2. Golden Arches V

Towers

1. Claymore Tower
2. Leaning Tower of Pasta
3. The Pipeworks

Tracks

1. Copper Road
2. The Irrigator
3. Marshmallow Snowman Pileup
4. Ping Pong Madness
5. Tubular Balls

Trampolines

1. Tear the Trampoline I
2. Tear the Trampoline II
3. Tear the Trampoline III
4. Tear the Trampoline IV

CONTENTS:

Categorical Mission Listing - Page 5

Water

1. Bayou Fanboats
2. Cable Cars II
3. Glass Bottom Boats
4. The Irrigator
5. Lead Sinker
6. Make It Rain
7. Nice Cold Drink
8. The Old Swimming Raft
9. Splashing Around

Wind

1. Ben Franklin's Kites
2. Glass Bottom Boats
3. Kitetastrophe!

Wax Paper

1. Kitetastrophe!
2. Tear the Trampoline II

Weight

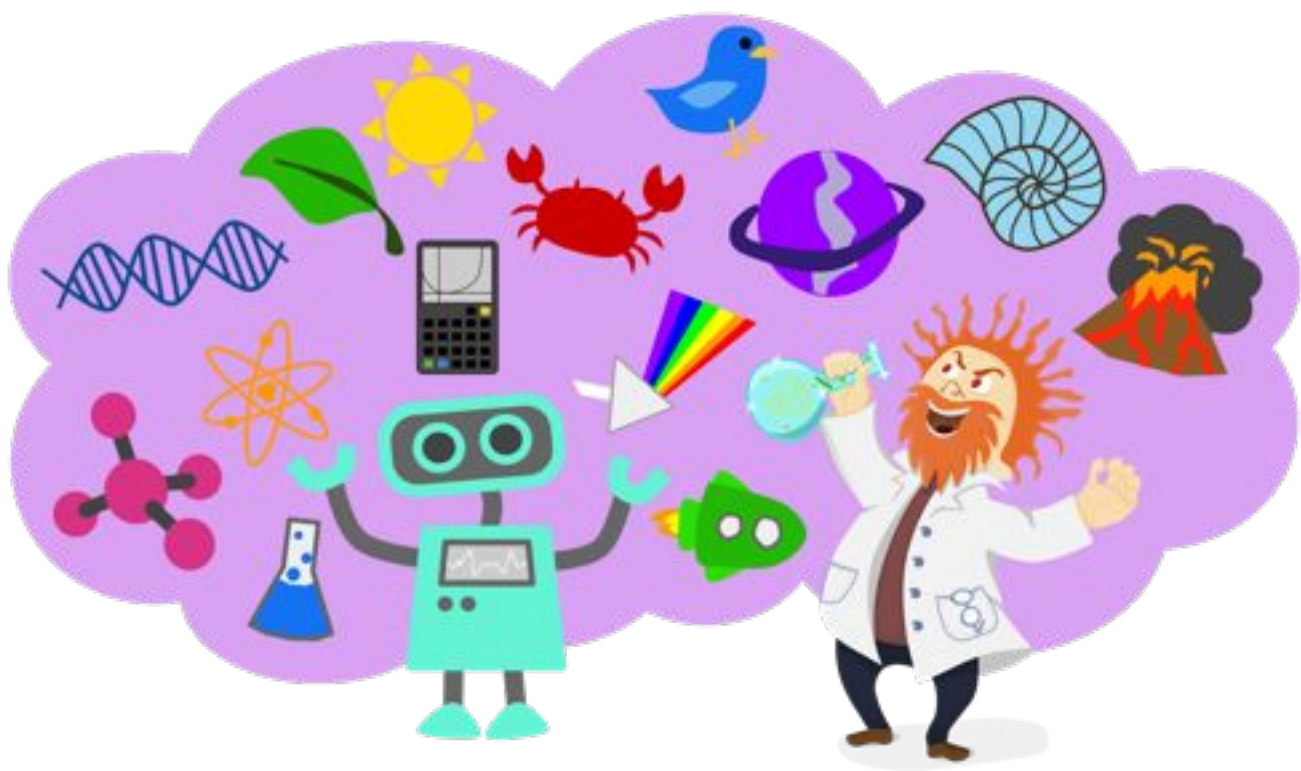
1. Cable Cars I
2. Clean Sweep
3. Lead Sinker
4. The Old Swimming Raft
5. Pump You Up
6. Tear the Trampoline I
7. Tear the Trampoline II
8. Tear the Trampoline III
9. Tear the Trampoline IV



CONTENTS: 50 MORE STEM LABS

Each of the new science labs in **50 MORE STEM LABS** has the following:

- A snappy **Title**
- A **Brief Description** of the task to be completed
- General **Mission Rules**, suggestions, limitations, and requirements of the task
- **Grading Rubrics** for a Quiz and a Test Grade
- A small **note space** for any changes or adaptations required
- **Category Tags** at the bottom to help you find similar projects



MISSION: Bayou Fanboats**BRIEF:**

You and your team have been selected to make balloon-powered boat that goes as fast and as far as possible.

MISSION RULES:

1. You will design a boat that is balloon-powered and attached to a string. The rocket ship must slide along the string to cross the body of water.
2. Your boat must be built from a single balloon, a straw, tape or glue, notecards, and other teacher-approved materials.
3. You will work with a single partner. Teams may not be of more than 2 people.
4. The straw will be used to slide along the line that is strung horizontally above a body of water. Both ends will be secured during tests. Inflated balloons will be attached to the balloon boat. Letting air from the balloons should propel the project across the water as fast as possible.
5. If your boat does not clear the distance with one use of the balloon, your teacher has the option of measuring the distance traveled or keeping the clock running while you refill the balloon as many times as needed to clear the course.

TEACHER'S NOTES: You will need some sort of body of water. A set of 1-3 rain gutters coupled together with caps at the end will hold water. Then you can run the string/fishing line parallel to the surface of the water.

**QUIZ GRADE:**

Create a blueprint designs for your ideas

- Sketch 25%
- Sketch is labeled 25%
- Explanation of strategies 25%
- Conclusions and reflections based on your results 25%

TEST GRADE:

Your completed design and the results of the test.

- Project Completed = 50%
- 50% of your grade depends on how fast your project is compared to others.
- Other places = +10-20%
 - Third Place = +30%
 - Second Place = +40%
 - Fastest Boat = +50%

NOTES:**CATEGORIES:**

Balloons, Boats, Buoyancy, Distance, Speed, Water

MISSION: Ben Franklin's Kites**BRIEF:**

You and your team have been selected to make a kite using tin foil!

MISSION RULES:

1. You will design a kite.
2. You will work with one or two partners. Teams may not be of more than 3 people.
3. The kite must be built using foil as your primary building material. It is up to your teacher how much and what kind of other materials are allowed.
4. Teams are encouraged to make non-traditional designs. Diamond-shaped kites will not get full points! Kite research is strongly recommended.

TEACHER'S NOTES: Obviously, this should not be done in poor weather. :)

**QUIZ GRADE:**

Create a blueprint design for your ideas

- Sketch 25%
- Sketch is labeled 25%
- Explanation of strategies 25%
- Conclusions and reflections based on your results 25%

TEST GRADE:

Your completed design and the results of the test.

- Project Completed = 50% (25% for diamond design)
- Project Gets airborne for 10+ seconds = 25%
- The remaining 25% of your points come from how long your project remains airborne compared to other teams' kites.

NOTES:

CATEGORIES: Fliers, Foil, Height, String, Wind

MISSION:

Andrew Frinkle

BRIEF:

A quick look at the author of this book and the previous volume (which I hope you have!).

ABOUT THE AUTHOR:

1. Over 10 years of experience in the teaching field with a specialization in math and science education in elementary and middle schools.
2. Award Nominated for teacher of the year.
3. Winner of the Karen Pelz Writing Award for short fiction.
4. Author of over 20 books in nonfiction and fiction genres.
5. Black Belt in the Korean Sword Martial Art Geomdo.

SNAZZY PHOTO:



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- www.common-core-assessments.com
- www.veleriondamarke.wordpress.com/

NOTES:

Chicago style is the best style of pizza.

Chili Cheese Dogs are pretty awesome, too.

CATEGORIES:

Hands-On, Labs, Math, Measurement, Physics, Science, STEM

MISSION:

SUPER COOL BLANK PAGE!

You always have to publish an even number of pages, so this page has been added for your visual enjoyment! :)

CATEGORIES:

Make sure you got the original book: 50 STEM LABS

50 More STEM Labs

SCIENCE EXPERIMENTS FOR KIDS

WHAT IS STEM?

STEM is an acronym for Science, Technology, Engineering, & Mathematics. It is in these areas that many American students are lacking, and recent initiatives in education are pushing the focus of students' academics back into these core technical fields to make them better prepared to find careers in high paying technical fields.

The goal of this book is to present these fields, which can seem uninteresting if taught wrong, in a fun and inventive way. Students are engaged with problem solving and critical thinking in exciting, hands-on, and competitive tasks. Math and measurement add to the tasks, making for educational activities that hit all core areas of the STEM philosophy.