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Transformation from Standards to STEM

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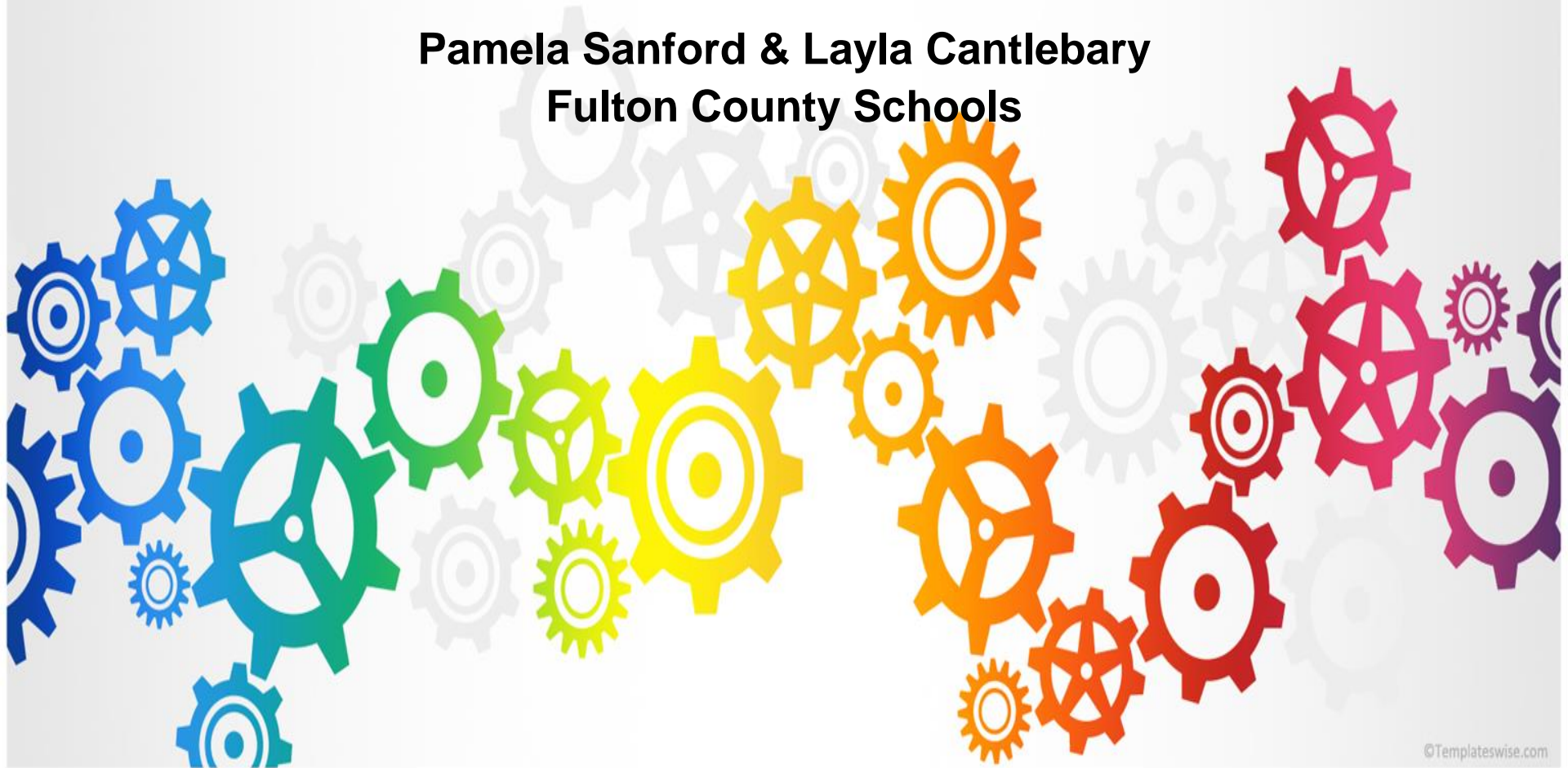
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Three strategies to support the transition from the standard to STEM

Pamela Sanford & Layla Cantebery
Fulton County Schools





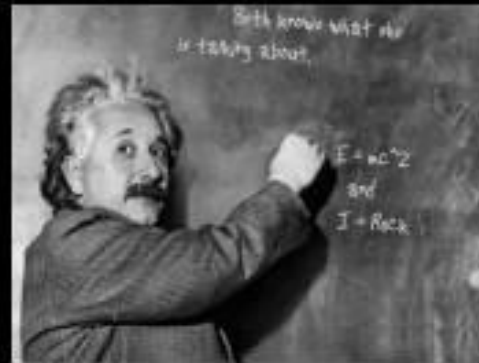
Three strategies to support the transition from the standard to STEM

- How did the STEM initiative changed classroom teaching?
- Science Olympiad Day as well as Club
- Sea Perch Robotics

TEACHER



What my friends think I do.



What my mom thinks I do.



What society thinks I do.



What kids think I do.



What I think I do.



What I actually do.

Standards

STEM



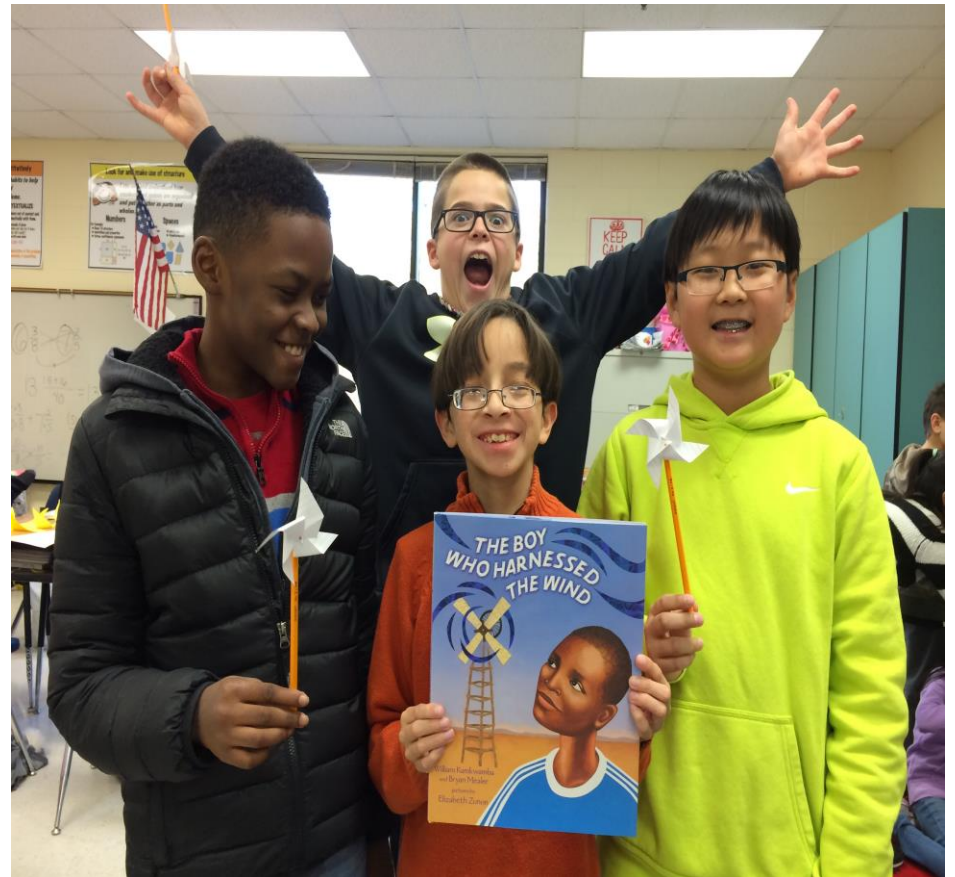
How did the STEM initiative changed classroom teaching?

- Collaboration
 - Engineering Design Process
 - Problem based learning
 - Real World Connections
 - Business and community partners
- (Connecting Math and Science Instruction)*

Collaboration

What's the first thing you notice about this picture?

(I'm guessing it isn't the amazing diversity of this collaborative group!)



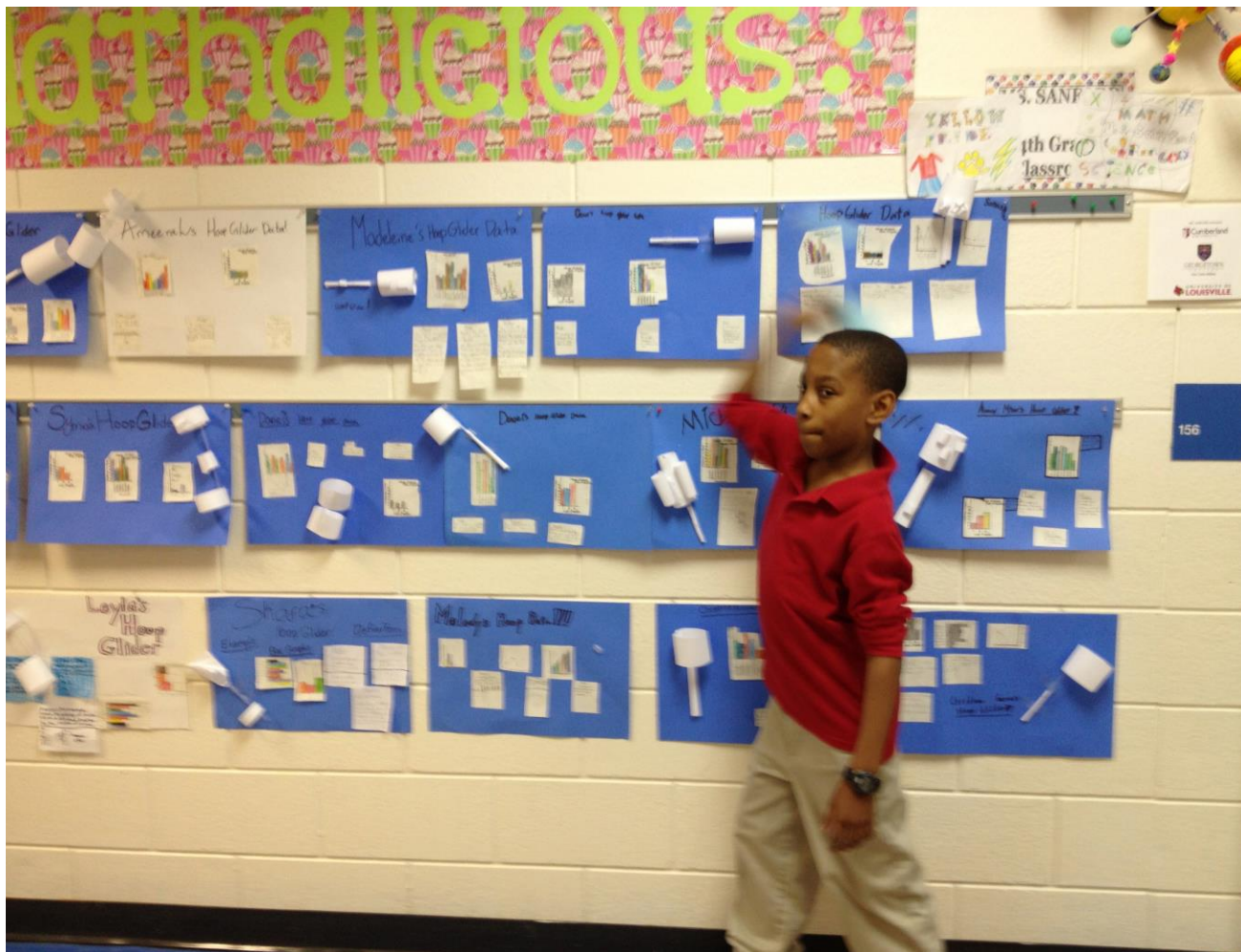
Collaboration

Here, we were designing load bearing structures from playing cards.

These two groups were the winners. What's most interesting about this picture is what you do not see.



Engineering Design Process



Problem-based learning

- Student centered
(The teacher facilitates/mentors)
- Problems are often real-world challenges
- Often involve research
(What do we need to know to solve this?)
- The question is central to PBL



Real-World Connections

S5E1. Students will identify surface features of the Earth caused by constructive and destructive processes.

Identify surface features caused by constructive processes. Deposition (Deltas, sand dunes, etc.)
Earthquakes Volcanoes Faults



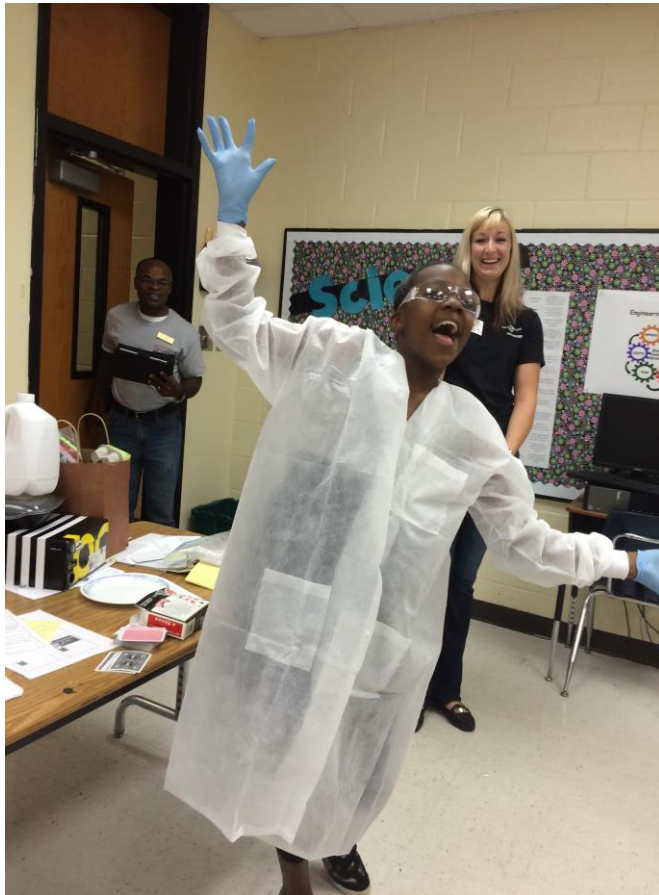
Real-World Connections

In conjunction with “An Hour of Code”, we wanted to see the real world applications of coding, and how it could be beneficial in the workplace and the real world.

Here you see Dr. Britton from Georgia Tech sharing their robot that monitors chicken coops.



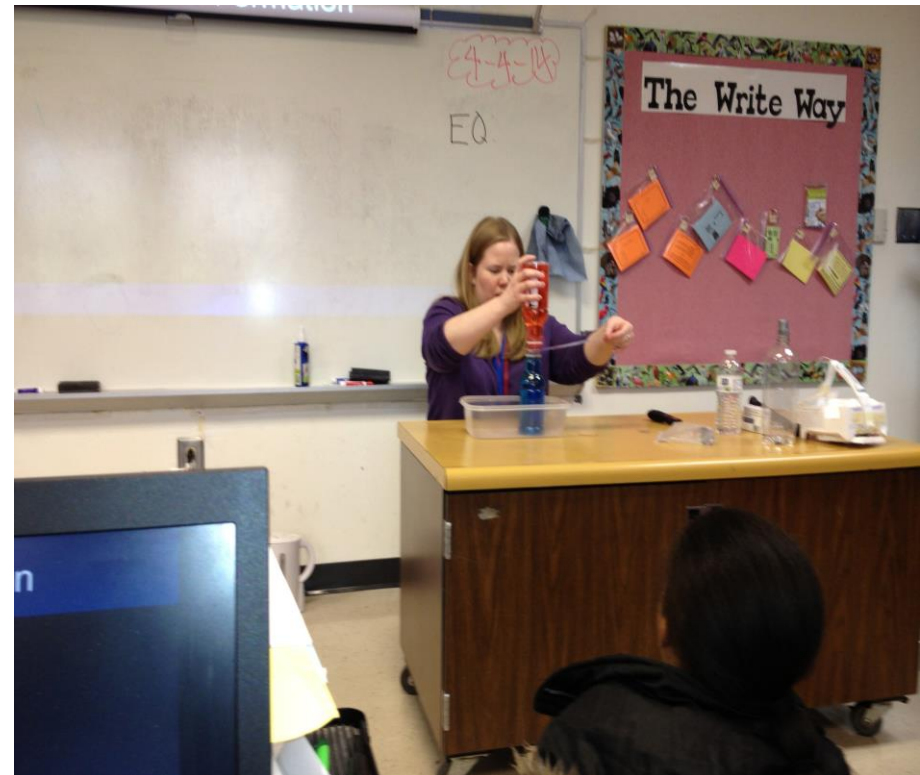
Business and community partners



Kimberly Clark is an official partner with our school, and sends engineers to all of our STEM Days to both speak, and support the students.

Here we were reviewing workplace safety, but they have been instrumental in making personal connections with my students.

Business and community partners





Exploring the World of Science



Genesis of idea

- Wanted to start a team
- Needed a recruitment tool
- Attended a workshop
- School decided to start STEM certification

A decorative header at the top of the slide features a row of colorful gears in shades of blue, green, yellow, orange, and red, set against a light gray background with a white curved border.

Planning

- Decide on events
- Recruit help
- Find financial assistance
- Create timeline

November

- Decided events

dec./jan.

- Compiled supply list
- Made schedule

Feb./mar.

- Create lesson plans
- Get supplies

April

- Create volunteer documents and teacher schedules
- Finish packaging supplies

May

- Teacher training
- Volunteer recruitment
- Event

S3CS8. Students will un

Students will apply the foll

- Scientific in things are l and doing e
- Clear and ac scientists to scientists, a
- Scientists us and compar
- Science inve ages and ba

Co-Requisite - C

Earth Science

S3E1. Students will inve

- Explain the
- Recognize t color, textu
- Use observa and color in
- Determine h observation

S3E2. Students will inve

- Investigate f information
- Describe ho

Physical Science

S3P1. Students will inve and will understa

- Categorize v mixing one
- Investigate l
- Investigate t
- Use thermom warm, cold

S3P2. Students will inve objects.

- Investigate t
- Investigate l



ENERGY BOX

Description:

Teams will construct, ahead of time, an insulated house-like structure no larger than 40 cm on a side (outside dimensions) to house and retain the heat of approximately 75 ml of water in a standard, empty, 100 ml Pyrex beaker (supplied by students).

Number of Participants: 2

Approximate Time: 45 minutes

The Competition:

- The Energy Box will be turned in a minimum of an hour before the event. Only one box is allowed per team. The judges will load them at thirty second intervals until all of the competing boxes have their hot water samples. Judges should use water taken from a constant temperature bath such as an electric coffee pot.
- There must be easy access to the energy box interior for easy loading or pouring and rapid measurement of the water sample temperature at the end of the competition period. Beakers may not be permanently installed in the energy boxes.
- At the end of a 20-30 minute time period (determined by the judges), energy boxes will be opened in the same order in which they were loaded by the judges, at thirty second intervals. Temperature measurements will be taken and recorded immediately by the judges. The hottest sample will win. Judges will supply the thermometer(s)-(digital would be best).

Scoring:

- Scoring will be based on the formula: score = $M \times \Delta T$ (where M = mass of box and ΔT = the change in temperature). The lowest score wins.
- In case of a tie, the team with the smallest ΔT will be declared the winner.
- Winning energy boxes will be inspected to insure that no other source of energy was used other than the hot water supplied by the judge.

iCal Today Day Week Month Q

2014 Wednesday, May 7

all-day

9 AM

8:40 AM Energy House: Intro, Build, Water

8:40 AM Energy House: Intro and Make Only

8:40 AM Egg Drop

9:30 AM Estimania

9:45 AM Egg Drop

10:00 AM Energy House: Intro

10:30 AM Energy House: Record

11:00 AM Lunch/Etc.

11:00 AM Etc.

12:00 PM Egg Drop

12:00 PM Energy House: Put in hot water

12:00 PM Estimania

1:00 PM Energy House: Record

Noon

11:50 AM Etc.

11:50 AM Energy House: Record

12:20 PM Estimania

1 PM

2 PM

3 PM

4 PM

5 PM

6 PM

7 PM

8 PM

▼ Hinton

▼ 3rd grade

✓ Garris/Lofe

✓ Pruett/Carter

✓ Brannen/Raymond

▼ 2nd grade

Collins/Usdan/...

Tanksley/Dowd

Donald/Harlan...

▼ 1st grade

Grosoff/Cantle...

Mann/McCullough

Bass/Holton

◀ April 2014 ▶

Sun Mon Tue Wed Thu Fri Sat

30 31 1 2 3 4 5

6 7 8 9 10 11 12

13 14 15 16 17 18 19

20 21 22 23 24 25 26

27 28 29 30

May 2014

Sun Mon Tue Wed Thu Fri Sat

1 2 3

4 5 6 7 8 9 10

11 12 13 14 15 16 17

18 19 20 21 22 23 24

25 26 27 28 29 30 31

June 2014

Sun Mon Tue Wed Thu Fri Sat

1 2 3 4 5 6 7

8 9 10 11 12 13 14

15 16 17 18 19 20 21

22 23 24 25 26 27 28

29 30

July 2014

Sun Mon Tue Wed Thu Fri Sat

1 2 3 4 5

6 7 8 9 10 11 12

13 14 15 16 17 18 19

20 21 22 23 24 25 26

27 28 29 30 31 1 2

3 4 5 6 7 8 9

Garris/Lofe

- 8:40-9:30** Energy House Intro Build Put in hot water
- 9:30-10:30** Estimania
- 10:30-11:00** Energy House Temperature/ Record results
- 11:00-12:00** Lunch/Etc.
- 12:00-1:15** Egg Drop
- 1:35** Awards Ceremony

*Note: The upper field will be closed

Pruett/Carter

- 8:40-9:25** Energy House Intro Build
- 9:45-11:00** Egg Drop
- 11:00-11:50** Lunch/Etc.
- 11:50-12:00** Energy House Put in hot water
- 12:00-1:00** Estimania
- 1:00-1:20** Energy House Temperature/ Record results
- 1:35** Awards Ceremony

*Note: The upper field will be closed

Brannen/Raymond

- 8:40-9:55** Egg Drop
- 10:00-10:50** Energy House Intro Build Put in hot water
- 10:50-11:50** Lunch/Etc.
- 11:50-12:15** Energy House Temperature/ Record results
- 12:20-1:20** Estimania
- 1:35** Awards Ceremony

*Note: the upper field will be closed.

Sci Oly STEM Day Supply List - cheapest prices

5th Grade:

- Chopper Challenge *
 Groups of 2
 Each group gets:
 - 2 sheets of cardstock (1 to play with 1 for fi
 - 3 small paperclips
- Write It, Do It
 Groups of 2 (one writing, one doing)
 Each writer gets:
 - 1 write it paper (two-sided)
 - shares one display figure with another write
 Each builder gets:
 - 1 writer-written set of instruction
 - 1 bag of Legos, matching the number/letter
- Paper Rockets *
 Individual
 Each student gets:
 - 1 pencil (to return)
 - 2 sheets of white paper
 - scotch tape to share with 2/3 other students

4th Grade:

- Bottle Rockets *
 Groups of 3
 Each group gets:
 - 1 2-L soda bottle
 - 1 2-L soda bottle "nose cone"
 - 3 yards of kite string
 - 1 plastic garbage bag
 - 1 piece of foam core board
 - 1 piece of white paper for planning
 Each class gets:
 - rolls of duck tape to share
- Grab a Gram
 Groups of 2
 Each group gets:
 - Two gallon bags
 Each CLASS gets:
 - bag of pretzels
 - bag of dog food
 - bag of plastic beads
 - bag of sand
 - bag of rice
 - bag of Cheerios

Item	Quantity	Link
Black Foam Board - 20"X30"	25	http://www.dollartree.com/household/arts-and-crafts/paper-note/500c565c567p310686/index.pro?method=search
Transparent Scotch Tape with dispenser	38	http://www.dollartree.com/household/arts-and-crafts/tape-glues-Packs/500c565c568p10980/index.pro
Timers	16	Dollar Tree (in store)
Non-Slip Shelf Liner	8	Dollar Tree (in store)
Duck Duct Tape	30	http://maxbuyer.officemax.com/shop/shopmvc.selectItemDetail
Masking Tape	65	http://maxbuyer.officemax.com/shop/shopmvc.selectItemDetail
Cardstock	2 (250)	http://maxbuyer.officemax.com/shop/shopmvc.selectItemDetail
Paperclips, Small	1 box (1,000)	http://maxbuyer.officemax.com/shop/shopmvc.selectItemDetail
Rubberbands	2 (100)	http://maxbuyer.officemax.com/shop/shopmvc.selectItemDetail.dex=5&csid=2-107-2196-184-2-156559-233985-184-2196-1823
Copy Paper	6 (reams)	http://maxbuyer.officemax.com/shop/shopmvc.selectItemDetail
Pipe Cleaners	1 boxes (1000)	http://maxbuyer.officemax.com/shop/shopmvc.selectItemDetail
Modeling Clay	2	http://maxbuyer.officemax.com/shop/shopmvc.selectItemDetail
Eraser (light-must be identical)	7	http://maxbuyer.officemax.com/shop/shopmvc.selectItemDetail.dex=4&csid=2-107-2196-184-2-162568-180664-184-2196-3445
Notebook Paper	2	http://maxbuyer.officemax.com/shop/shopmvc.selectItemDetail

Event: Paper Rockets

Time Total: 1 hour

The Low-down: Students will "shoot off" using the straw w

Important notes:

1. Kids HAVE to st a fair competi
2. Teachers can't have to design information fro
3. Students can b to shoot off for
4. Designate one
5. Students cann
6. Pencils should with you can p sheet.

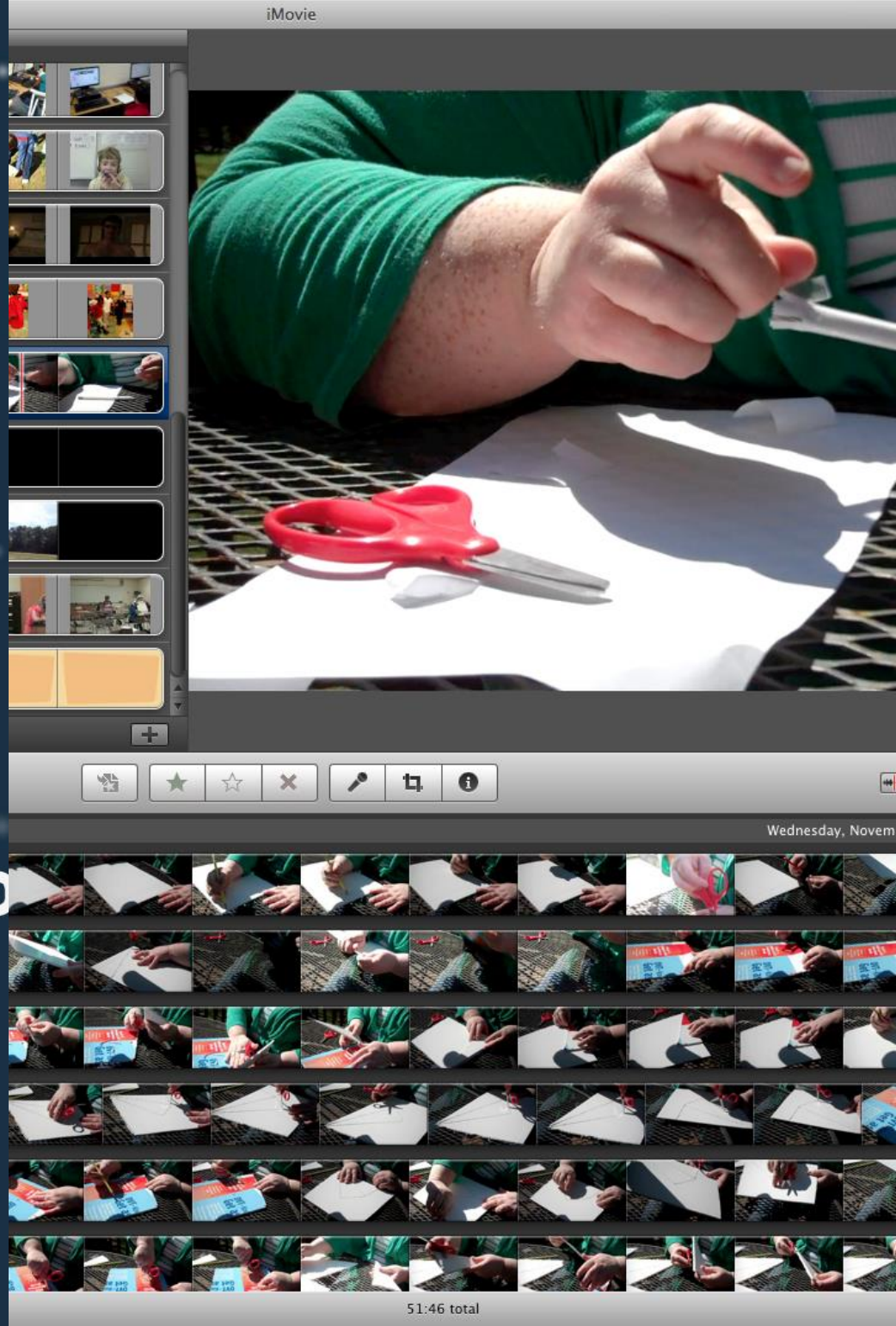
Introduction: 15 minutes (o

1. Explain to kids
2. Open Prezi and
3. Explain where must be patier could become
4. Let students kn make with two with.
5. Remind studer possible. When different angle distance and c
6. Watch tip vide paper, one str between stud
7. After tip video



Building and Testing: 25 mi

1. Start the 25-mi
2. Students shoul
3. While students
4. Give students busy, they mig





Training

- In-service day for teachers
- Week before event
- By grade level
- Downloaded presentations and videos
- Answered questions
- Shared lessons and schedule

WE NEED



Science Olympiad
educational competi

Volunteer to help us
materials, te

Scien
W
7

Brie
2:4

Due to safety concerns,
Pretty p

Yes! I'm incr

Name: _____

Cell: _____

E-mail: _____

Grade levels of chil

WE

Bridge Building Schedule

These are the times to pick up Bridge
Building result sheets from teachers

9:15- Donald and Harlan

10:30- Tanksley and Dowd

1:25 (please be there at 1:20)- Collins,
Usdan, and Schaffer

Science O
amazing, fun
nee

Volunteer to hel
cracks, deliver m

Due to safety conce



Final Preparations

- Delivered supplies, put up signs, readied “command central,” and placed tape afternoon before
- School news show shout out
- Test areas finished the morning of
- Walkie talkies

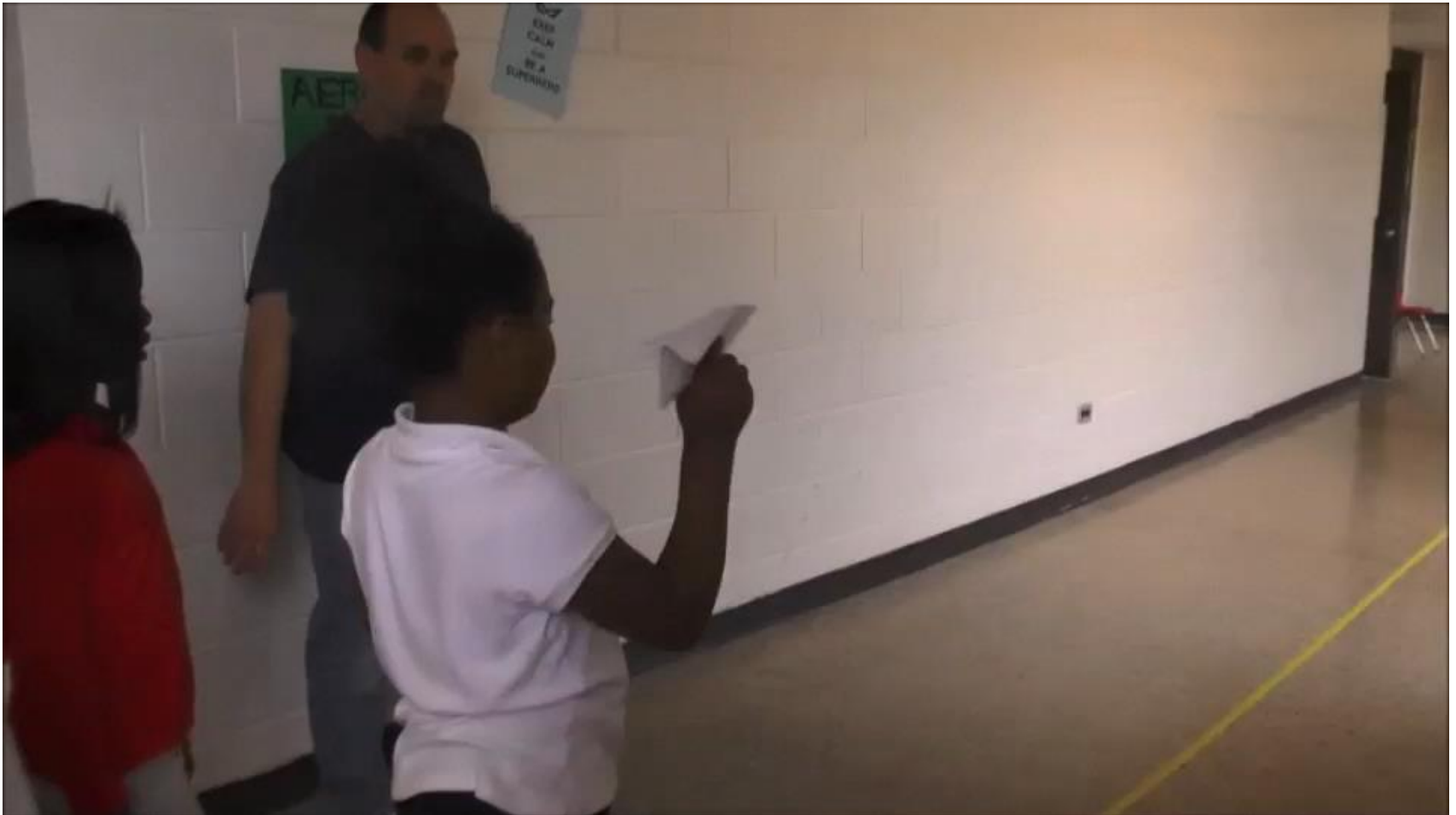




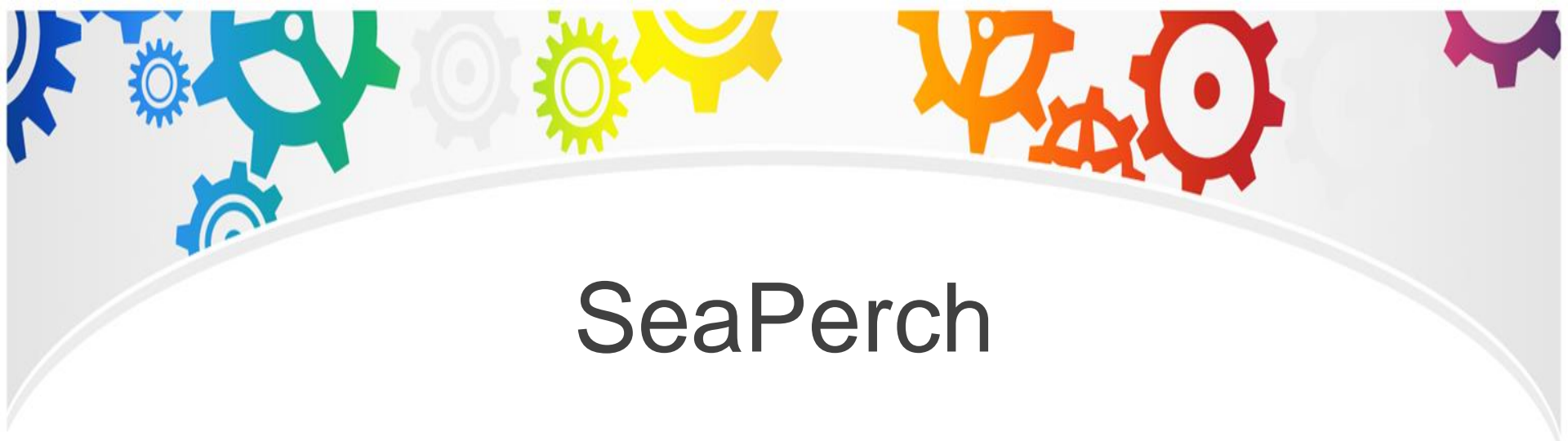
After Event

- Overwhelmingly positive response from teachers, parents, and students
- Touch point for students
- Photos and footage to be used recruitment

Commercials







SeaPerch

It all begins with the site...
And a grant!



SeaPerch

Assemble the basic frame



SeaPerch

Mounting the motors



SeaPerch

Sealing the motors



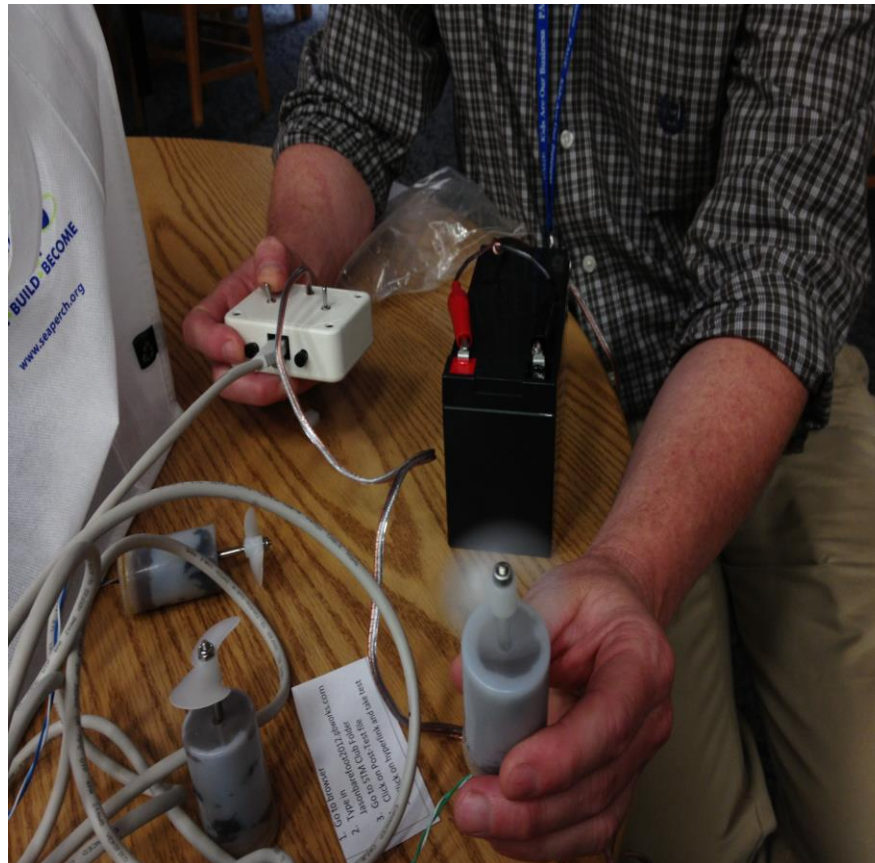
SeaPerch

Sealing the motors




SeaPerch

Trouble-shooting



SeaPerch Site





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Resources » Teacher Tools

Teacher Tools

Manuals & Instructions

[SeaPerch ROV Build Manual - 2011-02S](#) (PDF 3.3 MB)

[Resource and Activity Guide](#)

The Research and Activity Guide is a 118 page downloadable document that provides a framework of descriptions and activities to help groups understand the mission and opportunities of SeaPerch. This includes an overview of how to start a program, suggestions for managing a SeaPerch competition in your area, and career connections. In addition, there is a sampling of full science lessons with related standards available for teachers and mentors to use with their science enthusiasts!

Supporting Power Point documents:


- [PowerPoint 1: SeaPerch Overview and Design Challenge](#)
- [PowerPoint 2: SeaPerch Structural System](#)
- [PowerPoint 3: SeaPerch Electrical System](#)
- [PowerPoint 4: Core Technologies](#)


[Teachers Overview](#)

[SeaPerch Official Certificate of Participation](#) (PDF 625k)

[Bring SeaPerch To Your School*](#)


[SeaPerch Tri-fold Brochure](#) (PDF, 7 MB)

 [My SeaPerch Account](#)


 [TEACH](#)

 [BUILD](#)

 [BECOME](#)

 [Apply for a Grant](#)

 [Order Kits and Parts](#)

 [SeaPerch Event Calendar](#)

 [Add an Event](#)



SeaPerch Site

Labs & Lesson Plans*

[Biological Sampling Device Using a SeaPerch](#) (PDF 87.8 KB)

[Exploring Underwater Habitats and Environments](#)

[Hunt for Red October](#)

[Measurement of the Depth of the Ocean](#)

[Student-Designed Modification of SeaPerch](#)

How Everything Works

[PVC](#)

[Relays](#)

[Microcontrollers](#)

[Switches](#)

[Electric Motors](#)

How Everything Works - Advanced*

[Buoyancy](#)

[Electricity](#)

[Sensors](#)

SeaPerch Parts

[Full Parts Listing and Vendors](#)

Legacy build manuals (OLD ones)

[SeaPerch Construction Manual \(Standard Assembly\)](#) (101 pages, 3.42 MB)

[SeaPerch Short Build Manual](#) (21 pages, 649k)

The SeaPerch website is updated regularly. Please report any problems to info@seaperch.org.



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SeaPerch



SeaPerch

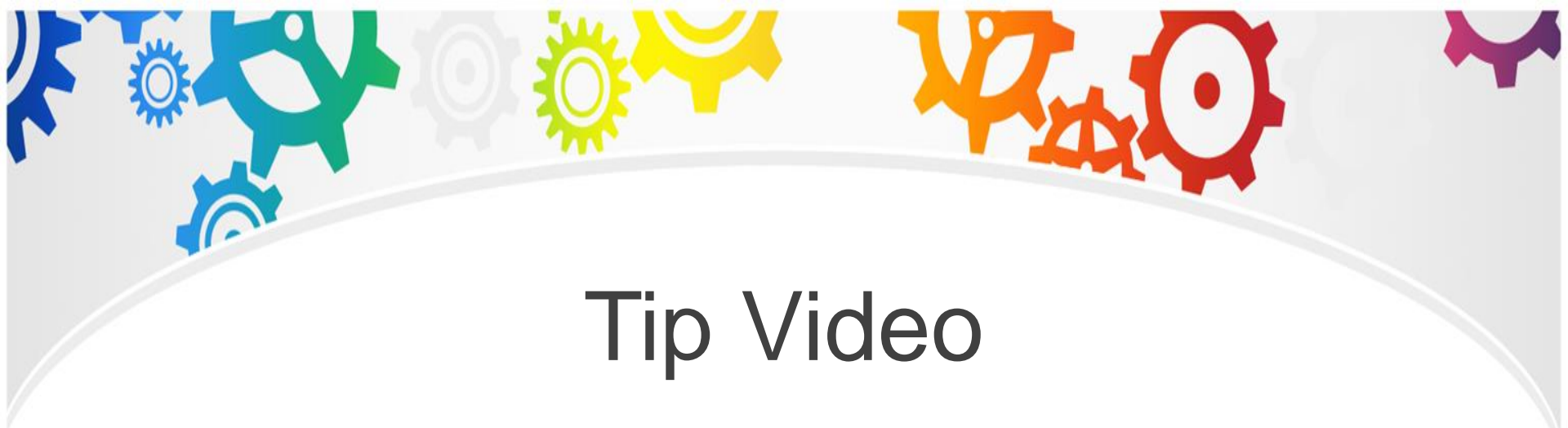




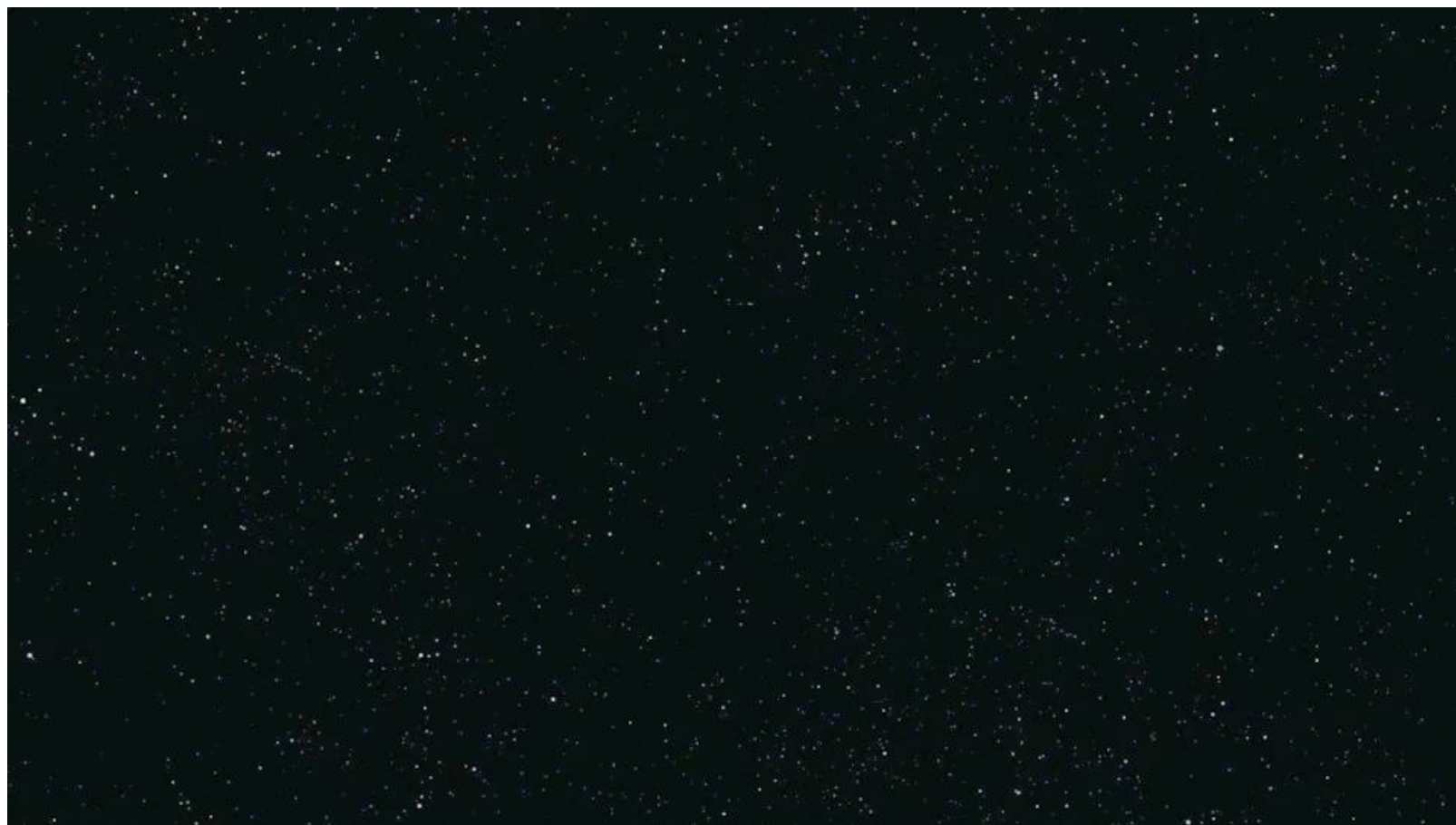


Sample Task

- Paper Rockets (adapted from Science Olympiad Elementary Handbook)
- Using a pencil, straw, one sheet of copy paper, and Scotch tape, you will design a paper rocket that will land on a given target some distance away from you.



Tip Video





Timer

10:00