

# KISLAND

## BRIDGE BUILDERS

### DESIGN CYCLE CHALLENGE WEEK

**An interdisciplinary, cross-grade level, MYP design cycle event . . .**

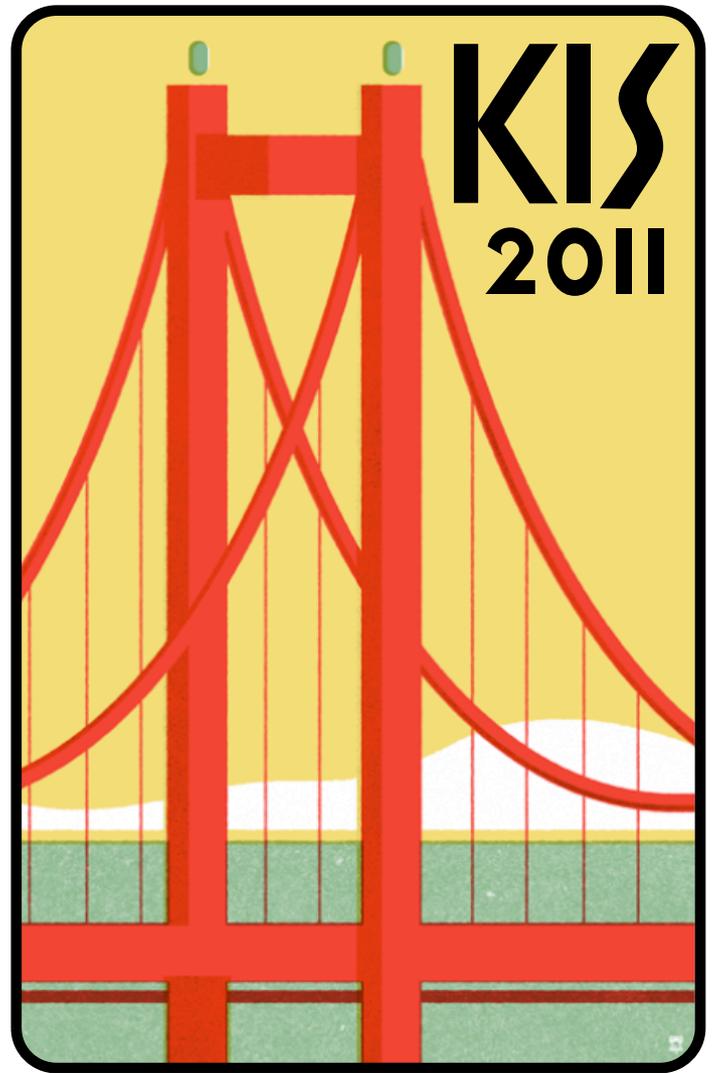
The KISLAND Ministry of Transportation and the Ministry of the Environment and Engineering put out a call for experts to come help build a strong, effective coast guard. It was by far a huge success and as a result, KISLAND continues to develop into a strong independent nation.

In the past year KISLAND's economy and population have grown quickly. Now a much larger infrastructure needs to be created to meet the needs. The first plan is to create bridges connecting the two islands of KISLAND. Now the Government is once again putting out a call for engineering experts to help the country in its mission to become a more developed nation.

- What are the different types of bridges?
- How can bridges reflect culture?
- How do bridge builders balance strength and design?



# DESIGN CYCLE CHALLENGE



	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
1st period	Auditorium	Bridge Breaking	Bridge Breaking	Bridge Breaking	Final Preparation
2nd period	Research and Marketing	Research and Marketing	Research and Marketing -or- Bridge Building	Research and Marketing -or- Bridge Building	
3rd period					Presentations
4th period	Bridge Building	Bridge Building	Research and Marketing -or- Bridge Building	Research and Marketing -or- Bridge Building	Presentations
5th period					
6th period	Poster Design	Research and Marketing	Research and Marketing	Research and Marketing	Reflection
7th period	Bridge Building	Bridge Building	Bridge Building	Bridge Building	Final Breaking



# RESEARCH & MARKETING

## AOI FOCUS: Human Ingenuity

How and why do we create?

Have you ever wondered why there are different types of bridges? Who came up with the designs and why?

Figuring out the answer to this question just may help you promote your own design!



### KISLAND Ministry of Transportation

The KISLAND Ministry of Transportation needs your help in connecting the islands of KISLAND. During the RESEARCH & MARKETING portion of the project you will research various bridges and their uses. This information will help you as you choose and create your own design, and market it.

**ATL's**  
- Collaboration  
- Information Literacy

QUESTION #1	QUESTION #2	QUESTION #3	QUESTION #4
What are the different types of bridges used throughout the world?	<b>What are the different purposes of bridges?</b> <ul style="list-style-type: none"> <li>- transportation?</li> <li>- social/economic development?</li> <li>- national pride?</li> <li>- etc.</li> </ul>	<b>Choose a famous bridge and complete a case study.</b>	<b>What is your sales pitch?</b>  How will your bridge help develop KISLAND?

# Research and Marketing Rubric

	1 / 2	3 / 4	5 / 6	TOTAL
<b>A KNOWLEDGE</b>	The group provided an insufficient / basic explanation of their bridge's social and economic impact. Use of bridge terminology was absent / limited or inaccurate.	The group provided an adequate explanation of their bridge's social and economic impact but could have been (much) more detailed. Use of bridge terminology was sufficient and accurate.	The group provided a detailed and thorough explanation of their bridge's social and economic impact. The group used a (wide) range of bridge terminology accurately.	
<b>B PRESENTATION SKILLS</b>	The presentation is not within the time limit. Clearly evident that rehearsal was not sufficient. There are many technical problems. The audience is bored.	The presentation is not within the time limit. Some evidence that rehearsal was not sufficient. There is one (or few) technical problem. The audience is entertained.	The presentation is one minute long, clearly well rehearsed . There are no technical problems evident. The audience are highly entertained and engaged.	
<b>C PERSUASION TECHNIQUES</b>	The group was not persuasive.	The group used persuasion techniques and some emotive language.	The group used highly effective persuasion techniques and emotive language.	
<b>D RESEARCH</b>	The students have chosen and used a <b>limited amount</b> of <b>relevant</b> information and resources, from a <b>limited number</b> of appropriate sources.	The students have chosen and used a <b>good</b> amount of relevant information and resources, from a <b>fairly extensive number</b> of appropriate sources.	The research contains <b>excellent</b> , relevant information and resources from a <b>wide variety</b> of appropriate web, print, and interview sources.	
<b>E COMMUNITY SPIRIT</b>	The group experienced many problems working together.	Not all members of the group contributed fairly. Not everyone had fun.	Each member of the group had a balanced contribution. Everyone had fun.	
<b>TOTAL:</b>				

# Getting Started . . .



## TEAM NAME

What are you going to call your team? Will it reflect your members, your design, your time period, or all three?

## To Think About . . .

*When collaboratively researching it's important to make sure you record all your information, and everyone knows what they're supposed to do.*

Who will do what in your group? Assign roles to each group member.

## TEAM LOGO

Sketch some team logo ideas.

## ROLES

# Question #1



**What are the different types of bridges used throughout the world?**

**What do you want/need to know???**

**Research**

**REFERENCES**

## Question #2



### What are the different purposes of bridges?

- transportation?
- social/economic development?
- national pride?
- etc

What do you want/need to know???

Research

REFERENCES

## Question #3

Research  
& Marketing

Choose a famous bridge and complete a case study.

Type of Bridge:

Length:

Year Built:

Cost:

Materials Used:

Purpose:

Influence on economic/social development (at least a paragraph):

REFERENCES

# Question #4



**What is your sales pitch?**  
How will your bridge help develop KISLAND?

**What do you want/need to know???**

**Research**

**REFERENCES**

# Option A: One-minute video.

\*\*\*Electronic Presentations to Mr. Brian by Thursday Period 5

**Audience:**

**Materials and Locations:**

**Other Notes:**

# ... Storyboarding

**Scene 1:** \_\_\_\_\_

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**Scene 2:** \_\_\_\_\_

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**Scene 3:** \_\_\_\_\_

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**Scene 4:** \_\_\_\_\_

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**Scene 5:** \_\_\_\_\_

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**Scene 6:** \_\_\_\_\_

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## Option B: One-minute skit.

## ... Scripting

### Setting

Where does your skit take place?

Audience:

Materials:

### Characters

Who is in your skit?

### Dialogue

# DESIGN & BUILD



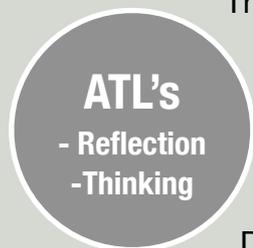
## AOI FOCUS: Environment

What resources do I have or need?

How can REDUCING the amount of materials used in construction be good for the environment AND for business?

Figuring out the answer to this question could help save money and the planet!

## KISLAND Ministry of the Environment and Engineering



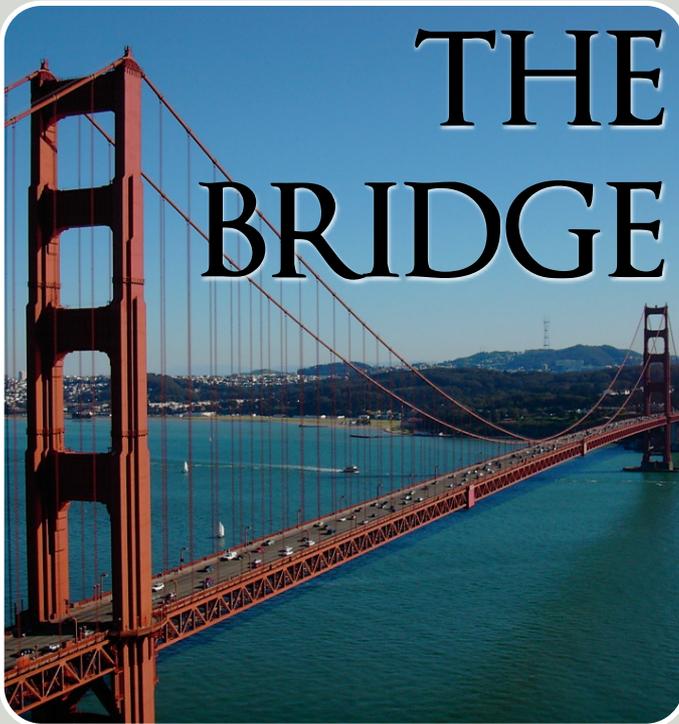
The KISLAND Guiding Environmental & Engineering Experts of KISLAND (GEEK's) will help guide you as you implement the Design Cycle to create an

environmentally friendly bridge for the KISLAND Ministry of Transportation. All bridges in KISLAND must meet the criteria set forth by the Ministry of the Environment and Engineering.

All elements of the Design Cycle are critical as you seek to come up with the best possible design for your bridge, particularly good Reflection skills!



QUESTION A	QUESTION B	QUESTION C	QUESTION D
What are the different types of bridges?	What shapes are the strongest in bridges?	How do you calculate the efficiency of your bridge?	What about your design will provide strength, without making the bridge too heavy?



Your final standing in the Bridge Building competition will be based on your bridge's EFFICIENCY RATING! Your final bridge efficiency will earn you points, but those points can be increased by your GEEEK REFLECTION rating. The better your reflection, the higher your final score. Holding the most weight does not guarantee you will win. you with their final score!

**EFFICIENCY RATING**

$$\frac{\text{Load Weight (kg)} \times}{\text{Bridge Weight}}$$

REDUCING MATERIALS BONUS	
BRIDGE WEIGHT	BONUS TO LOAD
≥ 150 grams	+ 15 kg
151 - 200 grams	+ 10 kg
201 - 250 grams	+ 5 kg
251 - 300 grams	No Bonus

**REFLECTION BONUS**

INDICATOR	MARK	BONUS
<ul style="list-style-type: none"> <li>- Calculates EFFICIENCIES <b>correctly</b> with proper work.</li> <li>- <b>Clearly</b> discusses a PLAN to achieve Target Efficiency.</li> <li>- <b>Clearly</b> discusses WEAKNESSES and how to improve design.</li> </ul>	7	+ 30 kg
<ul style="list-style-type: none"> <li>- Calculates EFFICIENCIES <b>correctly</b> with proper work.</li> <li>- <b>Clearly</b> discusses a PLAN to achieve Target Efficiency.</li> <li>- <b>Discusses</b> WEAKNESSES and how to improve design.</li> </ul>	6	+ 15 kg
<ul style="list-style-type: none"> <li>- Calculates EFFICIENCIES <b>correctly</b> with proper work.</li> <li>- <b>Discusses</b> a PLAN to achieve Target Efficiency.</li> <li>- <b>Discusses</b> WEAKNESSES and how to improve design.</li> </ul>	5	+ 5 kg
<ul style="list-style-type: none"> <li>- Calculates EFFICIENCIES, <b>with</b> minor errors or missing some work.</li> <li>- <b>Discusses</b> a PLAN to achieve Target Efficiency.</li> <li>- <b>Discusses</b> WEAKNESSES and how to improve design.</li> </ul>	4	No Bonus
<ul style="list-style-type: none"> <li>- Calculates EFFICIENCIES, <b>with</b> minor errors or missing some work.</li> <li>- PLAN to achieve Target Efficiency, <b>unrealistic</b>.</li> <li>- <b>Mentions</b> WEAKNESSES, or improvement to design, is <b>unrealistic</b>.</li> </ul>	3	- 10 kg
<ul style="list-style-type: none"> <li>- Calculates EFFICIENCIES, <b>with</b> major errors or no work.</li> <li>- PLAN to achieve Target Efficiency, <b>unrealistic</b>.</li> <li>- <b>NO</b> WEAKNESSES discussed.</li> </ul>	2	- 30 kg
<ul style="list-style-type: none"> <li>- <b>NO</b> Calculations for EFFICIENCIES, or</li> <li>- <b>NO</b> PLAN to achieve Target Efficiency, or</li> <li>- <b>NO</b> WEAKNESSES discussed.</li> </ul>	1	- 60 kg



ATL's

- Following  
Instructions!

# THE RULES

## 1. Materials

- a. Use Popsicle sticks provided by KIS Using other Popsicle sticks will result in disqualification.
- b. Sticks may be physically altered in any way, including:
  - i. Cut / notched at any angle.
  - ii. Sanded to any width.
  - iii. Bent or curved (sticks may be soaked in water to curve).
- c. Sticks may NOT be altered in the following ways:
  - i. Soaked in any material besides water.
  - ii. Painted or coated with any material.
- d. ONLY water soluble white TOA glue can be used.

## 2. Overall Dimensions

- a. The bridge may NOT extend below the end supports.
- b. The total bridge width must be 12cm or less (length of one popsicle stick).
- c. The bridge length must be greater than or equal to 50cm.

## 3. Weight:

- a. The bridge must weigh 300 grams or less.

## 4. Roadway

- a. A MatchBox car must be able to pass the entire length of the bridge.
- b. The roadway must be continuous with no gaps (natural warping okay).

5. Loading: The bridges will be loaded to ultimate capacity during the competition.

### **Bridges will break.**

- a. A 15cm x 6cm metal plate will apply a vertical load at the center of the bridge.
- b. The load must be applied directly to the roadway.
- c. Make sure that there is a clear space at the center of the bridge for the metal plate.

## 6. Supports

- a. Supports will be provided for the bridge to sit on.
- b. The supports will be placed 50cm apart.
- c. The bridge may not exert any horizontal loads on the supports, other than friction.

## 7. Construction

- a. At least one entire side of the longest dimension (typically the edge or face) of each Popsicle stick used must be visible for judging.
- b. Voids or enclosed areas where sticks could be hidden are not allowed.

### **Question A**

**What are the different types of bridges?**

### **Question B**

**What shapes are the strongest in bridges?**

**When your questions are answered, check with a KISLAND GEEK for permission to start planning.**

### **Question C**

**How do you calculate the efficiency of your bridge?**

### **Question D**

**What about your design will provide strength, without making the bridge too heavy?**

**When your questions are answered, check with a KISLAND GEEK for permission to start planning.**

# ... Sketch your design

## To Think About ...

*Don't try to build the bridge all at once!*

What are the different parts of your design?

How will you make each part?

How will you attach the parts together?

Design  
Cycle  
1

**CURRENT Efficiency:**

**TARGET Efficiency:**

**REFLECTION**

# ... Sketch your design

## To Think About ...

*Certain shapes are better for bridges than others.  
What shapes will you include in your bridge?*

What part of your bridge broke?

**Design  
Cycle  
2**

**CURRENT Efficiency:**

**TARGET Efficiency:**

**REFLECTION**

# ... Sketch your design

## To Think About ...

*Don't forget to think about the environmental impact of your bridge, REDUCE your weight bonuses!*

How can you make your design more efficient?

Design  
Cycle  
3

**CURRENT Efficiency:**

**TARGET Efficiency:**

**REFLECTION**

## ... Sketch your design

### To Think About ...

*Great inventions and designs often take many more than four design cycles.*

*Keep up the good creativity and hard work!*

**Design  
Cycle  
4**

**CURRENT Efficiency:**

**TARGET Efficiency:**

**REFLECTION**

# KISLAND



## BRIDGE BUILDERS

### DESIGN CYCLE CHALLENGE WEEK

An interdisciplinary, cross-grade level, MYP design cycle event . . .

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