light, photons, & beyond

4th annual STARS Summer Science Camp

June 5 - 23, 2006

USF STARS: an NSF GK-12 Program

Olympiad: Project Solar Ray

June 23, 2006

Crew Name: _____

NSF

Hillsborough County Public Schools
Excellence in Education

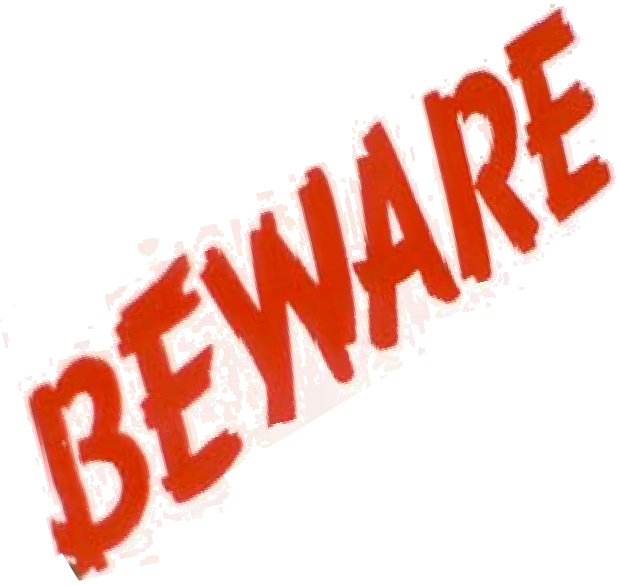
USF University of South Florida

The Project

Your project, should you choose to accept it, is to construct a solar ray that harnesses the sun's energy. The solar ray must reflect and focus the sun's energy onto a specific target area and heat it up. A successful project must have:

- A proper design
- A solar ray built to the design
- The highest possible temperature for their target
- The lowest budget

You will bring the Project Notebook to the Engineers and Scientists at Project Control to determine your project's success. Be prepared to use all of the skills that you learned during your three week training.



This mission may be difficult and dangerous…be safe, be careful.

Good luck,

From all of us at Project Control

Project Solar Ray Crew Roles

Name	**Project Manager:** Mature, reliable individual that makes sure everyone is on task and doing their job.
Name	**Quality Engineer**: Works with project manager to determine the best construction design. Makes sure that the design and the build match.
Up to 2 Names	**Accountant**: Must be good at math. Will be responsible for maintaining the budget.
Up to 4 Names	**Construction:** Builds the ray based on drafter design
Name	**Drafter**: Must be a skilled artist. Draws the designs for the solar ray. Must list the materials needed
Name	**Public Relations**: Must have good communication skills, will present the design and build to the Project Control Engineers
Name	**Buyer:** Works with accountant to buy the materials listed on the design plans. Must be swift and understand the project design.
Name	**Time Keeper**: This is one of the most important jobs. Works with Project Manager to make sure the crew is on track with time.

Project Solar Ray Crew Contract

Before your crew can accept this project, you must agree to the following. Failure to follow the rules in this contract will result in IMMEDIATE DISQUALIFICATION.

1. Everyone must wear eye protection at all times.
2. Do not reflect your mirror into anyone's face or body.
3. Do not look directly at mirrors or sun.
4. Do not touch the surface of the mirrors or the test target. IT WILL BE HOT.
5. If anything happens to break, call the nearest adult for help.
6. NO fighting or horse-playing. This is a serious scientific experiment and everyone must remain calm and alert.
7. Only focus mirror on target surface.
8. Do not put anything in the path of the mirrors and target surface.
9. As a crew you must pledge to:

   I, a member of the_____ crew, pledge to the success of my crew's project. I promise to help my crewmembers with the project; I promise to be a team player; and I promise to uphold the procedures set forth in this contract.

CREW SIGNATURES **CREW NAME** _____

FOR SALE

Supplies Store: Below are the items available for sale at the supplies store. If you want to return an unused item you will be charged a fee which is half the cost of the item returned.

Mirrors: Each mirror is 12 inches by 12 inches. Cannot buy more than 12 mirrors.
Cost: $ 100 each

Tinker Toys:
First set of tinker toys **Cost: $ 200**
Each extra piece **Cost: $ 30**

Heat Gun Use:
Heat gun must be used to test your target temperature. Each use **Cost: $ 100 each**

Target Surfaces: Choose from Wood, Granite, Plexiglass, Copper, Cardboard
Each Cost: $75

Proposal Approval:
Each design must be approved before construction can begin. You must get an initial (before construction begins) and a final approval. **Cost: $50**

Duct Tape:
Sold by the foot.
Each foot costs $ 5

String:
Sold by the foot.
Each foot costs $ 5

Spray Paint:
The test surfaces may be painted.
Each paint costs $ 50

CREW NAME _____

BUDGET SHEET

You have:	**$1,550**
List all expenses for your design:	
Expense 1.)	$
Expense 2.)	$
Expense 3.)	$
Expense 4.)	$
Expense 5.)	$
Expense 6.)	$
Expense 7.)	$
Expense 8.)	$
Expense 9.)	$
Expense 10.)	$
Expense 11.)	$
Expense 12.)	$
Expense 13.)	$
Expense 14.)	$
Expense 15.)	+$
Add total cost of expenses:	**$**
Subtract cost of expenses from $1,550:	**--$1,550**
This is your amount left over:	$
List all additional expenses:	
Additional 1.)	$
Additional 2.)	$
Additional 3.)	$
Additional 4.)	+$
Add total cost of additional expenses:	**$**
Subtract from your amount left over: This is your final amount in the bank.	**$**

CREW NAME _____

ORDER FORM

Items	Quantity number of items	Price price per item	Subtotal quantity x price
Mirrors			
Tinker Toys (first set)			
Extra Tinker Toy Pieces			
Target Surfaces:			
Wood			
Granite			
Plexiglass			
Copper			
Cardboard			
Spray Paint			
Duct Tape (feet)			
String (feet)			
Heat Gun Tests (ticket(s))			
		TOTAL	

Receipt Signatures

Buyer
Accountant
Shop Keeper

DESIGN PAGE

Initial Approval:_____

Final Approval:_____

Draft Number: _____

CREW NAME _____

Describe the design:

CREW NAME _____

PUBLIC RELATIONS PRESENTATION

For final approval your crew needs to have the following completed:
The budget sheet, the final draft of the design (with approval), and a completed solar ray construction.

Record Target Temperature Reading → [ ]

Record Money left over _____
For every $10 left over, your crew gets 1° added to the temperature reading.

Record additional degrees added → [ ]

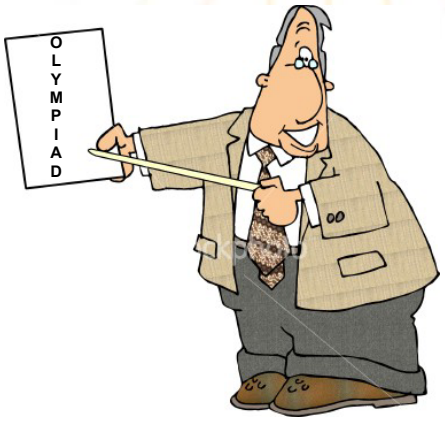
Grand Total for Temperature → [ ]

Did your solar ray work? Yes, why? No, why not?	What was the most important factor in your design?

CREW NAME _____

PUBLIC RELATIONS PRESENTATION

How could your crew have designed the solar ray better? What improvements would your crew add?



What target surface did you use? Could you have chosen a better surface to get a higher temperature? Why or why not?

What surface color did you have? Could that have affected the temperature? Why or why not?

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STARS

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