Crazy Contraption
Design Portfolio

Group Name: _____ Date: _____

Group Members: _____ Set: _____

_____

_____

The Checklist:

Your portfolio will consist of the following pages:

- ☐ 1. This page, or a cover page followed by this page
- ☐ 2. Problem Statement & Design Brief
- ☐ 3. Investigation & Research
- ☐ 4. Connecting Contraptions -required only if contraptions are connected
- ☐ 5. Alternative Solutions (2 pages)
- ☐ 6. Choose The Best Solution
- ☐ 7. Final Solution
- ☐ 8. Mechanical Advantage
- ☐ 9. Final Evaluation
- ☐ 10. Concluding paragraph(s) outlining how you followed the engineering design process to create your crazy contraption. Type/write this on your paper.

(Each student in the group must write their own concluding paragraph.)

Other Portfolio Requirements:

_____

_____

Crazy Contraptions **Problem Statement & Design Brief**

Problem Statement

Design and build a machine that performs a simple task through an extremely complex process.

☐ Option 1: Contraptions will function independent of each other.

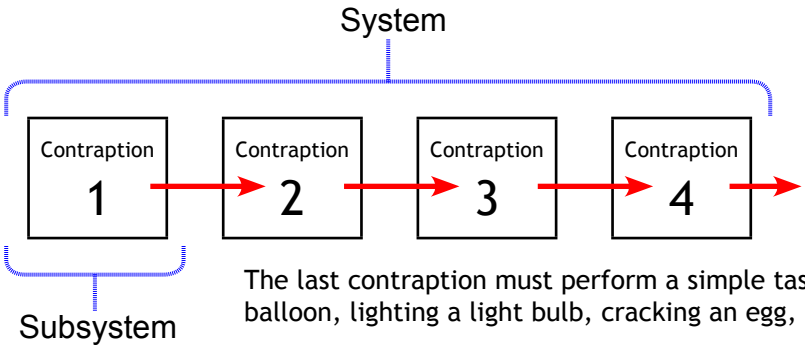
Contraption 1	Contraption 2	Contraption 3	Contraption 4	Contraption 5

Dont stop at 5. Create as many contraptions as you can.

• • •

Each contraption must perform a simple task such as popping a balloon, lighting a light bulb, cracking an egg, raising a flag...

☐ Option 2: Contraptions will be connected in series. The first contraption triggers the second, which triggers the third and so forth until the last contraption is reached. The last contraption must perform a simple task.



Dont stop at 5. Create as many contraptions as you can.

The last contraption must perform a simple task such as popping a balloon, lighting a light bulb, cracking an egg, raising a flag...

Design Brief

The contraption must:

1. transfer energy through a series of mechanisms. Each mechanism will link with the next mechanism to transfer energy from start to finish.
2. operate completely on its own, once started.
3. fit into the area directly above its 12” x 12” base, other than any components designated to trigger another contraption. There is no limit to the height of your subsystem, but is must be free-standing.
4. be constructed from the parts specified on page 2, or other teacher approved materials (from the classroom or home).
5. use 4 or more simple machines (the more simple machines, the better).
6. take more than 4 seconds to transfer energy through its system.
7. not involve any living creatures (other than a person to start it).
8. be safe (it may not contain potentially hazardous items or operate in a hazardous way).
9. not destroy other contraptions.

Crazy Contraptions **Investigation & Research**

Below, place pictures of the Rube Goldberg style machines you like the best. Write notes around the pictures pointing out the features and concepts you may be able to use on your Crazy Contraption.

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Connecting Contraptions

Complete this sheet if your contraption will be linked to other contraptions (Option #2).

Meet with the groups that will have contraptions connecting to yours. Figure out how energy will be transferred between contraptions. Draw and describe how energy will be transferred below. You must have the signature from a representative of any connecting contraption agreeing/approving to the energy transfer method shown.

Previous Contraption or **Initial Trigger** (if you are the 1st contraption)	**Your Contraption**	**Next Contraption** or **Final Task** (if you are the last contraption)
Group Name (of the previous contraption):	Draw how and where energy will be transferred between contraptions.	Group Name (of the next contraption):

Energy Transfer Into Your Contraption →

Representatives agreeing to the above method of energy transfer between contraptions:

Representative for Previous Contraption:

_____

Representative for Your Group:

_____

Energy Transfer Out of Your Contraption →

Representatives agreeing to the above method of energy transfer between contraptions:

Representative for Next Contraption:

_____

Representative for Your Group:

_____

Crazy Contraptions **Alternative Solution #1**

Step / Mechanism #1	Step / Mechanism #2	Step / Mechanism #3	Step / Mechanism #4
Step / Mechanism #5	Step / Mechanism #6	Step / Mechanism #7	Step / Mechanism #8

Energy Transfer

Need space for more steps? Use another sheet.

Crazy Contraptions **Alternative Solution #2**

Step / Mechanism #1	Step / Mechanism #2	Step / Mechanism #3	Step / Mechanism #4
Step / Mechanism #5	Step / Mechanism #6	Step / Mechanism #7	Step / Mechanism #8

Energy Transfer

Need space for more steps? Use another sheet.

Choose The Best Solution

1. Complete the table below to create the criteria to evaluate your alternative solutions. Note: Refer to the design brief and evaluation criteria, but don't copy it word-for-word. The first row has been started for you.
2. Score your alternative solutions based upon the criteria you created.

Criteria:	Description:	Alternative Solution #1	Alternative Solution #2
Creativity	• The machine's steps should be innovative • Materials/Components should be used in unique ways	/20	/20
		/20	/20
		/20	/20
		/20	/20
		/20	/20
Total Points:		/100	/100

The Best Solution: _____

(This is the design you will build.)

Crazy Contraption **Final Solution**

Step / Mechanism #1	Step / Mechanism #2	Step / Mechanism #3	Step / Mechanism #4
Step / Mechanism #5	Step / Mechanism #6	Step / Mechanism #7	Step / Mechanism #8

Energy Transfer

Need space for more steps? Use another sheet.

Crazy Contraption **Mechanical Advantage**

Calculate the mechanical advantage for two different mechanisms on your Crazy Contraption. Draw a diagram of the mechanisms you are calculating. Detail the diagram with any information used to calculate mechanical advantage (dimensions, teeth, etc.).

Mechanism: _____

In Step #:_____
Draw the mechanism and show the math used to calculate mechanical advantage.

Mechanical Advantage: _____

Mechanism: _____

In Step #:_____
Draw the mechanism and show the math used to calculate mechanical advantage.

Mechanical Advantage: _____

Crazy Contraption Evaluation

Group Name: _____ Date: _____ Set: _____

Group Members: _____

Criteria:	Description:	Student	Teacher
Design Brief	• The machine should fit the design brief	/15	/15
Function	• The machine should complete its task with no human intervention • The machine should be reliable	/15	/15
Creativity	• The machine's steps should be innovative • Materials/Components should be used in unique ways	/15	/15
Complexity	• Your machine should have at least 4 steps using at least 4 different simple machines • Five points will be awarded for each step after 4 steps • All steps should be unique from each other and of reasonable complexity	/15 Extra Points	/15 Extra Points
Participation & Teamwork	• Team members must actively participate throughout the activity	/15	/15
Mechanical Advantage	• Mechanical advantage should be calculated for at least 2 of the simple machines in the contraption	/10	/15
Portfolio	• Create a portfolio on your contraption containing the following: • Investigation & Research • Alternative Designs • Final Design • Mechanical Advantage / Lever Classification • Process (how you followed the engineering design process)	/15	/15

Total Points:	/100+	/100+