

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.

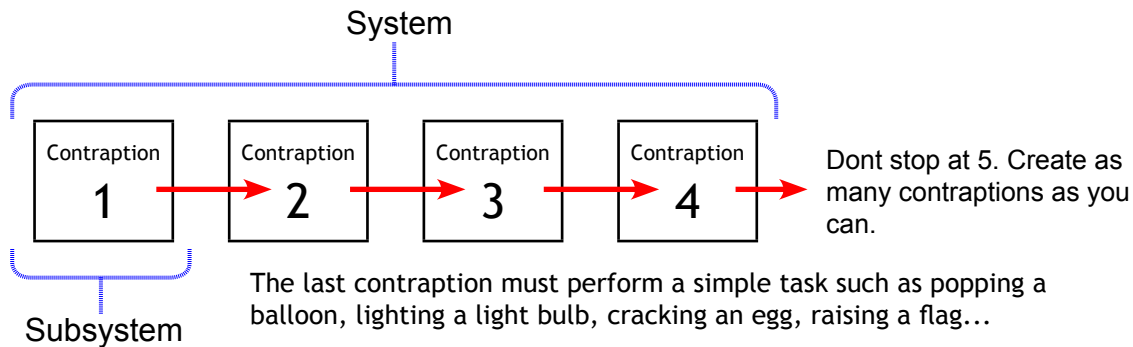


Don't stop at 5. Create as many contraptions as you can.



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.



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 it 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.
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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 of 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)
<p>Group Name (of the previous contraption):</p>	<p>Group Name (of the next contraption):</p>	
<p style="text-align: center;">Energy Transfer Into Your Contraption →</p>	<p style="text-align: center;">Draw how and where energy will be transferred between contraptions.</p> <div style="text-align: center;"> </div>	<p style="text-align: center;">Energy Transfer Out of Your Contraption →</p>
<div style="border: 1px solid black; border-radius: 15px; padding: 10px;"> <p>Representatives agreeing to the above method of energy transfer between contraptions:</p> <p>Representative for Previous Contraption: _____</p> <p>Representative for Your Group: _____</p> </div>		<div style="border: 1px solid black; border-radius: 15px; padding: 10px;"> <p>Representatives agreeing to the above method of energy transfer between contraptions:</p> <p>Representative for Next Contraption: _____</p> <p>Representative for Your Group: _____</p> </div>

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

Energy Transfer

Energy Transfer

Energy Transfer

Energy Transfer

Energy Transfer

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

Energy Transfer

Energy Transfer

Energy Transfer

Energy Transfer

Energy Transfer

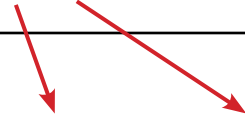
Energy Transfer

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.

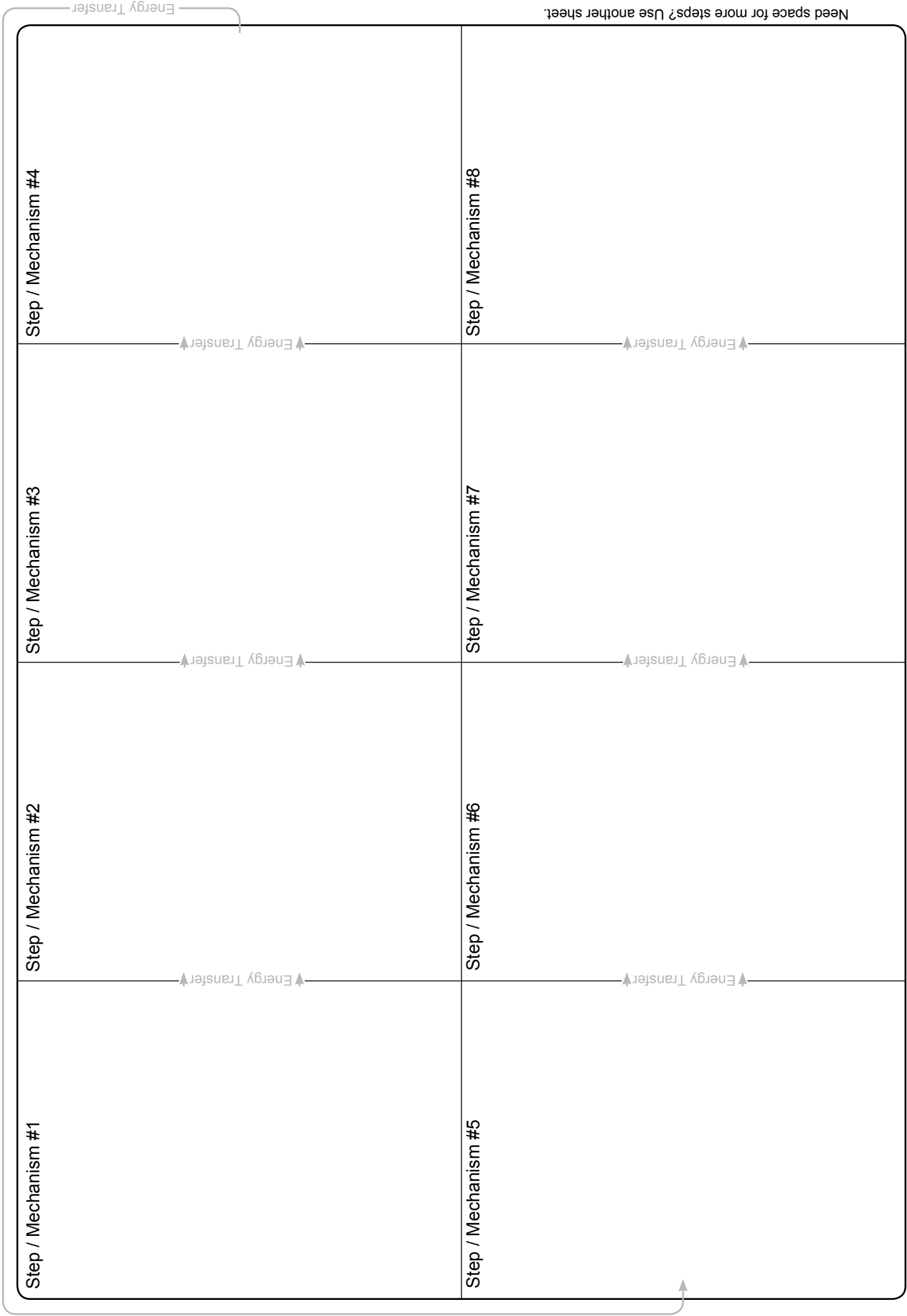


Criteria:	Description:	Alternative Solution #1	Alternative Solution #2
Creativity	<ul style="list-style-type: none"> The machine's steps should be innovative Materials/Components should be used in unique ways 	/20	/20
		/20	/20
		/20	/20
		/20	/20
		/20	/20
Total Points:		/100	/100

The Best Solution: _____

(This is the design you will build.)

CRAZY CONTRAPTION FINAL SOLUTION



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.

Mechanism: _____

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

Mechanical Advantage: _____

Mechanical Advantage: _____

CRAZY CONTRAPTION EVALUATION

Group Name: _____ Date: _____ Set: _____

Group Members: _____

Criteria:	Description:	Student	Teacher
Design Brief	<ul style="list-style-type: none"> The machine should fit the design brief 	/15	/15
Function	<ul style="list-style-type: none"> The machine should complete its task with no human intervention The machine should be reliable 	/15	/15
Creativity	<ul style="list-style-type: none"> The machine's steps should be innovative Materials/Components should be used in unique ways 	/15	/15
Complexity	<ul style="list-style-type: none"> 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	/15
		Extra Points	Extra Points
Participation & Teamwork	<ul style="list-style-type: none"> Team members must actively participate throughout the activity 	/15	/15
Mechanical Advantage	<ul style="list-style-type: none"> Mechanical advantage should be calculated for at least 2 of the simple machines in the contraption 	/10	/15
Portfolio	<ul style="list-style-type: none"> Create a portfolio on your contraption containing the following: <ul style="list-style-type: none"> Investigation & Research Alternative Designs Final Design Mechanical Advantage / Lever Classification Process (how you followed the engineering design process) 	/15	/15

Total Points:

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 /100+ /100+