

**ENGINEERING DESIGN PROCESS –
DESIGN CHALLENGE: MOUNTAIN RESCUE LITTER**



<u>Step 1: Define the Problem</u>	<i>Write your answers in the blocks.</i>
What is the Problem?	
What are the Requirements?	<ol style="list-style-type: none"> 1. use only the materials available 2. spend only the money we have 3. everyone in my group has to be involved
What are the Constraints?	<ol style="list-style-type: none"> 1. we have to be able to build it “on site” 2. it has to be _____ 3. it has to be _____

Checked by teacher or Wizard.	
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<u>Step 2: Plan Solutions</u>	<i>Write your answers in the blocks.</i>
List 3 design ideas your group came up with while Brainstorming.	<ol style="list-style-type: none"> 1. 2. 3.
Choose the best/your favorite idea. You may not agree with your group yet.	My favorite idea:

List a positive about your favorite idea.	List a negative about your favorite idea.

Based on the information, decide as a group which option is most likely to be successful. Which one did your team choose? What factor was the most important in helping you decide?

Continue Planning—

In the space to the right, draw your rescue litter design, labeling the materials you will use.

When finished, show your design to your teacher for review and approval.

Materials available: paper towels, pop-sicle sticks, straws, sponges, aluminum foil square, pipe cleaner, toothpicks

How much will it cost to build your prototype?

Material	Unit size	Cost per unit	Quantity purchased	Total Cost
Toothpick	1	\$1.00		
Paper towel	1	\$2.00		
Popsicle stick	2	\$2.00		
Straw	2	\$1.00		
Sponge	1	\$3.00		
Aluminum foil square	1	\$3.00		
Pipe cleaner	1	\$2.00		

TOTAL DESIGN COST (maximum of \$20.00): _____

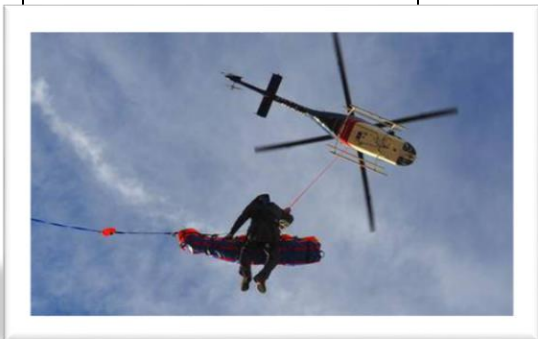
Checked by teacher or Wizard. _____



<p><i>Step 3: Build your Prototype!</i></p>	<p><i>Write your answers in the blocks.</i></p>
<p>Follow your plan.</p>	<p>Write any problems you have. Write about any changes you make to your design and why.</p>

Will your design satisfy the discussed constraints?
 (lightweight, stable, portable, easy to assemble, strong,
 within budget, fits in the bag)

<p><i>Step 4: Test and Evaluate</i></p>	<p><i>Write your answers in the blocks.</i></p>
<p>Test it out.</p>	<p>How did it work?</p>



As groups demonstrate their rescue litter design, fill in the table below.

Group/Team	Mass of Litter	Cost of Litter	Time to Rescue	Stability (circle answer)		
				stable	kind of stable	unstable
				stable	kind of stable	unstable
				stable	kind of stable	unstable
				stable	kind of stable	unstable
				stable	kind of stable	unstable
				stable	kind of stable	unstable
				stable	kind of stable	unstable

Step 5: Reflect, Redesign and Improve	<i>Write your answers in the blocks.</i>
Did your design meet the Requirements?	Did you meet all of the requirements listed in Step 1? If not, which ones did you not meet and why?
Did your design meet the Constraints?	Did you meet all of the constraints you listed in Step 1? If not, which ones did you not meet and why?
Improve your Design.	How would you improve your design based on your own group's testing and based on the observations of other groups' designs after testing?



Step 6: Communicate and Share the Solution	
Discuss with your team, and share with the class.	What was special/different about your design? What were your successes? What were your failures? What would you do differently?

activity adapted from: https://www.teachengineering.org/activities/view/cub_human_lesson06_activity3

graphics credited to: <https://www.amazon.com/CMC-Rescue-726305-DISASTER-RESPONSE/dp/B01LXUP9UT>; <https://m.citizensvoice.com/news/rescue-workers-pull-two-from-scranton-s-nay-aug-gorge-1.2063091>; <https://www.airmedandrescue.com/latest/long-read/helicopter-rescue-equipment>; <https://firerescuemagazine.firefighternation.com/2012/07/25/ladder-rescue-system-types-tactics/#gref>