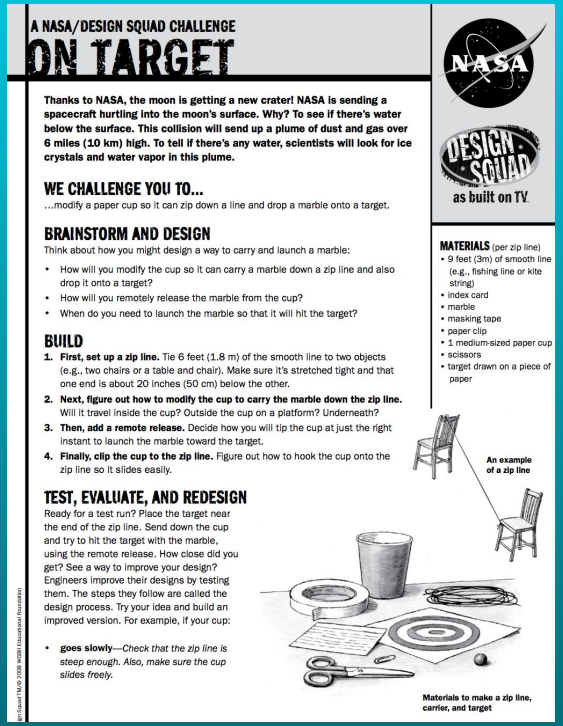
On Target

SLED Process = Science Learning through Engineering Design

- Design Brief
- Identification
- Individual Design
- Team Design Brainstorm
- Team Design
- Construction
- Testing & Data Collection
- Reflection
- Redesign



A NASA/DESIGN SQUAD CHALLENGE

ON TARGET

as built on TV

Thanks to NASA, the moon is getting a new crater! NASA is sending a spacecraft hurtling into the moon's surface. Why? To see if there's water below the surface. This collision will send up a plume of dust and gas over 6 miles (10 km) high. To tell if there's any water, scientists will look for ice crystals and water vapor in this plume.

WE CHALLENGE YOU TO...

...modify a paper cup so it can zip down a line and drop a marble onto a target.

BRAINSTORM AND DESIGN

Think about how you might design a way to carry and launch a marble:

- How will you modify the cup so it can carry a marble down a zip line and also drop it onto a target?
- How will you remotely release the marble from the cup?
- When do you need to launch the marble so that it will hit the target?

BUILD

1. **First, set up a zip line.** Tie 6 feet (1.8 m) of the smooth line to two objects (e.g., two chairs or a table and chair). Make sure it's stretched tight and that one end is about 20 inches (50 cm) below the other.
2. **Next, figure out how to modify the cup to carry the marble down the zip line.** Will it travel inside the cup? Outside the cup on a platform? Underneath?
3. **Then, add a remote release.** Decide how you will tip the cup at just the right instant to launch the marble toward the target.
4. **Finally, clip the cup to the zip line.** Figure out how to hook the cup onto the zip line so it slides easily.

TEST, EVALUATE, AND REDESIGN

Ready for a test run? Place the target near the end of the zip line. Send down the cup and try to hit the target with the marble, using the remote release. How close did you get? See a way to improve your design? Engineers improve their designs by testing them. The steps they follow are called the design process. Try your idea and build an improved version. For example, if your cup:

- **goes slowly**—*Check that the zip line is steep enough. Also, make sure the cup slides freely.*

MATERIALS (per zip line)

- 9 feet (3m) of smooth line (e.g., fishing line or kite string)
- index card
- marble
- masking tape
- paper clip
- 1 medium-sized paper cup
- scissors
- target drawn on a piece of paper

An example of a zip line

Materials to make a zip line, carrier, and target

Design Brief

It is the first annual WIS Hunger Games. The tribute representatives from your districts are fighting to survive the last week of school. Money and supplies are limited, so you'll have to be creative with what is available. Your tributes will have to successfully complete many challenges in order to be crowned the winners. As mentors, you are able to send gifts to the tributes in the games.

Unfortunately, President Patchett has destroyed the delivery system that was previously used. It is up to you to quickly design a gift delivery system that can provide your tributes with necessary provisions. Your system must be precise and accurate in order to deliver to the correct tribute and not give an advantage to the competitors. Your system must use the zip line and have some type of release mechanism to drop the gift. Be sure to camouflage your delivery system in order to prevent it from being discovered. Points will be awarded throughout as you meet checkpoints.

May the odds be ever in your favor.

On Target Gift Delivery System ~ Swain

Name	Gift Type	Number of Items	Mass	Distance from target
District 1 Capitol Parachute	Ping pong ball	3	11.4	51cm
District 2 Mail time	dice	5	10.4	60cm
District 3 Transportation Teapot	marble	5	22.8	135cm
District 4 Impact	dice	4	13.0	50cm
District 5 Delivery System 3000	dice	4	18.9	48cm
District 6 Banana phone	dice	6	18.1	36cm

Identification (SEPS.1, 6-8.E.1)

- Problem: _____
- Goal: _____
- Client: _____
- End – user: _____
- Design criteria: _____ _____ _____ _____ _____ _____
- Constraints: _____ _____ _____ _____ _____ _____

Design Squad Challenge Sheet

Team Design Brainstorm Requirement
(6-8.E.2)

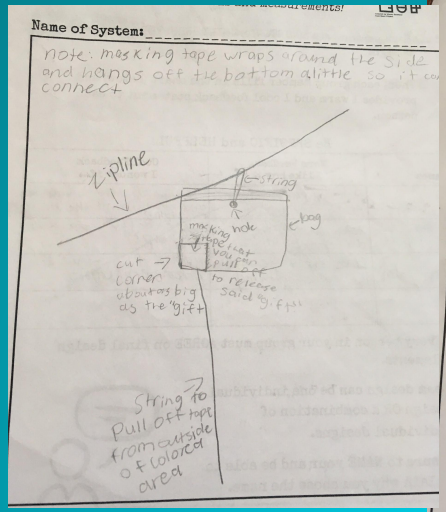
- ❑ Each person gets 30 SECONDS UNINTERRUPTED to share their design.
- ❑ Then, each group member fills in the chart (below) and provides 1 warm and 1 cool feedback statement to each person.

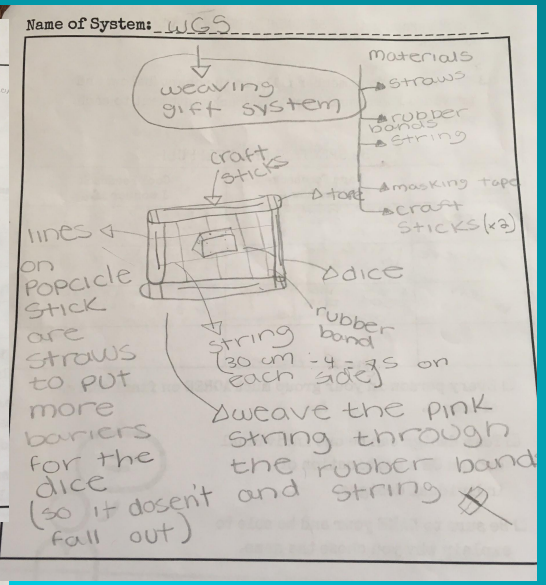
Be SPECIFIC and HELPFUL!

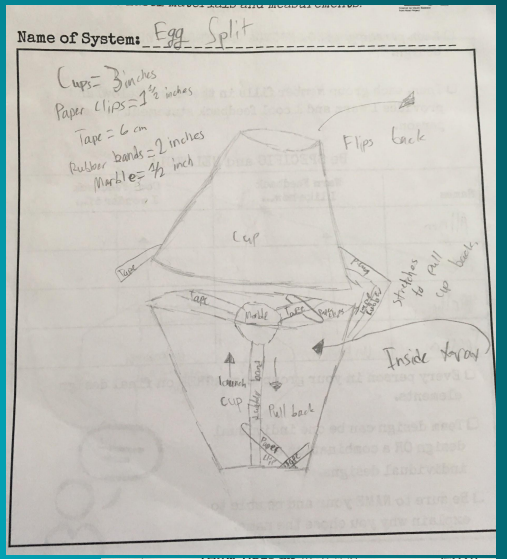
Names	Warm Feedback I like how...	Cool Feedback I wonder if...

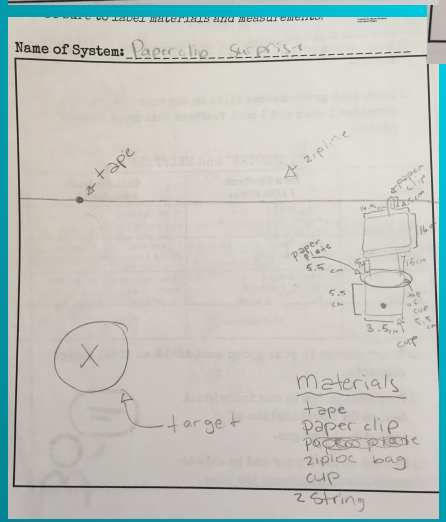
- ❑ Every person in your group must AGREE on final design elements.
- ❑ Team design can be one individual design OR a combination of individual designs.
- ❑ Be sure to NAME your and be able to explain why you chose the name.

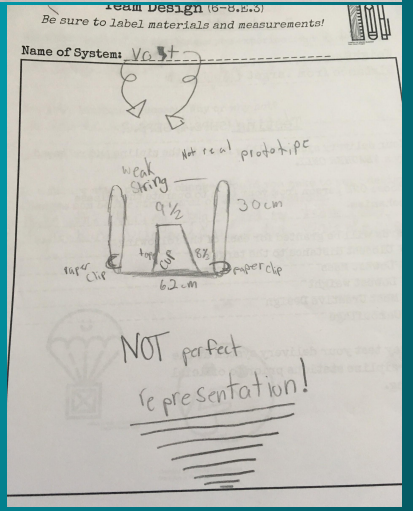
Created by Symbolstix from Noun Project











6th Grade Student Designs