Some familiar examples:

Example 1: Using the ten step design process, plan a surprise party for your friend.
Example 2: Using the ten step design process, create a vehicle powered by a nuclear reactor.

Discover and Define

1. Needs & Assumptions Analysis **(decide what you need to solve)**
    - ALWAYS. ASK. WHY. Why a surprise party? Why not a party where the birthday celebrant is involved with the planning?
    - First ask "why?" Why do we need a nuclear powered vehicle? What potential applications would this have? If we can identify the needs, we can move forward.
        - Assume the vehicle is being used to transport material for a lunar mining system. What needs arise for a lunar vehicle that is nuclear powered?

2. Research & Discovery **(research and learn)**
    - What goes into planning a surprise party? When (if so) is your friend available on his/her birthday? Are they a party person? Should you plan something more similar to a get-together instead? Will the surprise ideally happen before or after their actual birthday?
    - Nuclear design research, sustaining that power, and researching the economy of the power generated to utilize it in the best way possible.

3. Stakeholder Analysis **(understand who you will impact)**
    - The birthday celebrant; the people invited to the party; friends and family of the celebrant; people in the neighborhood (if it's going to be a loud party); the police :0
    - Nuclear engineers, politicians, astronauts, private space companies, mining corporations, bureaucracies involved in the space industry, and scientists

4. Boundary & Hazard Mitigation **(identify challenges)**
    - Your friend could find out about the surprise; your friend might have other plans for the day of; your friend could hate surprises :((
    - Nuclear reactors pose a threat of radiation during production, transporting (whether to the spacecraft that will transport it or even on the spacecraft), and during utilization. Boundaries may include pushback from interest groups that do not support nuclear power and additional training required for astronauts to maintain and use this equipment.

5. Specify Desired Outcomes **(define what success looks like)**
    - Your friend is *actually* surprised and they enjoy the elements of the birthday (party).
    - This vehicle can be operated effectively, easily, maintained easily, and will be sustainable to facilitate the mining operation occurring.

Explore and Explain

6. Concept Generation **(generate lots of ideas)**
    - A ‘concert’ party (drive your friend to a concert and have friends meet there); a pinnata (:0); cake (what kind of cake; layered cake; chocolate cake; vanilla?); 20 people vs 70 people; a party in their home or in your home; laser tag themed party; summer beach surprise party? uwu
    - Tank-like design, where tread tracks can easily traverse the moon's surface while reactor power source is heavily fortified. Large loads can be stored inside vehicles for transportation. Filtration system to keep the reactor from being covered by lunar surface’s dust. Make it fly! Or make it have capabilities of mining itself. Or make it very simple, completely identical to a car on earth, or make it extremely light weight, 3-D printable, so it can be assembled on the moon via a 3D printing system and then used in the low gravity environment…

7. Concept Downselection **(select the best ideas)**
    - I’m team laser tag surprise birthday party!! ***(but ofc feel free to choose what you think would be best for your friend)***
    - I’m a fan of a 3-D printable nuclear powered vehicle! very exotic

8. Concept Articulation **(find a way to share the ideas)**
    - Create a group chat on iMessage? Or Messenger? Choose the most commonly shared social media platforms. **DO NOT** name the group chat “X’s surprise party planning :/ Never ends well :,(
    - Create a research report, organize a presentation with your superiors in NASA/SpaceX, or potentially pitch your idea via a concept video to potential contractors to take up the project and fund it.

Make and Mesasure

9. Uncertainty Reduction **(reduce uncertainty with mini-experiments)**
    - What is the greatest thing you’re afraid will ruin the surprise? **TACKLE THAT.** Your friend doesn’t show up? Remember Blade’s example! Constantly reminding them about the ‘thing’ that’s coming up. Another uncertainty could come from people who do not know how to keep surprises. An easy way to reduce this uncertainty: **do not get them involved in the planning :p**
    - What is concerning you most about a vehicle with a nuclear reactor in it? Is it the efficiency compared to electric or gas powered lunar vehicles? What are the benefits and strengths of your design and seek to understand how we can be **certain** that this design holds value. If it doesn’t, we continue to rethink and redesign!

10. Stakeholder Testing **(see if it works and if others like it)**
    - Plan a practice surprise party **(WITHOUT the person you're actually trying to surprise lol);** how will you yell surprise? How will you turn on the lights? How will you distract your friend until T=0. **Dominate the details; practice until it is perfect ;)**
    - Test your vehicle in a lunar simulated environment. Simulate a collision with a mining drill and what contingencies are in place. **What do your stakeholders want to see from these tests and how can you ensure your design is effective?**