EDST4160 Design of STEM Education

Workshop 2: 2nd Guided Project

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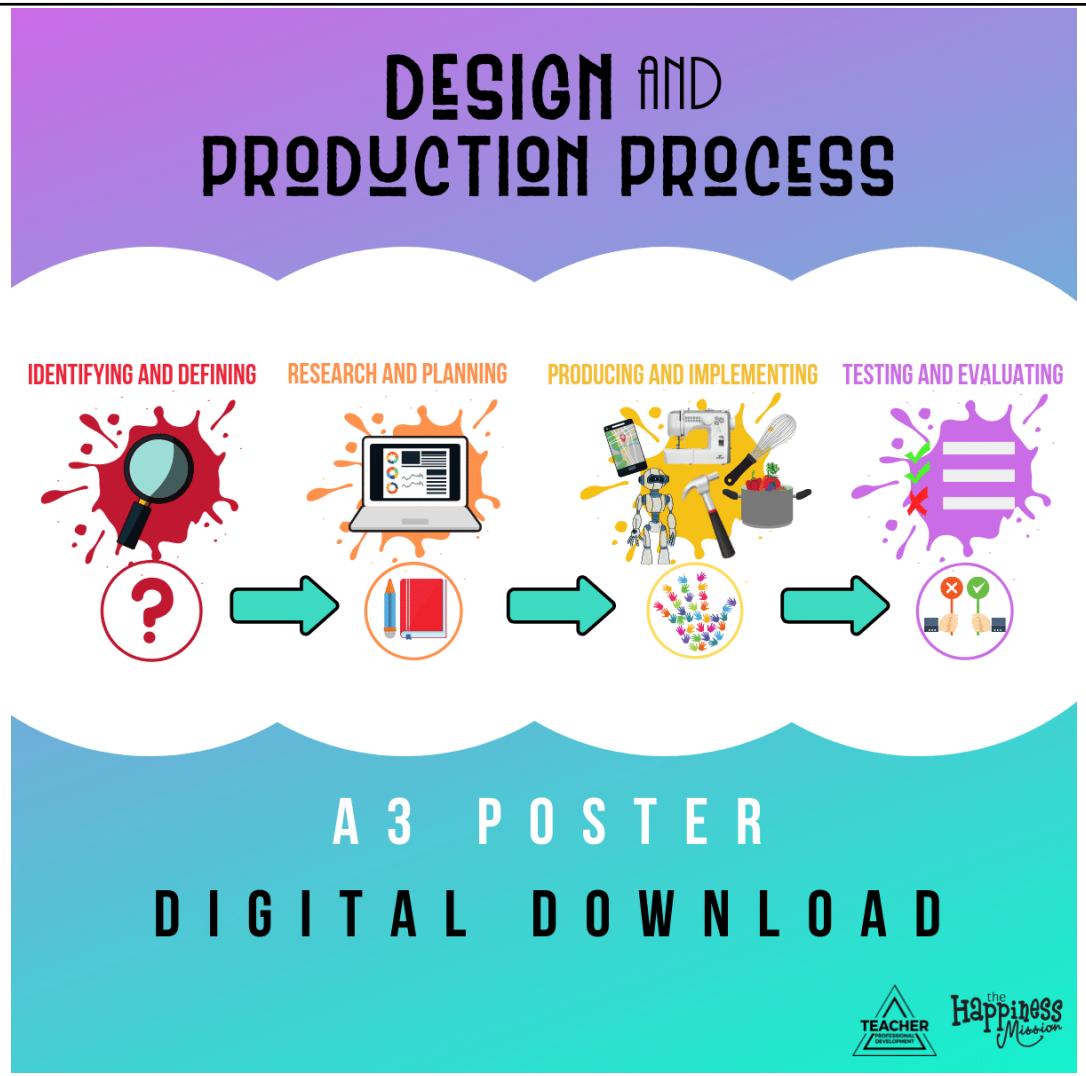
D&P skills from S&T K-6 Syllabus



Design Thinking Terminology

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Prototype	Ideation
Wicked problems	Creative thinking
Constraints	Satisficing
Iteration	Empathy
The frequency trap	Critical thinking

Identifying and Defining

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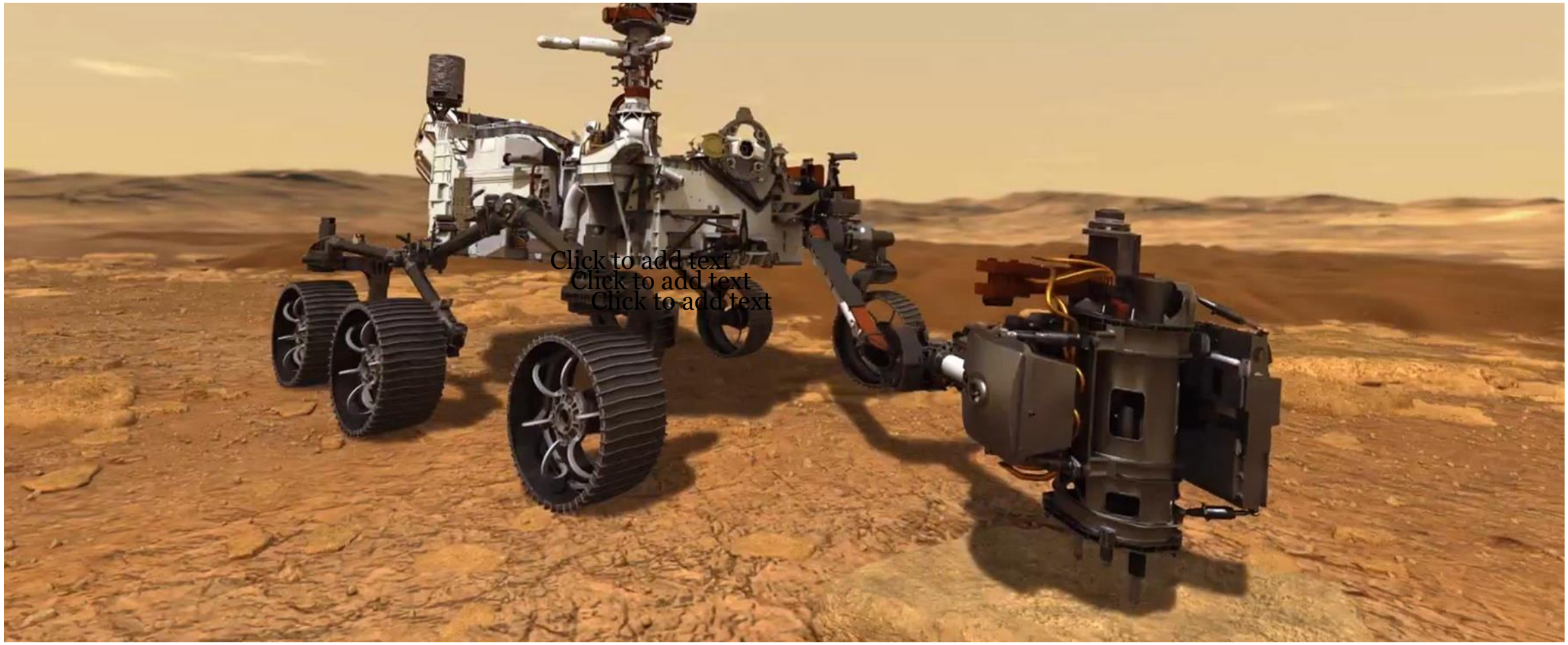
pair-share

Research and Planning
What do we know about how rovers have been landed on Mars?

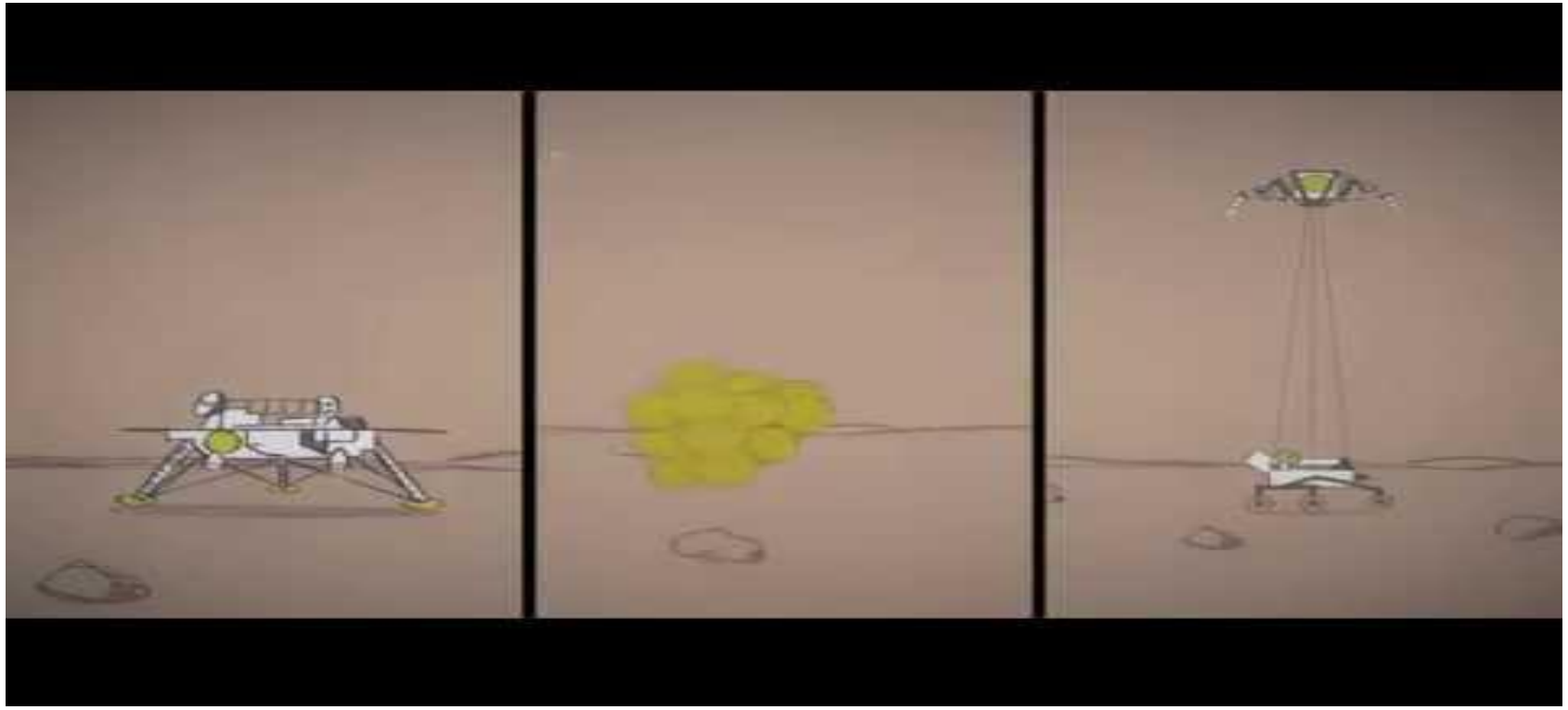


Do 15 minutes of research, report back, record in your e-portfolio.

Images from https://www.nasa.gov/

Identifying and Defining

What could our engineering challenge be?
How can the different disciplines be integrated?



Write a paragraph about what this challenge might be like and what STEM learning might be involved? Add your thoughts to the e-portfolio.

https://www.youtube.com/watch?list=PL9TFrgFq7557nWqmfuVngU22OhTpUE9g&time_continue=57&v=cA8ar8vwpTs&feature=emb_logo

Identifying and Defining

THE CHALLENGE

DESIGN AND BUILD A LANDER THAT BRINGS THE ROVER SAFELY TO A DESIGNATED DROP ZONE ON THE MARTIAN SURFACE.

A BOILED EGG STANDS IN FOR THE ROVER. THE CRUCIAL DROP WILL BE FROM 2ND FLOOR TO GROUND (CONCRETE).

SUCCESS CRITERIA:

A SUCCESSFUL DROP LEAVES THE "ROVER" UNDAMAGED (NO CRACKS IN ITS SHELL) AND WITHIN THE DROP ZONE.

THE LANDER MUST BE AS LIGHT AS POSSIBLE.

Identifying and Defining

ASSESSMENT

SYLLABUS OUTCOMES?

WHAT TO ASSESS?

HOW TO ASSESS?

Research and Planning

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Do some research on the science of protecting a falling object.
For example, take a good look at the documents below.

How parachutes work | The science of air resistance (explainthatstuff.com)

Crumple zones (scitation.org)

Create a title in Book Creator like the one at the top of this slide.
From your research, write about what you have learned that might be useful in the project.

Research and Planning

Permitted Materials (sample list)

- paper
- plastic bag
- cling wrap
- styrofoam cups
- plastic cups
- masking tape
- straws
- bubble wrap
- string, thread
- cardboard tubes
- newspaper
- cotton balls.

Research and Planning

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Without looking at your partners' plans, use the grid paper provided to draw your own plan for what the rover lander should look like.

Make sure the plan is labelled and clear enough for the lander to be built by someone else.

When everyone in your small group has finished, compare plans.
Discuss their advantages and disadvantages.
Choose one which seems to be the best idea.

Photograph this plan and put it into Book Creator.
Write a few lines about why this idea was first chosen and the science behind it.

Producing and Implementing

One person to collect materials for the build observing material and weight limits.

Build a prototype of your rover lander using the chosen plan.
Test in the classroom. Modify or rebuild as necessary.

Create a title in Book Creator similar to the one at the top of this slide.
Take a few photos to show the lander being built and add comments about how the work seems to be going.

Testing and Evaluation

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One by one, groups take their rover lander to the testing area.
They release the lander from a specified height and then record how it performed.

Was the eggshell cracked?
Did it land within the drop zone?
What was the lander's mass?

Record results (how did other groups go?), observations and ideas for improvement in Book Creator under the title at the top of this slide.

As an example of project-based STEM, which syllabus outcomes could be linked to this challenge?

Add these to this week's section in Book Creator.