Name: _____

Wheels & Levers

Date: _____

How Can Ideas be Shared and Designs be Compared to Build the Best Moving Device Possible?

Discover: Team Building a Vehicle

Question

Does teamwork improve the device design and vehicle design processes?

This is the perfect activity to work on with a partner. If at all possible involve someone in this build. Talk to your teacher, they may be able to partner you up with a classmate!

Resources

- Toy construction kit that includes wheels, gears, and axles, such as K'nex or similar type of kit
- Optional - paper, cardboard, scissors
- Optional - common household materials, depending on your design
- Optional - digital camera

Instructions

1 Your goal is to build an excavator. Keep these important points in mind when you are designing and building:

- The excavator should be able to move easily from place to place. (It should have wheels or a track.)
- When the excavator is moving dirt, it should be stable (not fall apart or fall over).
- The excavator should have something on it that can be used for moving dirt. For example, it might have a bucket on a rope and pulley or maybe a shovel on the end of a lever.
- When you have finished, you will explain how your excavator works.
- Safety first! Be careful when you are building and testing your excavator.

Safety Warning: Whatever you build, you must do so **safely**. Protect your eyes. If you are using anything sharp, be very careful and never cut toward yourself.

RUBRIC

Rubric

Before you begin building, be sure to read the **Build an Excavator Rubric** so that you know what is expected of you.

Build an Excavator Rubric

Criteria	Excellent	Proficient	Adequate	Limited
Communication and Understanding				
I will design an excavator and explain clearly what I have built and how it functions.	I have explained very clearly how my excavator works, moves, and transports dirt.	I have explained clearly how my excavator works, moves, and transports dirt.	I have explained how my excavator works, moves, and transports dirt, but my explanation could be clearer.	I have explained how my excavator works, moves, and transports dirt, but my explanation is unclear and needs lots of improvement.
Application				
I will build a stable excavator that moves effectively from place to place.	I have built a very stable excavator that moves very well.	I have built a stable excavator that moves.	I have built an excavator that is a bit wobbly and unstable; it moves from place to place but with some difficulty.	I have built an excavator that is very wobbly and unstable, and barely moves (or not at all).
I will build a stable excavator that effectively can transport dirt.	I have built an excavator that can very effectively transport dirt.	I have built an excavator that can transport dirt.	I have built an excavator can transport dirt, but this could be improved.	I have built an excavator that cannot transport dirt effectively.

2 Build your excavator. You can choose from several options for building, depending on your design and what materials you have available. Choose **one** of the following:

- **a.** Build your excavator with a toy construction kit such as K'nex or a similar type of kit.
- **b.** Build your excavator using the materials you have around your home.
- **c.** Build a paper and cardboard model of your excavator.

This design of an excavator has four wheels attached to two axles for moving, and it has a pulley-and-bucket system for moving dirt.

3 Test your excavator. If it does not work the way you want, make changes and repeat the testing. Repeat until the vehicle performs the way you want. Every time you do a test, record your result in the ***Excavator Test Recording Chart*** on the following page.

When your vehicle works the way you want it to, go to Step 5.

Excavator Test Recording Chart			
Test	**Success? (Yes or No)**	**If no success, what went wrong?**	**What did you change to fix the problem?**
1			
2			

3			
4			
5			
6			
7			

8			

4 If you have a digital camera, take a photo or video of your excavator for sharing later.

5 No matter what method you used to build, the last step is to write an explanation of how your excavator works. Be sure to explain the idea behind your design, and how the excavator moves from place to place and how it moves dirt.

Use the space below to draft your explanation: