WOW! on Wheels – STEM Labs

Rolling Things

Teaching Timeline

The Rolling Things activity was originally purchased from and created by SAE International.
https://www.sae.org/learn/education/curriculum/rolling-things

The Rolling Things challenge is written so that students can work through activities in pairs. The following schedule options may need to be adjusted because it assumes that there are a total of 24 students in a classroom.

Throughout the course of the challenge, students will participate in both whole-group and pair activities. Students are expected to rotate through different stations.

Option 1 and 2: They offer a 17 day schedule and a 12 day schedule. (schedule suggestions below)

Option 3: You will also find a suggestion on how to complete this activity in a much shorter time frame, as a whole group. This suggestion could be used for small groups as well, stretched over several days or class periods.

Option 4: You can create whatever schedule works best for you and your students.

A binder is included with reproducible pages available that can be used whether you work through these activities as a large group or if you choose to have your students work in pairs.

OPTION 1: Rotating Four Student Pairs per Day				
		Day 1	**Day 2**	**Day 3**
1. Playing with Cars and Ramps	**Circle Time**	Whole Group (start of activity)	–	Whole Group (end of activity)
	Center Time	Teams 1 and 2	Teams 5 and 6	Teams 9 and 10
		Teams 3 and 4	Teams 7 and 8	Teams 11 and 12
		Day 4	**Day 5**	**Day 6**
2. Crash and Bash!	**Circle Time**	Whole Group (start of activity)	–	Whole Group (end of activity)
	Center Time	Teams 1 and 2	Teams 5 and 6	Teams 9 and 10
		Teams 3 and 4	Teams 7 and 8	Teams 11 and 12
		Day 7		
3. Getting to Know the Cars and Ramps	**Circle Time**	Whole Group		
		Day 8	**Day 9**	**Day 10**
4. Ramp Height	**Circle Time**	Whole Group (start of activity)	–	Whole Group (end of activity)
	Center Time	Teams 1 and 2	Teams 5 and 6	Teams 9 and 10
		Teams 3 and 4	Teams 7 and 8	Teams 11 and 12
		Day 11	**Day 12**	**Day 13**
5. Car Weight	**Circle Time**	Whole Group (start of activity)	–	Whole Group (end of activity)
	Center Time	Teams 1 and 2	Teams 5 and 6	Teams 9 and 10
		Teams 3 and 4	Teams 7 and 8	Teams 11 and 12
		Day 14		
6. Outfoxing the Big Bad Wolf	**Circle Time**	Whole Group		
		Day 15	**Day 16**	**Day 17**
7. Make It Happen!	**Circle Time**	Whole Group (start of activity)	–	Whole Group (end of activity)
	Center Time	Teams 1 and 2	Teams 5 and 6	Teams 9 and 10
		Teams 3 and 4	Teams 7 and 8	Teams 11 and 12

OPTION 2: Rotating Six Student Pairs per Day			
		Day 1	**Day 2**
1. Playing with Cars and Ramps	**Circle Time**	Whole Group (start of activity)	Whole Group (end of activity)
	Center Time	Teams 1 and 2	Teams 7 and 8
		Teams 3 and 4	Teams 9 and 10
		Teams 5 and 6	Teams 11 and 12
		Day 3	**Day 4**
2. Crash and Bash!	**Circle Time**	Whole Group (start of activity)	Whole Group (end of activity)
	Center Time	Teams 1 and 2	Teams 7 and 8
		Teams 3 and 4	Teams 9 and 10
		Teams 5 and 6	Teams 11 and 12
		Day 5	
3. Getting to Know the Cars and Ramps	**Circle Time**	Whole Group	
		Day 6	**Day 7**
4. Ramp Height	**Circle Time**	Whole Group (start of activity)	Whole Group (end of activity)
	Center Time	Teams 1 and 2	Teams 7 and 8
		Teams 3 and 4	Teams 9 and 10
		Teams 5 and 6	Teams 11 and 12
		Day 8	**Day 9**
5. Car Weight	**Circle Time**	Whole Group (start of activity)	Whole Group (end of activity)
	Center Time	Teams 1 and 2	Teams 7 and 8
		Teams 3 and 4	Teams 9 and 10
		Teams 5 and 6	Teams 11 and 12
		Day 10	
6. Outfoxing the Big Bad Wolf	**Circle Time**	Whole Group	
		Day 11	**Day 12**
7. Make It Happen!	**Circle Time**	Whole Group (start of activity)	Whole Group (end of activity)
	Center Time	Teams 1 and 2	Teams 7 and 8
		Teams 3 and 4	Teams 9 and 10
		Teams 5 and 6	Teams 11 and 12

Option 3:

Using the ramp set up and 3 vehicles, discuss with your class that the ramp can be moved up and down, and this changes its' incline.

Discuss the similarities and differences in the 3 vehicles being used – a convertible, a truck, and a sedan.

Have the ramp incline at a middle point. Place the convertible at the top of the ramp.
If I let go of the car, what do you think will happen?

Release the convertible several times, discussing with the students what they observed.

Explain to the students that as scientists they will be conducting experiments with the ramp and the vehicles. They will make guesses or predictions about what will happen. They will conduct a test several times to observe the results and to make sure the results stay the same. And, they will discuss what they observe. You can also have them record the information as it happens.

Through their tests, the vehicles will come down the ramp into a crash box, and they will measure how far the cars move the box. They will determine how the height of the ramp changes the result, and how the weight of the car changes the result.
Explain that scientists and engineers are very careful when they are running tests.
Why do you think scientists and engineers need to be careful?

Explain that we are going to perform each test 3 times.
Why do scientists need to run experiments more than once?

If you are going to have your students record their own results, explain that process now.
If you are going to record for the class, show them your chart now.
If your students are not familiar with a measuring tape, take some time to address that.

Testing Height

We want to figure out how the height of the ramp changes what happens as the vehicle hits the box. Place the box at the end of the ramp now.

Will it matter how high the ramp is?

Have students predict the distance the box will move. Mark the positions so the students can compare. (Use a sticky note, or bingo chip for example.)
Adjust the ramp to its highest position, place the crash box at the bottom of the ramp, and allow the convertible to roll down.
Run the test three times.
Measure how far the crash box moved when it was hit by the car.

Adjust the ramp to its lowest position.
How far do you think the car will move the crash box now?

Allow the convertible to roll down the ramp again.
Run the test three times.
Discuss that you are releasing the car, and not pushing the car.
Discuss how this would change the result.

Observe how far it moved the crash box.
Compare this distance with how far the convertible moved the box when it rolled from the highest position.
Why do you think this happened?
What do you think will happen if we try some of the positions between the highest and the lowest?
Run the tests three times.

What did we learn about how the ramp height effected how far the crash box was moved?
What makes the car push the box farther?

Test the sedan and the truck in the same way.
Continue the same discussions.

Testing Weight

We want to figure out how the weight of the vehicle changes what happens as the vehicle hits the box.

Will it matter how heavy the vehicle is?

Choose the height of the ramp you want to use, and discuss with your students why you won't be changing the height for your next set of tests.
Show the students how easily you can add washers to the "weight car", and discuss how the additional washers will change the weight of the car.

Test the weight car with nothing added, and then continue to add washers to it for the rest of your tests.

What happened when "X" washers were put on the car?
Why did that happen?

Connecting Literature

Read the book the *Three Little Pigs' Sledding Adventure*.

Stop at the end of page 16 and discuss.
(At this point, the first pig was easily stopped by the wolf because his sled is very light.)
Why do you think it was so easy for the wolf to stop the sled?
Do you think the wolf will catch the second little pig?
Why do you think the second little pig will or will not get caught by the wolf?

Stop at the end of page 20 and discuss.
(At this point, the second pig was easily stopped by the wolf because his sled is still too light.)
Why do you think it was so easy for the wolf to stop the sled?
Do you think the wolf will catch the third little pig?
Why do you think the third little pig will or will not get caught by the wolf?

Stop at the end of page 27 and discuss.
(At this point, the third pig has knocked the wolf over.)
Why do you think the third pig knocked the wolf over when his brothers didn't?
What differences do you see in the 3 sleds the brothers built?
Are there other things that might change how they crash into the wolf?

Taking It One Step Farther

Explain that the goal now (either as a whole group or sending pairs to the ramps throughout the day) will be to make a weight car that will be stopped by the wolf, and make a weight car that will knock over the wolf. They can use the reproducible pages to track their tests.

Go back to the book the *Three Little Pigs' Sledding Adventure*, and either reread it (stopping on the same pages to have discussions again) or jump to those parts of the book. Discuss each pig's sled, the predicament he was in, and the ideas your students now have to fix these situations.
What if you were the first pig? Or the second pig?
What would you have done?
Why would that work?

Relate the story to the activities they have been doing.
What did we do with our ramps that changed how our cars crashed?
What did we do with our cars that changed how our cars crashed?
How does what we learned help us if we want to change the story so that the first and second pigs could knock the wolf over?

How could you change the story so that the third pig would not knock over the wolf?