



# ***It's Time to Launch into Space!***

*For years, NASA has been reusing launch components to send rockets and the Space Shuttle into space. For example, the solid rocket boosters (SRB's) on the Space Shuttle are often retrieved from the ocean, brought back to Kennedy Space Center, then cleaned and prepped for another Shuttle Launch. Why? The same reason we recycle our aluminum cans. It helps the environment and helps us save money for future launches. During this session, you must design and test a Reusable Launcher for your Crew Exploration Vehicle that will journey to the Moon. Therefore, your goal will be to launch your CEV into an orbit around the Moon.*

## THE CHALLENGE:

*To design and test a Reusable Launcher with the following constraints:*

1. Launch the CEV to reach a goal of **5 meters**. See the drawing on the previous page for an idea of how to set up your launch.
2. The Launcher must be reusable for each trial. If your rubber band breaks because it was pulled too far, it is not reusable for another launch.
3. The Launcher must produce a repeatable outcome. If you set up the Launcher the same way twice, the CEV should travel the same distance both times. It is more important that the CEV is launched the same distance using the same setup than it is to get the CEV to travel the farthest distance.

## DESIGN challenge

*To design and test a Reusable Launcher for the Crew Exploration Vehicle (CEV). The CEV should travel 5 meters when launched.*

Launch Your CEV  
**Student page**



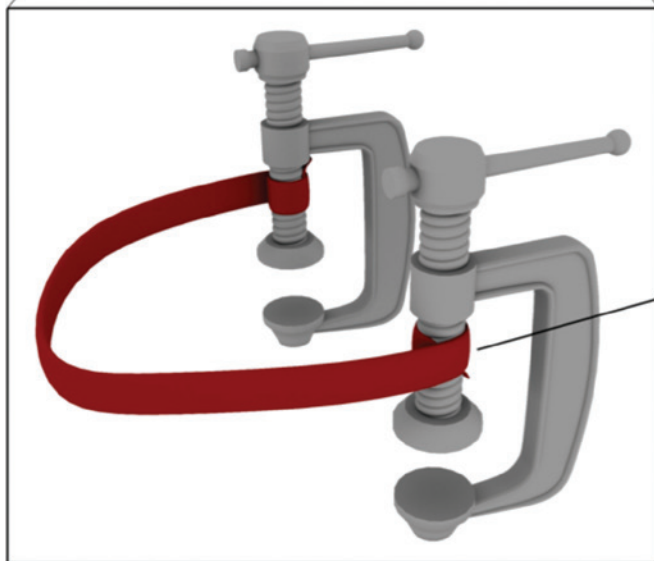
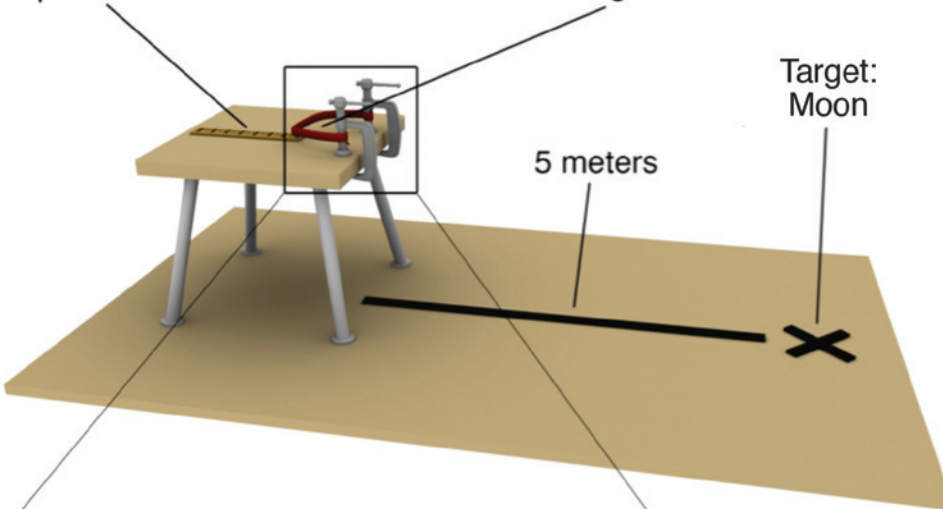
# Launch Set-Up

Use ruler or tape to measure how far the rubber band is pulled back.

Launcher goes here.

Target:  
Moon

5 meters



Clamp down or  
wrap a rubber  
band.

## DESIGN challenge

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Launch Your CEV  
**Student page**

# ASK IMAGINE & PLAN

**What questions do you have about today's challenge?**

**Describe the rubber band your team will choose to use. How wide and how long?**

**How will you test your rubber bands to see if they will work well as a "Reusable Launcher"?**



Draw a picture of your team's Reusable Launcher with your CEV.

## DESIGN challenge

*To design and test a Reusable Launcher for the Crew Exploration Vehicle (CEV). The CEV should travel 5 meters when launched.*

Launch Your CEV  
**Student page**

Approved by: \_\_\_\_\_

# ***Experiment & Record***

**Write a hypothesis. Complete the following statement:**

**By changing the distance the rubber band is pulled, our CEV will...**

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**Record your observations.** Measure how far back you pull the rubber band and record the data. Repeat for two more trials. Pull the rubber band back at a different length and launch your CEV. Measure the new distance and record your data. Repeat.

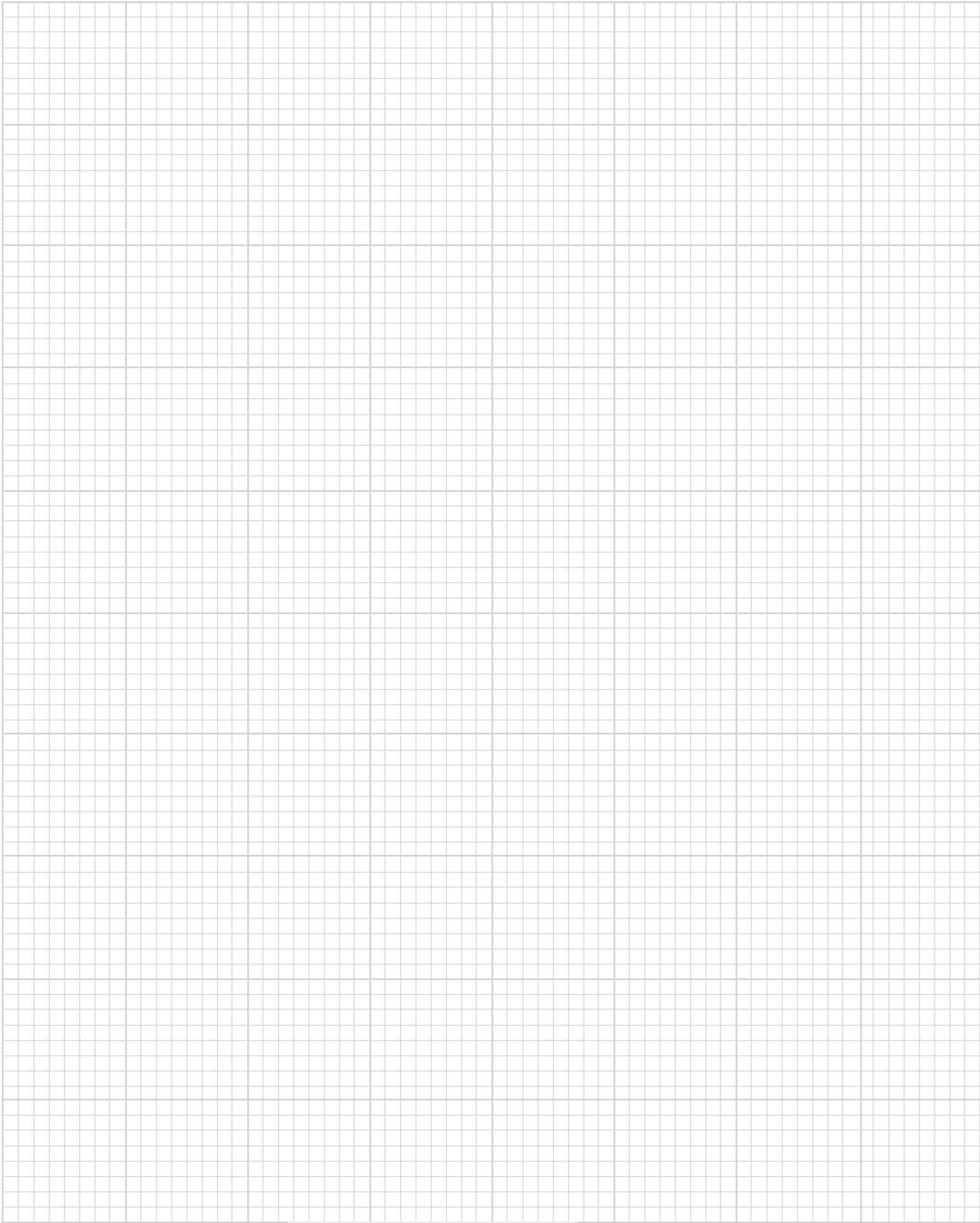
CEV Launch Data Table

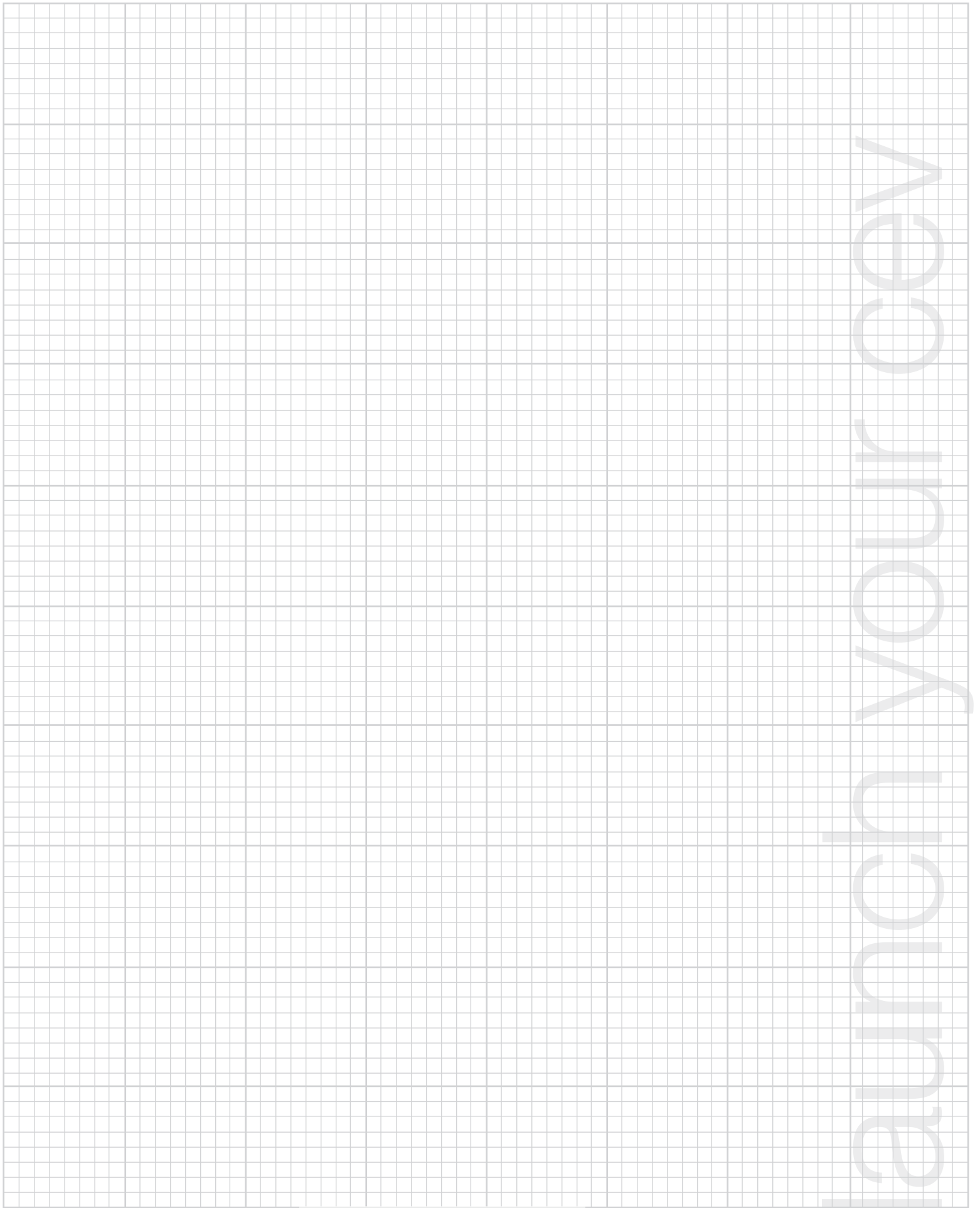
Distance rubber band is pulled back	Trial	Dependent Variables	
		Distance traveled (m)	Distance from target (m)
Setup A: ____ cm	1		
Setup A: ____ cm	2		
Setup A: ____ cm	3		
Setup B: ____ cm	1		
Setup B: ____ cm	2		
Setup B: ____ cm	3		

Did your Launcher produce the same distances for each pull of the rubber band? If not, discuss with your team how to improve the Launcher. Make those changes in your drawing and your launcher. Repeat the experiment.

CEV Launch Data Table (continued)

Distance rubber band is pulled back	Trial	Distance traveled (m)	Distance from target (m)
Setup C: ____ cm	1		
Setup C: ____ cm	2		
Setup C: ____ cm	3		





Launch your cev

