

### STARBASE Hill Day 3 Review

1. An engineering team gathered to discuss why they were not receiving data from the Mars Opportunity Rover. At the end of the meeting, they determined the rover was stuck in an area of Mars' sand and immobile, as its wheels just spun in the sand. What step of the Engineering Design Process (EDP) did they accomplish and what is their next step?

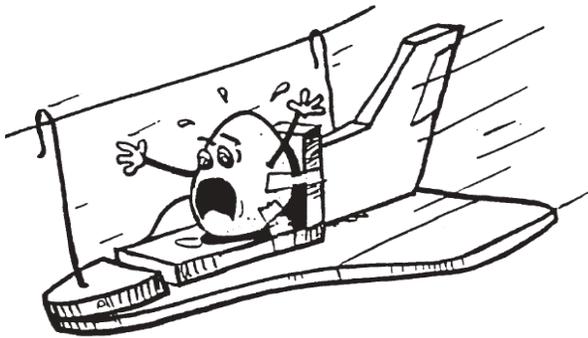
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2. When saving Robin from the Moon, you witnessed all 3 of Newton's Laws of Motion. Describe when you saw these laws take place.

**1<sup>st</sup> Law**-An object will stay at rest or in motion until an outside force acts upon it. (Inertia)

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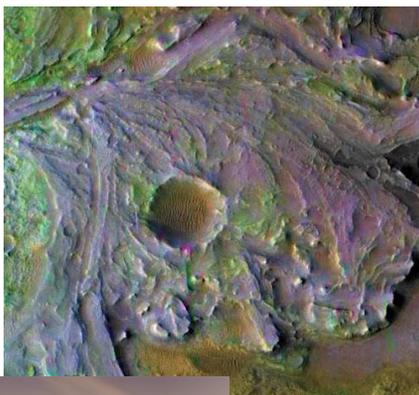
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**2<sup>nd</sup> Law**- Force = mass x acceleration

**3<sup>rd</sup> Law**-For every action, there is an equal and opposite reaction. (Forces occur in pairs)



3. On February 18, 2021, the Mars' Rover Perseverance is scheduled to land in the Jezero Crater on Mars. Immediately upon landing, the roboticist will move the rover north 20 meters, make a 45° turn to the northeast and then travel another 24 meters to take a soil sample. For each rotation of the wheels, the rover will travel 2 meters. Please complete the following tasks.

How many wheel rotations are needed to travel the first 20 meters?

How many wheel rotations are needed to travel the last 24 meters?

Draw a 45° angle.



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Students may answer #2 with varying answers, all other questions should follow this key.

Name \_\_\_\_\_

Date \_\_\_\_\_

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1. An engineering team gathered to discuss why they were not receiving data from the Mars Opportunity Rover. At the end of the meeting, they determined the rover was stuck in an area of Mars' sand and immobile, as its wheels just spun in the sand. What step of the Engineering Design Process (EDP) did they accomplish and what is their next step?



The engineering team completed the first step in the EDP, Define the Problem. They will move on to the second step, Research the Problem.



2. When saving Robin from the Moon, you witnessed all 3 of Newton's Laws of Motion. Describe when you saw these laws take place.

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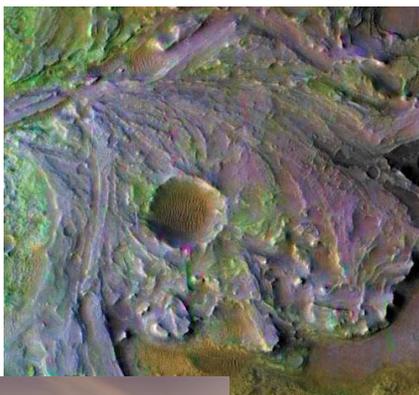
When shuttle struck the wall, the egg continued in motion, sometimes ejecting from the ship.

2<sup>nd</sup> Law- Force = mass x acceleration

Students were limited on the mass of their overall design so the acceleration was not too high.

3<sup>rd</sup> Law- For every action, there is an equal and opposite reaction. (Forces occur in pairs)

When the egg struck the wall, it would hit the shuttle and the shuttle would strike back with equal force, sometimes cracking the egg



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How many wheel rotations are needed to travel the first 20 meters?

60/5 = 12 rotations

How many wheel rotations are needed to travel the last 24 meters?

75/5 = 15 rotations

Draw a 45° angle.



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