**Resource Card 1: A Video Model**

**Instructions:**

* Watch the following video in your small groups (sound is not required):
  + <https://www.youtube.com/watch?v=4sKqz5JQt5o>
* Analyze and discuss the video with your group members and use it to answer the questions in your student guide.

**Resource Card 2: Data Set**

We experience gravity all the time. It’s why things fall when we drop them and why we do not fly into space. Gravity is a force that acts the same way everywhere in the universe. But what **properties** of an object affect the **strength** of its gravitational force?

100 gram rock

To investigate the strength of gravity on different bodies (planets, moons, or suns), NASA scientists have studied how long it would take a 100-gram rock to fall 100 meters to the surface of each major body in our solar system. They recorded their data in the table below.

**Instructions:**

* Analyze and discuss the data with your group members and use it to answer the questions in your student guide.

**Table 1: Time it Takes 100-gram Rock to Fall 100 Meters on Different Celestial Bodies**

|  |  |  |
| --- | --- | --- |
| **Body** | **Mass of the Body (kg)** | **Time it takes the same rock to impact the surface from 100 meters away** |
| Earth | 5.98 \* 1024 | 4.51 seconds |
| Mercury | 3.30 \* 1023 | 7.35 seconds |
| Venus | 4.87 \* 1024 | 4.72 seconds |
| Mars | 6.42 \* 1023 | 7.33 seconds |
| Jupiter | 1.90 \* 1027 | 0.90 seconds |
| Saturn | 5.69 \* 1026 | 1.38 seconds |
| Uranus | 8.68 \* 1025 | 2.04 seconds |
| Neptune | 1.02 \* 1026 | 1.97 seconds |
| Pluto | 1.29 \* 1022 | 17.53 seconds |
| Moon | 7.35 \* 1022 | 11.10 seconds |
| Sun | 1.99 \* 1030 | 0.42 seconds |

**Resource Card 3: Computer Simulation Model**

The reason why everything on Earth falls downwards is because of gravity. And yet, we saw in other resources that gravity does not just mean “falls towards Earth.” Gravity attracts objects to other large bodies and on those bodies objects can fall at different rates. Let’s explore this more in this simulation of our solar system.

**Instructions:**

Open the pHet simulation on [**Gravity and Orbits**](https://phet.colorado.edu/en/simulation/legacy/gravity-and-orbits)**.**

Part 1:

1. Click the selection showing the Sun and the Earth.
2. Click the boxes to show Gravity Force and Path.
   1. Note: Gravity Force is shown with an arrow. The bigger the arrow, the bigger the force.
3. Play around with the mass of the sun, increasing and decreasing it.
4. Analyze and discuss your observations with your group members and use it to answer the questions in your student guide.

Part 2:

Reset All on your simulation. Then,

1. Click the selection showing the Earth and Moon.
2. Click the box to show Gravity Force.
3. Play around with the mass of the moon, increasing and decreasing it.
4. Play around with the mass of the Earth, increasing and decreasing it.
5. Analyze and discuss your observations with your group members and use it to answer the questions in your student guide.