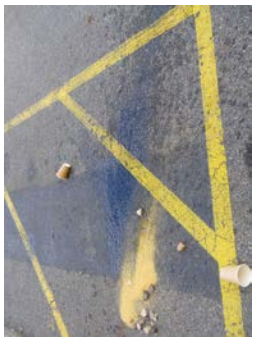
# Rocky & Gas Planets – Teacher Notes

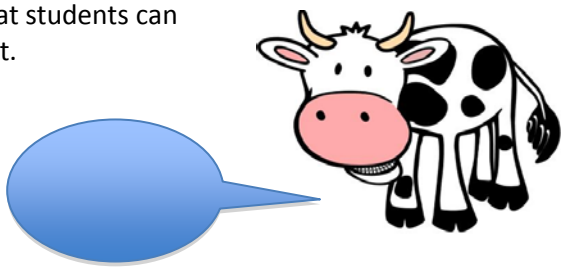



The eight planets in our solar system are organised into four inner rocky or terrestrial planets and four outer gas giants. Gravity is the major force that separated the materials in the solar disc into these positions. More massive materials were drawn by gravitational attraction towards the immensely massive Sun that contains 98% of the material in the solar system. Gases, having less mass were spun to the outer edges of the system. The Sun's solar wind also blew gassy materials outward. The farther from the Sun the colder it is. The gases froze and planets became solid. Comets from these outer zones are mostly "dirty snowballs" of frozen water.

**Other Objects in the Solar System**

The *Desert Fireball Network* is a meteorite research group based at Curtin University who aim to study meteorites by tracking them as they enter our atmosphere as meteors (fireballs). The. students and schools can also get involved in the Fireballs community by using the free app, hosting a camera and participating in the online conversation via social media.

The pull of gravity on materials with different masses can be easily demonstrated by the following experiment that could be a teacher demonstration or student activity.
The experiment process is deliberately flawed so that students can suggest improvements and replay to make a fair test.



***Cows Moo Softly***
***C***hange one thing
***M***easure one thing
Keep everything else the ***S***ame

**Activity - To demonstrate how gravity separated the planets into inner terrestrial or rocky planets and outer gas planets**

**Materials**

- Three paper or plastic cups
- Some stones, sand and water. Sufficient material to half fill a cup
- A cricket bat
- An open sealed area of veranda or playground

**Method**

1. Approximately half fill one cup with stones, the second with sand and the third with water
2. Line up the cups as in the picture above
3. Hit each cup firmly with the cricket bat. Alternatively a student with robust shoes could kick the cup
4. Observe what happens to the contents of the cups and report below

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**Prediction**

What do you think will happen to the different materials when they are hit?

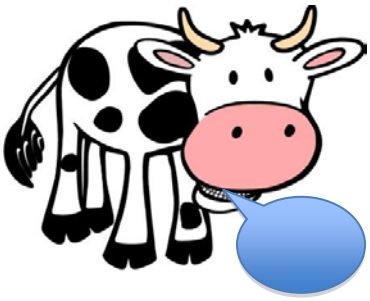
Any reasonable answer

**Observations**

What happened to the contents of the cups?

The heavy rocks did not travel far, the sand started dropping about half way along the rocks and the water started dropping before the end of the sand but extended well beyond it.

**Discussion**



Was this a "fair test"? (Did the Cow Moo Softly?)

No

**C = Change**. We were only supposed to change one thing, the material in the cup. However

1. We did not have exactly the same amount of material in the cups
2. We did not control the amount of energy used for the three hits or kicks

**M = Measure**

1. We did not measure the distance the different materials travelled

**S = Same**

Everything else needs to be kept the same (see above)

What could be adjusted to make this a fair test?

Make a mark at the same level on all paper cups (5cm?) and fill to that point.

With a ruler and chalk mark 35cm behind the cups and only swing the bat from that point

Measure the spread of each material with a ruler.

**Extension - Solar Wind**

Our Sun is a massive energy source. Early in planetary formation it was even more energetic and particles streamed away from it as a solar wind. This also moved lighter particles away from the inner planets towards the outer solar system. The magnetic field round the Earth defends us against particles in the solar wind.

If the wind is blowing strongly outside the classroom, grab a handful of dry soil, sand and stones. Release this into the wind and plot the movement of the different materials.

Mercury, the innermost and smallest rocky planet, has hardly any atmosphere at all. Only a little helium gas can be detected. Scientists suspect that any gas present is blown away by the present, weaker solar wind.