

## Lesson 4:

# Small bodies of the Solar System: asteroids, comets and meteoroids.

### Aims:

1. To learn about asteroids: their characteristics, origin, location.
2. To learn about comets: their characteristics, origin, location. To learn about Rosetta spacecraft and its study of a comet 67P/ Churyumov- Gerasimenko. To make a model of a comet.
3. To learn about meteoroids. To learn the difference between meteoroids, meteors and meteorites.

**Age group:** this lesson can be adapted to suit a wide age group from Y4 to Y8.

**Time:** varies from 1 hour to 1 day

- “Space lesson”: about 60 minutes. Use only the information sheets and related activities, leave out the movie and the demonstration.
- “Space morning”: the whole lesson with all activities and demonstration will take about 3 hours.
- “Space day”: use lesson 4 in the morning and lesson 5 (dwarf planets) in the afternoon

### Materials:

1. Information sheet 1: Asteroids
2. Information sheet 2: Comets
3. Information sheet 3: Meteoroids
4. *Rosetta mission* cartoon (28 minutes long)  
[https://www.youtube.com/watch?v=PrctxIVWm\\_E&t=1s](https://www.youtube.com/watch?v=PrctxIVWm_E&t=1s)
5. “How to make a comet” video tutorial by NASA  
<https://www.youtube.com/watch?v=2lk874N7AjQ>
6. *How to make a comet: list of ingredients* (see Appendix on page 4)
7. *Solar System (with belts)* image  
<http://media1.britannica.com/eb-media/92/95392-063-07574048.jpg>
8. Images of asteroids [Ceres](#) and [Vesta](#)
9. Images of comets [Halley](#) and [67P/ Churyumov-Gerasimenko](#)
10. [Asteroids vs. Meteoroids](#) image

### Introduction:

In this lesson, the children think about what else there is in the Solar System apart from the Sun, eight planets and their moons, divided into two groups they learn about asteroids and comets and then present the information to the rest of the class, the children watch a cartoon about the spacecraft called Rosetta and its historical journey to comet 67P/ Churyumov-

Gerasimenko, they learn what ingredients the comet is made of and watch the teacher make model of a comet using these ingredients, the children learn about meteoroids, then they do a quiz about asteroids, comets and meteoroids and finish the lesson writing a space dictionary.

### **Procedure:**

Tell the children, that the Solar System is made of the Sun, eight planets and their moons. Ask the children if there are any other objects in the Solar System. Write down their suggestions on the whiteboard. Discuss them with the class and cross off any incorrect ones.

Summarize, that there are lots of other objects and that they can be divided into two groups: in the first group would be dwarf planets- objects that are big and heavy enough to become round. In the second group would be asteroids, comets a meteoroids - small and funny shaped objects.

Tell the children, that you will be learning about dwarf plants on the next lesson and that the focus of today's lesson would be the second group.

1. Divide the class into two groups and give each group an information sheet (1) or (2) to study. One group will be learning about asteroids, another about comets. Make a few books about space available for the children to look at if they need any additional information. Each group's task will be to read the information and to present it to the rest of the class. The group should decide how to present their topic: whether they will choose one presenter, several, or everybody will take part, will they be doing posters or any other visual resources etc. Allow up to 30 minutes to prepare the presentation.
2. Support the presentations by showing the picture of the Solar System with belts (7), pictures of asteroids (8) and comets (9).
3. Discuss with the children what they have just learned.
4. Show movie (4) to the class. Bear in mind, the movie is 28 minutes long!
5. Make a model of the comet using tutorial (5). Keep the list of ingredients (6) displayed (projected or written on the whiteboard) during the demonstration.
6. Put the comet on a display for the children to watch. It will slowly sublime (sublimate means turn from solid state to gas skipping the liquid state).
7. Ask the children to give comet a name (traditionally, comets we named after their discoverers or people who studied them or the year they were observed, these days we discover so many comets that the names we give them are special codes that tell the type of orbit comet has and when it was discovered)
8. Tell the children, that if a small piece of asteroid or a comet gets chipped off, it continues its journey through the Solar System as a meteoroid.
9. Tell the children about meteoroids using the information sheet (3) and image (10).
10. Give the children a quiz about asteroids, comets and meteoroids.
11. Make you class's "Space Dictionary":
  - Ask the children to think about new the concepts they've learned today (such as asteroid, Asteroid Belt, comet, nucleus, coma, Kuiper Belt, meteoroid, meteor, meteorite, Astronomical Unit etc). Write them down.
  - Ask the children to define each concept (if there are several good definitions, the class can vote for the best one)

- Give each child (or a group of children) one task such as: to write down definition, to draw an illustration, to make a front page etc (don't forget to leave a few empty pages so that you could add up to the dictionary later)

End of the lesson!

# Appendix:

## How to make a comet: list of ingredients

(Instructions from the video)

- 1 liter water (comets have lots of water)
- 2 cups dirt (minerals, water and dust)
- 1 Tbsp starch (optional to hold our comet together)
- 1 Tbsp syrup (for organic)
- 1 Tbsp vinegar (for amino acids)
- 1 Tbsp rubbing Alcohol (for methanol)
- Ice-cream
- 5 lb dry ice crushed into tiny bits

