# Our Solar System

Imagine now that our Solar System is a miliard times smaller- on a scale of 1:1 000 000 000. 1cm in this model will be $10^9$cm in reality. How many kilometres is this?

We work this out like this:

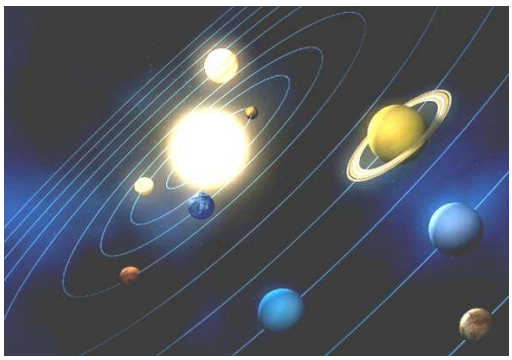
$1\text{km} = 10^3\text{m}$, $1\text{m} = 10^2\text{cm}$, so $1\text{km} = 10^3\text{m} = 10^3 \cdot 10^2\text{cm} = 10^5\text{cm}$.

$$\mathbf{10^9 : 10^5} = \frac{1000000000}{100000} = 10000 = \mathbf{10^4}$$

1 cm in the model is therefore 10 000 kilometres in reality..

**Tasks:**

1. Calculate using this scale $1:10^9$ how long in kilometres in reality would be 1m in the model.
2. $10^{21}$ m – the diameter of our galaxy - are approximately how many lightyears?
3. The lens of the biggest telescope allows us to see the light of a candle at a distance of $24 \cdot 10^8$ cm. How many kilometres is this?
4. The distance of the earth from the moon is about 400 000km, the closest star (apart from the sun) to us (Proxima Centauri) is $4 \cdot 10^{10}$km. How many times further away is the star compared to the moon?
5. Equal or different?
   a) $5^4 : 5^2 = 625 : 25 = \ldots$ und $5^4 : 5^2 = 5^{4-2} = 5^2 = \ldots\ldots$
   b) $(1/2)^5 : (1/2)^2$ and $(1/2)^{5-2}$
   c) $(-10)^7 : (-10)^4$ and $(-10)^{7-4}$.
6. Did you see a rule which is working here? Express it in <u>words</u>, try to find a <u>formula</u> and give an example with <u>numbers</u>.
7. An amateur astronomer is thinking of making a model of the solar system using a scale of 1:1 000 000 000. Help him with his calculations! Use the results of task 2 on page 2!



   a. What is the distance of the planets to the sun in his model? Write this in in a senseful unit.

   b. What is the diameter of the planets in this model (have a look at a lexicon!)? Use a sensful unit!

   c. Look at the illustration of the solar system on the right side. What would you criticise? For what is it good for?

   d. How would you build up a model of the solar system? Is it e.g. possible to realise it on or around the schoolyard?