

POSSIBLE SOLUTION

Tennis ball radius is 2.7 inches, or 6.8cm

Earth radius is 3950 miles or 6371km

Moon radius is 1100 miles or 1700km

Distance from Earth to Moon is 238,850 miles or 384,400km

So, the Moon is about a quarter of the radius of the Earth, so in our model it's 1.75cm = about the size of a table-tennis ball (which has a real radius of 2cm)

Look at scale of tennis ball radius (cm) : earth radius (km) and it's roughly 1cm:1000km

So the distance from the Earth to the Moon is roughly 1/1000th of the real distance = 384cm

We conclude that if the Earth is a Tennis Ball then the Moon is roughly a Table-Tennis ball that's about 4 metres away!

EXTENSION

How are the 'real' dimensions of the earth and moon even known?

And what about the distance between the earth and the moon ... and is it constant? (ie does the moon have a circular orbit around the earth?)

How were they worked out?

JUSTIFICATION

This activity is considered a STEM activity, as it...

- provides a motivational starting point, from a Science perspective
- prompts student discussion about what information is required to solve it
- has a graphical/diagrammatic element
- requires students to deal with approximation and uncertainty.
- has contextualized mathematics of scale factors and units of measurement

There are some more suggestions for 'Preparing Students for STEM', here:

<https://nrich.maths.org/7308>

In particular, scroll down to Part 2 where it says....

- **"Inability to make estimates or approximations"**
 - Mathematical contexts in real applications are rarely simple. In order to apply mathematics predictively, approximations will need to be made. To make approximations requires the student to really understand the meaning and structure of the mathematics."

And then try this activity: <http://nrich.maths.org/6505>

There are also some related activities on the TI Science Nspired website:

Earth Science: Space – Scale Properties

<https://education.ti.com/en/tisciencespired/us/earth-science/space?m=Ctuqx14ph02YIZprwTz8Lg>

Earth Science: Space – Lunar Phases

https://education.ti.com/en/tisciencespired/us/earth-science/space?m=fkNibOo_nk-odsLQOxYZlw