



## Horrible Science Downloadable Experiments - 5 HOW TO MEASURE THE DISTANCE AROUND THE EARTH WITHOUT GETTING OUT OF BED

Ancient Greek genius Eratosthenes (270-190 BC) measured the Earth with the help of his ridiculously brainy brain but since this is Horrible Science you can cheat using a calculator. And you can find more gruesome geniuses in **FAMOUSLY FOUL EXPERIMENTS** published by Scholastic in 2007.

### WHAT YOU NEED:

Calculator (if you're a maths genius like Eratosthenes you really ought to do without one).

Planet Earth (hopefully you've got one of these)



Pencil and paper

### WHAT YOU DO:

YOU are going to be Eratosthenes (but don't worry you don't have to dress up in a tunic, sandals and embarrassing baldy head and fake beard). Here's the great man himself ...



1. You know that at noon on 21 June (Midsummer Day) the Sun shines directly down into a well in Syrene.
2. You also know that Syrene is 5000 stadia (that's an ancient unit of measurement) south of your home in Alexandria. (You've checked this with camel drivers - but you could send your slave teacher to pace it out just to make doubly sure.)
3. Using measurements made with a sundial, you know that the angle of the Sun's rays at noon in Alexandria on Midsummer Day is  $7.2^\circ$ .
4. You divide  $360^\circ$  (the number of degrees in a circle) by 7.2.
5. Multiply your result by 5000.
6. Finally, multiply your result by 0.16 to change stadia into kilometres.

### WHAT HAPPENS:

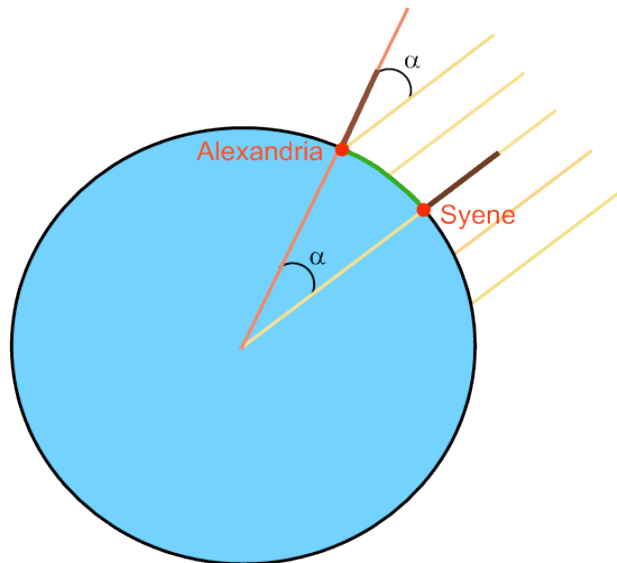
Your figure is very close to the modern measurement of Earth's



circumference through the poles – 40008 km. In fact no-one is too sure how long a stadia was but it's thought that Eratosthenes got a result very close to this.

THIS IS BECAUSE:

Here's a diagram that explains it all - the yellow lines are meant to be rays of sunlight and the angle shown is  $7.2^\circ$  ... Eratosthenes realised that the distance between the two cities must be  $7.2/360$  of the distance around the Earth. The rest was maths!



**Bet you never knew!**

Eratosthenes actually invented the word "geography" – so you can blame him for all those boring lessons! But he didn't always get his geography facts right – he thought Syrene was due south of Alexandria – and it wasn't!