



Relative Time Graph - Teacher's Notes

Relative Time Graph

Ptolemy divided degrees of latitude into 60 smaller (more minute) parts. He called these "partes minutae primae" and then these into even more minute parts "partes minutae secundae". This is why we call them "minutes" and "seconds". Again, the general public did not use these smaller subdivisions until the development of mechanical clocks.

Medieval town clocks often had only an hour hand.

Artisans such as smiths, engineers and pharmacists could estimate time using rhymes and prayers in much the same way that one second can be roughly measured by saying "One Mississippi" or one chimpanzeeses".



This brings us to the idea that one day can be divided into 24 hours, which can each be divided into 60 minutes, which can each be divided into 60 seconds. To create uniformity across the Earth, the new definition of a second is taken as the time taken for 9,192,631,770 energy transitions of a cesium atom. This not only allows for UTC (Co-ordinated Universal Time - in French) it also allows for the addition of "leap" seconds to permit greater accuracy and agree with astronomical time. Eight times in every ten years a minute has 61 seconds.

Relative timescales

Materials

- Graph paper or the worksheet provided
- Three different coloured pencils

Method

We are going to see the differences in size of the units we use to measure one day.





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1. Each small square on the graph paper is two seconds
2. Colour in 1 second in **green** in the square at the bottom left corner of the graph paper. What fraction of the square will it be? $\frac{1}{2}$
3. Label this "1 second".
How many 1 seconds are there in a minute? **60**
Do you think we can fit one minute of seconds into this graph paper?
Students write in their best guess.
How many squares would we need to fill in for one minute? **Half of 60 = 30 squares.**
4. We shall colour one minute worth of seconds in **red**. (remember to include the first second)
5. Label this "1 minute".
Did the minute of seconds fit into the graph paper? **Yes, easily.**
Is a second larger or smaller than a minute? **Smaller**
What fraction of a minute is a second? **1/60**
How many minutes make an hour? **60 minutes**
Do you think you will be able to fill in an hour of seconds onto this graph paper? Explain your answer. **Yes because there is room for six of these red blocks on the graph paper.**





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6. Outline this 1 hour block in blue
Guess how many seconds there are in 1 hour

- a. 6 seconds (1/10 minute)
- b. 60 seconds (1 minute)
- c. 360 seconds (6X60 seconds)
- d. 3,600 seconds (60X60 seconds)

Can we fit a day into this graph? **No**
because a day has 24 hours and there
isn't room for 24 blue blocks.

Why do we have a minute hand (and sometimes a second hand) on
clocks and watches? **To accurately measure time for things which
take less than one hour**



To boil an egg = 3minutes - Too little it is runny - too long it turns into
rubber!

Year 3 to run 100m ~16seconds (Teacher might take a little longer)

To measure heart rate 70 to 110 beats per minute

