Slide 1:
For this activity, we're going to condense the 13.8 billion years of the Universe into one calendar year to look at it on a smaller, more manageable scale. It's very hard to visualise 13.8 billion years but it might be easier to understand how old the Universe is when we see it all in one calendar year.

Slide 2:
This calendar will begin on the 1st of January, with the first moment of that day being the beginning of the Universe and midnight on the 31st of December will be now. To try and understand how long these times are, the scale we are using means that one second is around 437.5 years, one hour is 1.575 million years, one day is 37.8 million years and each month is around 1.1 to 1.2 billion years.
Now that we know this, I want you to cut out the images on one of the sheets of paper with the historical events on it. When they're cut out, stick a small piece of blue tac to the back of the image and stick it to the same image on the uncut sheet. This is so it will act as a sticker sheet for this activity.
When this is done, you will have 10 minutes to make an estimate for when each of those events occurred on the cosmic calendar. It might be more surprising than you think!

Slide 3:
Now let's start off with the first month! As many might have expected, the Big Bang which started off the Universe happened on the 1st of January, 13.8 billion years ago. It would be nearly a billion years later before the first galaxies would form on the 22nd of January, 12.85 billion years ago.

Slide 4:
And in February, nothing really happens for us on our cosmic calendar. Things are obviously happening in the Universe with galaxies being born and stars being created but when it comes to us, our galaxy hasn't even formed yet.

Slide 5:
This wouldn't happen until the 16th of March, 11 billion years ago. And this would not even be the galaxy we know today but the start of it. Our galaxy, the Milky Way. would not finish fully forming its disk until the 12th of May, 8.8 billion years ago. It takes over 2 billion years for just our galaxy to form!

Slide 6:
And as you can see here, for five months there's really nothing going on in the Universe that relates to us. Far off in some other galaxy this might be a very busy time but for us it's quite empty.

Slide 7:
In September, on the 2nd, the Solar System formed, about 4.57 billion years ago. It would be 2 days later, or about 70 million years, when the Moon forms, 4.5 billion years ago. But though everything has been so spaced out before, suddenly life occurs on Earth in the same month that the Earth is formed. The Earth formed 4.5 billion years ago, it would only take 700 million years for the first life to occur on Earth, 3.8 billion years ago.

Slide 8:
And it would be on the 29th of October when the atmosphere becomes oxygenated, which means the first life on Earth didn't even need oxygen to breathe!

Slide 9:
In November we really don't have anything of note going on.

Slide 10:
But December is a totally different story. The first multicellular life would occur on the 5th of December, 0.8 billion years ago. Soon after the first simple animals would happen on the 7th, 0.67 billion years ago. Then we would have the first insects on the 14th, 0.55 billion years ago. Fish would occur on the 17th, 0.5 billion years ago. The first plants would occur on the 20th, followed by seeds on the 21st, 0.4 billion years ago. Reptiles would come into existence on the 23rd, 0.3 billion years ago, and on the 25th our favourite big reptiles, the dinosaurs, would evolve into existence, 0.23 billion years ago. Flying dinosaurs like the pterodactyl would have to wait until the 27th to happen, 0.15 billion years ago, followed closely by flowers. And then on the 30th of December, the famous asteroid would hit and the dinosaurs would go extinct, 66 million years ago. We've gotten pretty much to the end of December and we humans have still not appeared at all!

Slide 11:
We will have to get closer to midnight on December 31st before we appear. It would be at 9pm on the 31st when the first apes appear, 15 million years ago. And this would be quickly (relatively speaking) followed by primitive humans, 2.5 million years ago, at 11pm on our calendar. Humans would domesticate fire 0.4 million years ago and modern humans like us would evolve 0.2 million years ago.

Slide 12:
Now we get into the last minute of December 31st. With half a minute to midnight, farming and the last ice age happen. That's about 12.5 and 12 thousand years ago. 20 seconds to midnight we have Newgrange, Stonehenge and the alphabet, all around 5 thousand years ago. The Iron Age is 10 seconds to midnight, 1.3 thousand years ago and the Renaissance is only 1 thousand years ago. And finally there's the Modern Age, in the last second to midnight, beginning 500 years ago.

Slide 13:
And this is how it all looks on a condensed timescale. A lot happens in very little time on the cosmic calendar!

Midway Questions:
When did you guess where dinosaurs/humans occurred?
Did you expect that it took so little time for all this to happen?
We've only been around for half a minute and we've done quite a lot, can you imagine what else we could do if we lived for as long as the dinosaurs?

Slide 14:
Now we can move into the future. All these events are hypothetical and are not fact and can seem a bit dismal. However, this stuff is not set in stone and may change!

In the first 3 hours after midnight, Niagara falls will wear away, which is in about 50 thousand years. An asteroid around 1km in size may hit Earth in 500 thousand years and the Pyramids of Giza will wear away in 1 million years. At 4pm, in around 20 million years, Eastern Africa will split apart from the rest of Africa.

Slide 15:
On the 2nd of January the Mediterranean Sea will close up when Europe and Africa collide, that's in 50 million years. Saturn will lose its rings in 100 million years and on the 8th of January, 450 million years into the future, a new supercontinent will possibly form.

Slide 16:
On the 8th of February, 1 billion years into the future, the oceans will evaporate.

Slide 17:
And on the 1st of March, 2 billion years into the future, all life will die on Earth. In 3 billion years, on the 18th, the Milky Way galaxy will collide with the Andromeda galaxy, the greatest light show in history!

Slide 18:
On the 9th of April, the Sun will expand into a Red Giant which will be 4 billion years into the future. (*Possible Question, What is a red giant star?: A red giant star is formed when a star like our Sun burns up all of its hydrogen by converting it into helium in its core. However, there is a shell of hydrogen around this core. Because the fusion has stopped, the outward pressure decreases so that the gravity of the star starts to compress the core and the hydrogen shell. This reignites the hydrogen fusion in the shell and the layers outside this shell expand.*)

Slide 19:
And for another 2 months, not much happens for us. So for around 2 billion years not much will change.

Slide 20:
In July, on the 28th, the Sun will destroy the Earth as it has expanded out into its red giant phase. This is around 7.9 billion years into the future, so not something to worry about right now!

Slide 21:
The Sun will then become a white dwarf star on the 12th of August, 8 billion years into the future. (*Possible Question, what is a white dwarf star? When the Sun has started to fuse helium, it will fuse it into carbon and oxygen. Stars like the Sun aren't big enough to fuse these heavier elements so it will be left with an outer helium and hydrogen shells that will eventually exhaust its fuel and radiate away from the star into what becomes a planetary nebula, leaving this hot dense white dwarf star behind.*)

Slide 22:
And for another little while nothing really happens in our Solar System.

Slide 23:

That is until the 31st of December of the second cosmic year when the Solar System is destroyed, about 12 billion years into the future. But that’s a long while away and who knows where we could be by then!