



History of the universe

Time

time

60 minutes

learning outcomes

To:

- learn that the universe is very old
- discover that the Earth was created relatively recently
- learn that humans have been on the planet for a relatively short time
- practise maths skills

end product

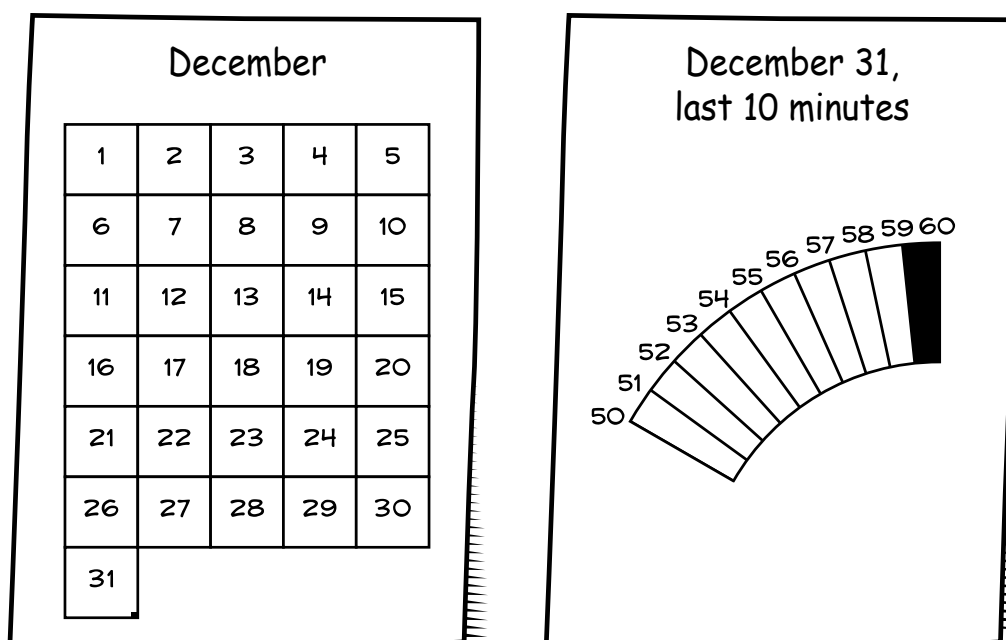
- a timeline showing various events from the beginning of the universe to the present day

materials needed

- craft paper
- calculators or squared paper
- scissors
- glue
- colouring pencils
- coloured A4 paper

Preparation

For the activity **Timeline of the universe** you will need a timeline made from 12 sheets of A4 paper. Each sheet of paper represents one month. Divide the month of December into 31 squares. These are the days. Number the days 1-31. On a sheet of coloured A4 paper, draw a section of a circle as shown in the drawing. This represents the last 10 minutes of December. Display the timeline, together with the section of circle, on the wall in the classroom.





What is a year? 10 min.

The children complete Task 1 on the worksheet. Explain briefly what a year is. Ask if every year is the same length of time. Discuss the following questions: How old is old? Is a father old? And a grandfather? Father Christmas? An antique chair? Discuss with the children how far back in time we know about. Explain that most of what we know about long ago comes from written sources. Everything that we know about the time before people learned to write has been deduced by scientists on the basis of research, such as archaeological digs.



The children investigate how old the universe is and when important events took place in the universe and on Earth.



Timeline of the universe 40 min.

Draw the children's attention to the timeline. Explain that this timeline shows time from the beginning of the universe to the present day. Now look at the section of the circle and explain that this shows the last ten minutes in the year. Organise the children into groups of three. Give each group a calculator or a sheet of squared paper. The children complete Tasks 2a to c. Help them to complete the table. Explain how to calculate how long a month on the timeline is in reality (15 billion years divided by 12 months = each month on the timeline is 1.25 billion years in reality). You can find the answers in the list below. The children will need this information for the next task.

1 year	=	15 billion years
1 month	=	1.25 billion (1250 million) years
1 week	=	300 million years
1 day	=	43 billion years
1 hour	=	1.8 million (1,800,000) years
1 minute	=	30,000 years
1 second	=	500 years

Good to know. According to the Big Bang theory, the universe was 'born' around 15 billion years ago. After this the universe developed, the galaxies (including our own, the Milky Way) were formed, the Sun was born and the Earth took shape. The various geological eras passed, and life as we know it today evolved from the first living organisms. On the timeline the children will be making, the Big Bang took place at 00.00 on 1 January. Earth was born in September, and the first human appeared on 31 December at 23.57.

time on timeline	time in reality	event
1 January	15 billion years ago	beginning of the universe
early January – mid-march	12 – 14.7 billion years ago	birth of solar systems
early September	5 billion years ago	birth of Sun and planets
end of September	3.8 billion years ago	emergence of first life forms
25 December	225 billion years	mammals appear on Earth
29 December	65 million years ago	extinction of dinosaurs, more mammals ap-
pear	30 December	5 million years ago
first ancestors of man appear		
31 December 23.53.00	195,000 years ago	Homo Sapiens appears
31 December 23.59.52	4300 years ago	building of Stonehenge
31 December 23.59.59	around 400 years ago	invention of the telescope



Give each group a specific event to investigate. The third column of the above table shows eleven events that can be shared among the groups. The groups complete Task 2d to j. The children calculate the point on the timeline on which their event took place. Before they begin, discuss the example on the worksheet.

For Task 2k hand out craft paper, colouring pencils, glue and scissors. Encourage the children to make something associated with the event they have just investigated and paste it in the correct place on the timeline.



How old is old? 10 min.

The children complete Task 3 on the worksheet. Discuss the answers and the timeline. Explain that the entire timeline covers a span of 15 billion years. So one second on the timeline actually represents 500 years! Come to the conclusion that the universe is very old, that the Earth came into existence relatively recently and that people have only lived on the planet for a relatively short time. Review the activity **What is a year?** Has the children's concept of 'old' changed?



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worksheet

History of the universe



You are going to answer the following questions: *How old is the universe? and When did a number of important events in the universe take place?*



1 What is a year?

a How many months are there in a year? _____ months

b In which month is your birthday? _____

c What do you think is old?

2 Timeline of the universe



You are going to make a timeline of the universe.

First of all you need to calculate the units of time that make up a year on Earth.

a Write your answer in the space provided.

A year has _____ months.

A year has _____ weeks.

A year has _____ days.

A day has _____ hours.

An hour has _____ minutes.

A minute has _____ seconds.

b Fill in column 2.

Complete
column 2
HERE

Complete
column 3
HERE

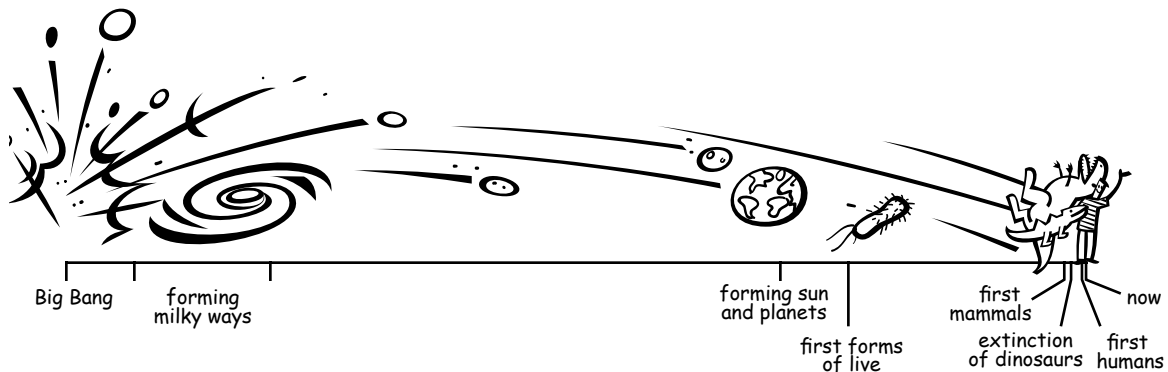
Time on timeline	Fraction	Time in reality (years)
1 year	1	15 billion
1 month	1/ _____ of a year	15 ÷ _____ = _____
1 week	1/ _____ of a month	300 million
1 day	1/ _____ of a week	300 million ÷ _____ = _____
1 hour	1/ _____ of a day	300 million ÷ _____ = _____
1 minute	1/ _____ of an hour	30,000
1 second	1/ _____ of a minute	30,000 ÷ _____ = _____

c Complete column 3 on the previous page.

Remember: 1 year on the timeline is 15 billion years in reality. Calculate the time

in reality by dividing the figure in column 3 by the figure you wrote in column 2.

The sums in column 3 are to help you calculate.



d Your teacher will give you an important event in the history of the universe

for you to investigate in your group: _____

How long after the beginning of the universe did your event take place?

Read the example below before answering this question.

Birth of galaxies: 12 billion years ago

Step 1

How many years after the beginning of the universe did your event take place?

15 billion - 12 billion = 3 billion

Step 2

How many months after the beginning of the universe is this on the timeline?

3 billion \div 1.25 billion = 2.4 months on the timeline.

Step 3

How many days of the partial month is this on the timeline?

$31 \div 10$ (this is a fixed number) \times 4 (this is the number after the decimal point in Step 2) = 12.4 days

On the timeline, 12 billion years is represented by 2 months and 12.4 days after the beginning of the universe. The date on the timeline is 13 March.

EXAMPLE

e	Write down the answers for your event.
	15 billion – _____ billion = _____ billion years after the beginning of the universe.
f	One month on the timeline represents 1.25 billion years.
answer question e	On the timeline, how many months after the beginning of the universe did your event take place?
	_____ billion years ÷ 1.25 billion years = _____ months
	after the beginning of the timeline.
g	In which month of the timeline was this?
	Remember: February is 1 month after January, July is 6 months after the beginning.
	The month: _____
h	Did your event take place in December? yes / no
	If you answered yes go to question i.
	If you answered no go straight to question k.
i	On what day did your event take place? December has 31 days. Look carefully at the example in the table in question b and the example on the previous page.
	Day: _____
	If you answered 31 December go to question i.
	If you did not answer 31 December go to question k.
j	What is the exact time at which your event took place?
	Express your answer in hours, minutes and seconds. The time is: _____

- Make something to attach to the timeline that shows your event.

- Attach your event to the appropriate place on the timeline.

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How old is old?

a

How old is the universe?



b

How long ago did the Earth come into being?

c

How long ago did the first people appear on Earth?

d

Do you think people have been on the Earth for a long time, or not?

e

Why do you think that?

write your
answers
HERE