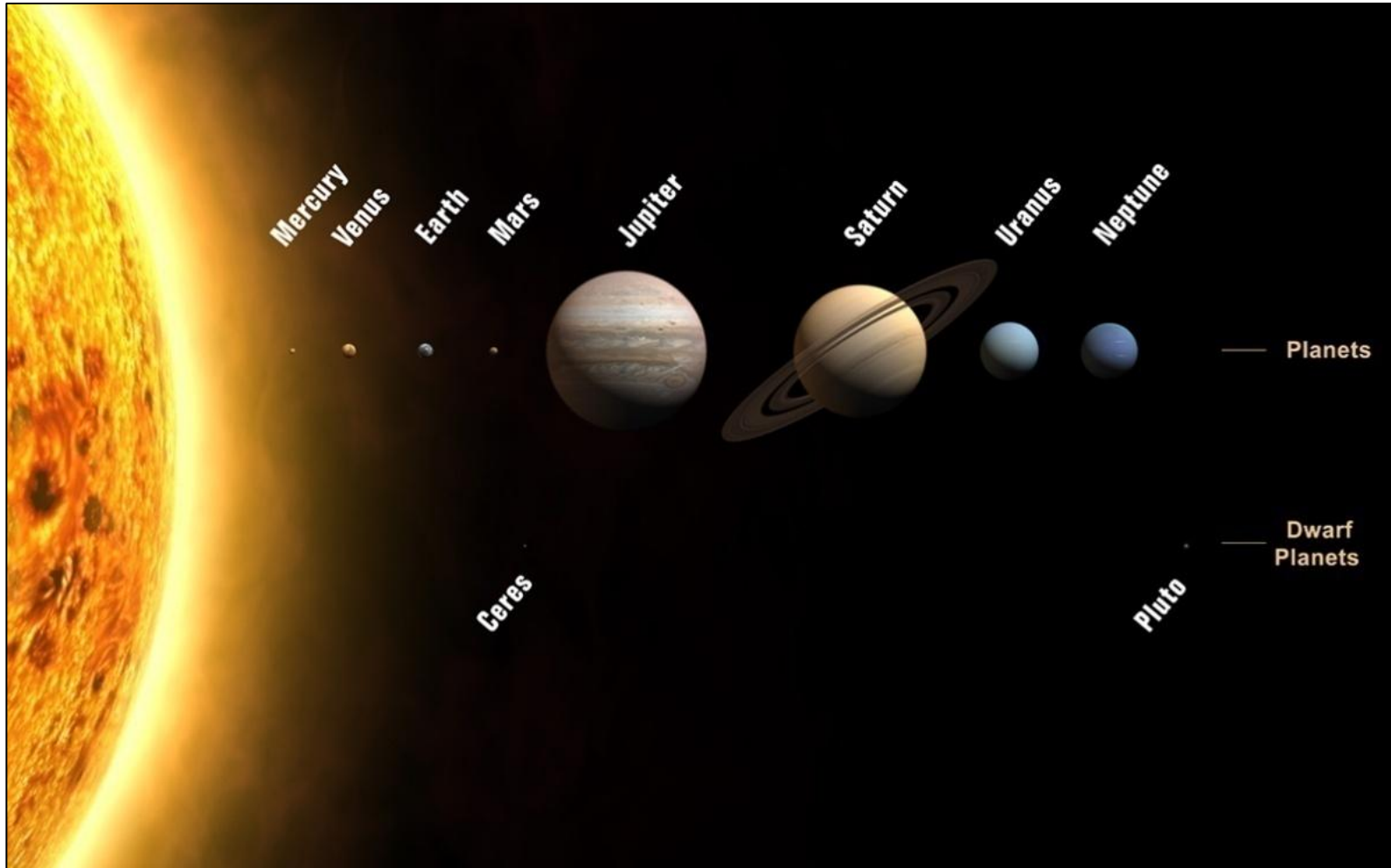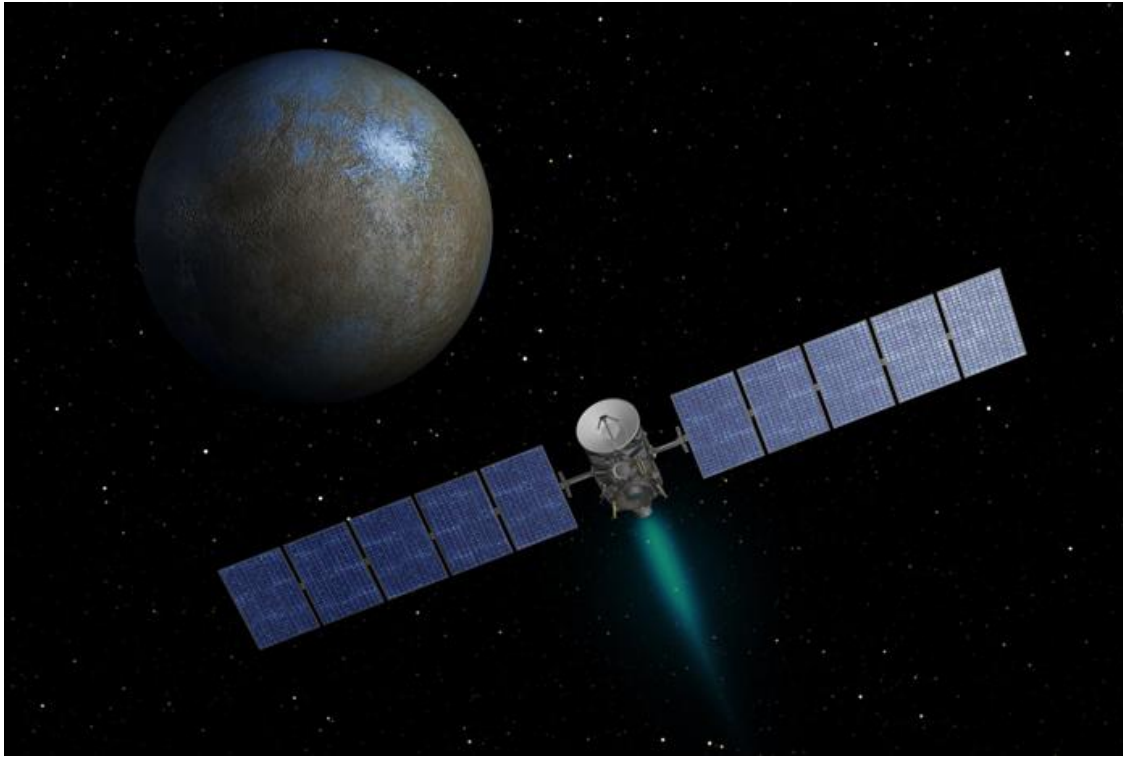# *The Astronomer*

What do astronomers study?

"There are different aspects to astronomy, and most astronomers will concentrate only on one particular area. Some examples of these areas could be solar astronomy, planetary astronomy, or the study of stars and/or galaxy formations."

Observational Astronomers

"Observational astronomers use a spacecraft or a digital camera attached to a telescope in order to test a theory or answer a question. Theorists try to understand the processes responsible for a star's appearance."
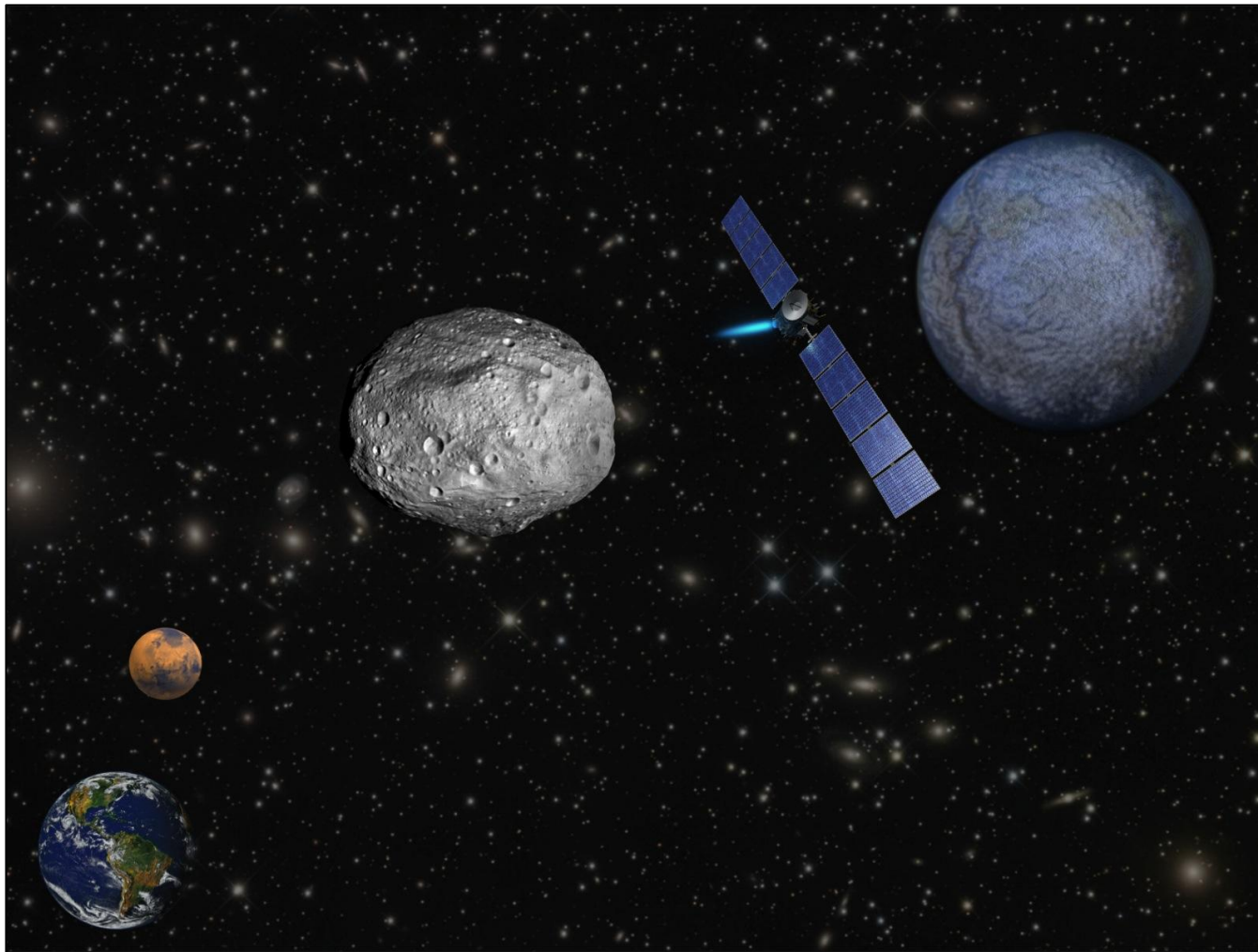
This picture (courtesy of NASA/JPL) shows the DAWN spacecraft. After leaving Earth, the spacecraft flew past Mars to the giant protoplanet Vesta, where it spent 14 months in orbit. Now it is on its way to orbit dwarf planet Ceres.
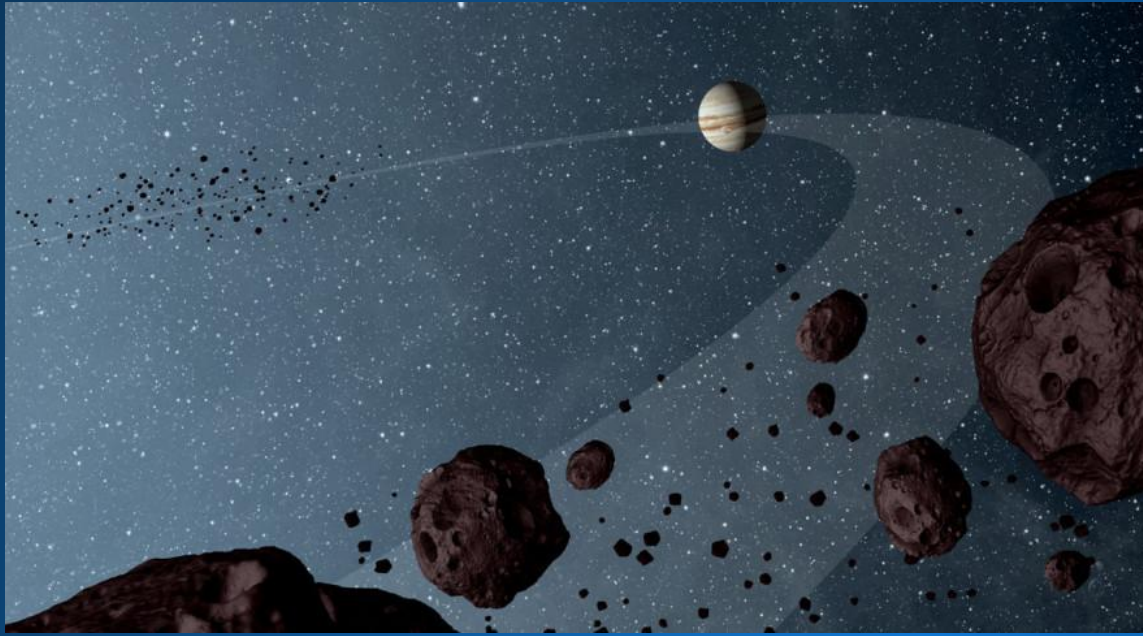
Milky Way Galaxy
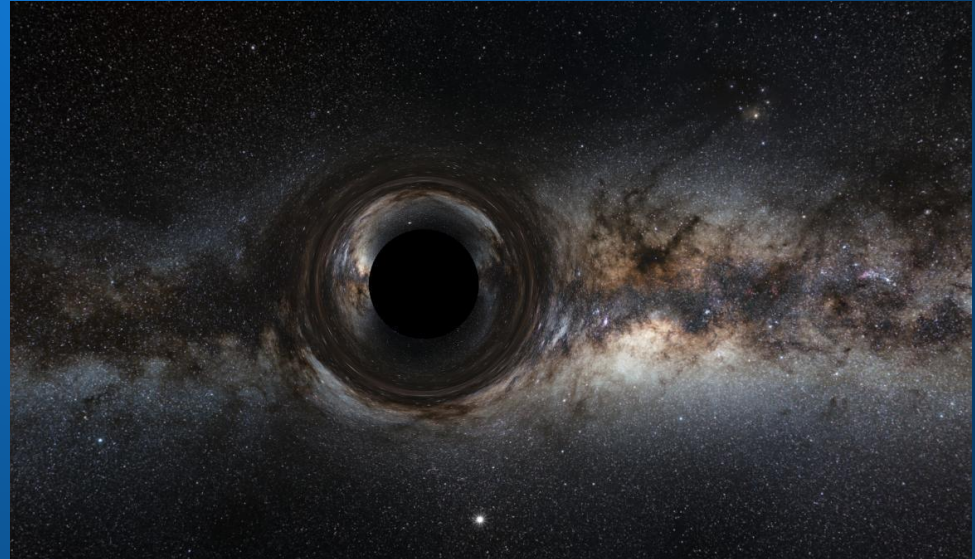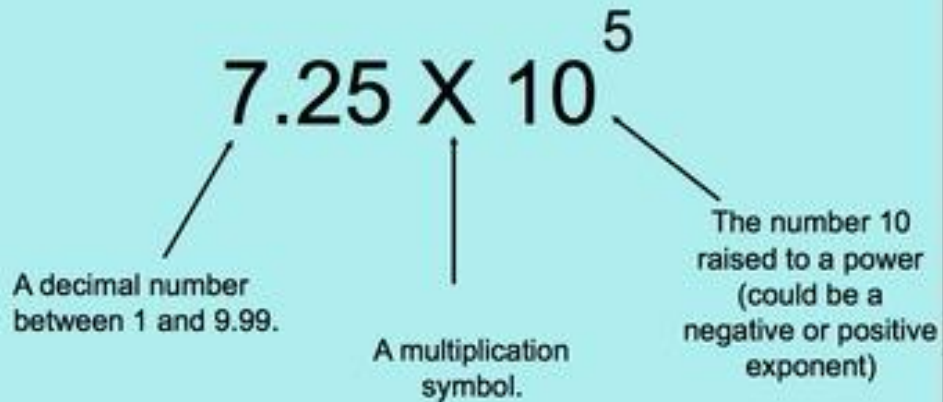
How do astronomers use math?

Astronomers use math to manipulate the equations

"Astronomers use math all the time. One way it is used is when we look at objects in the sky with a telescope. The camera attached to the telescope records a series of numbers - which correspond to how much light different objects in the sky are emitting, what type of light, etc.

To be able to understand the information that these numbers contain, we need to use math and statistics to interpret them."

Astronomers also use math to express numbers in scientific notation

Powers of Ten

Power	Equation	Standard Form
10^1	10	10
10^2	10 × 10	100
10^3	10 × 10 × 10	1,000
10^4	10 × 10 × 10 × 10	10,000
10^5	10 × 10 × 10 × 10 × 10	100,000
10^6	10 × 10 × 10 × 10 × 10 × 10	1,000,000
10^7	10 × 10 × 10 × 10 × 10 × 10 × 10	10,000,000
10^8	10 × 10 × 10 × 10 × 10 × 10 × 10 × 10	100,000,000
10^9	10 × 10 × 10 × 10 × 10 × 10 × 10 × 10 × 10	1,000,000,000

Numbers written in scientific notation have 3 parts:

$$7.25 \times 10^5$$

A decimal number between 1 and 9.99.

A multiplication symbol.

The number 10 raised to a power (could be a negative or positive exponent)

$$2 \times 10^9$$

2.000000000

1 2 3 4 5 6 7 8 9

2,000,000,000

Scientific Notation

Positive exponent means your number is very big!!!

$$4.23 \times 10^{3}$$

4.23

. Move right →

= 4230

Negative exponent means your number is very small!!!

$$7.003 \times 10^{-4}$$

7.003

← Move left .

= 0.0007003

Scientific Notation

$7{,}500{,}000{,}000 = 7.5 \times 10^{9}$

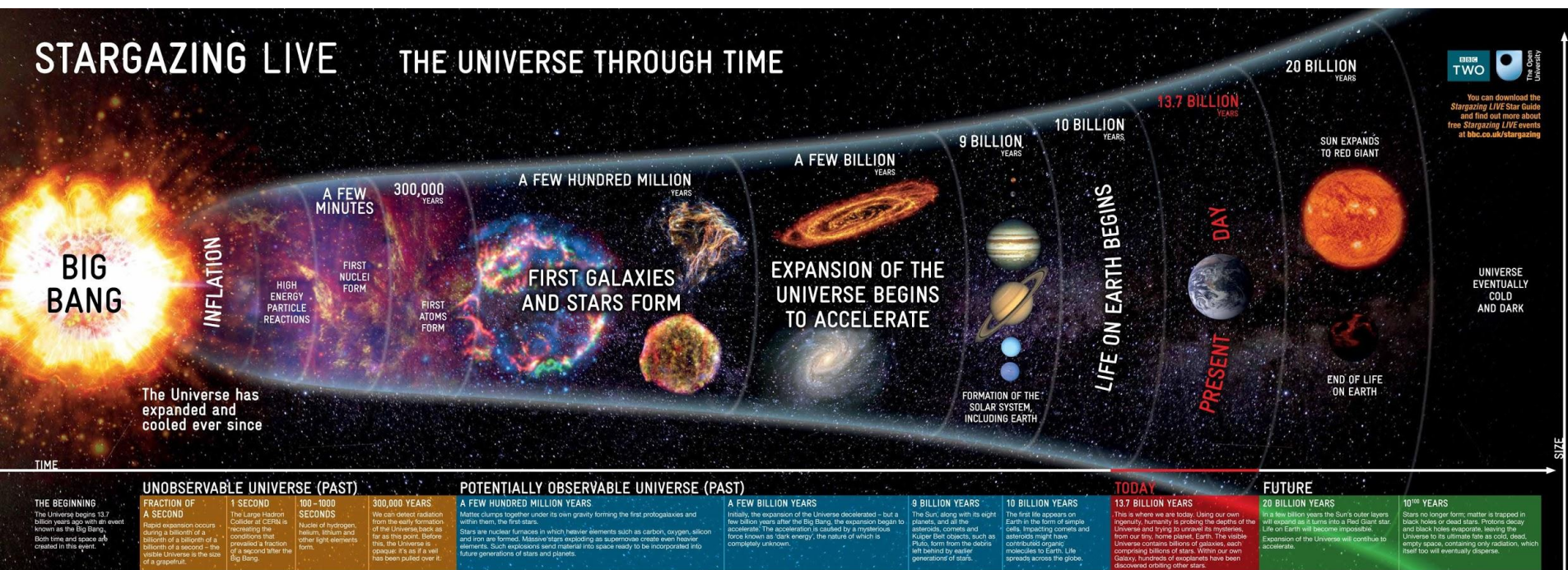$0.00000000005 = 5 \times 10^{-11}$
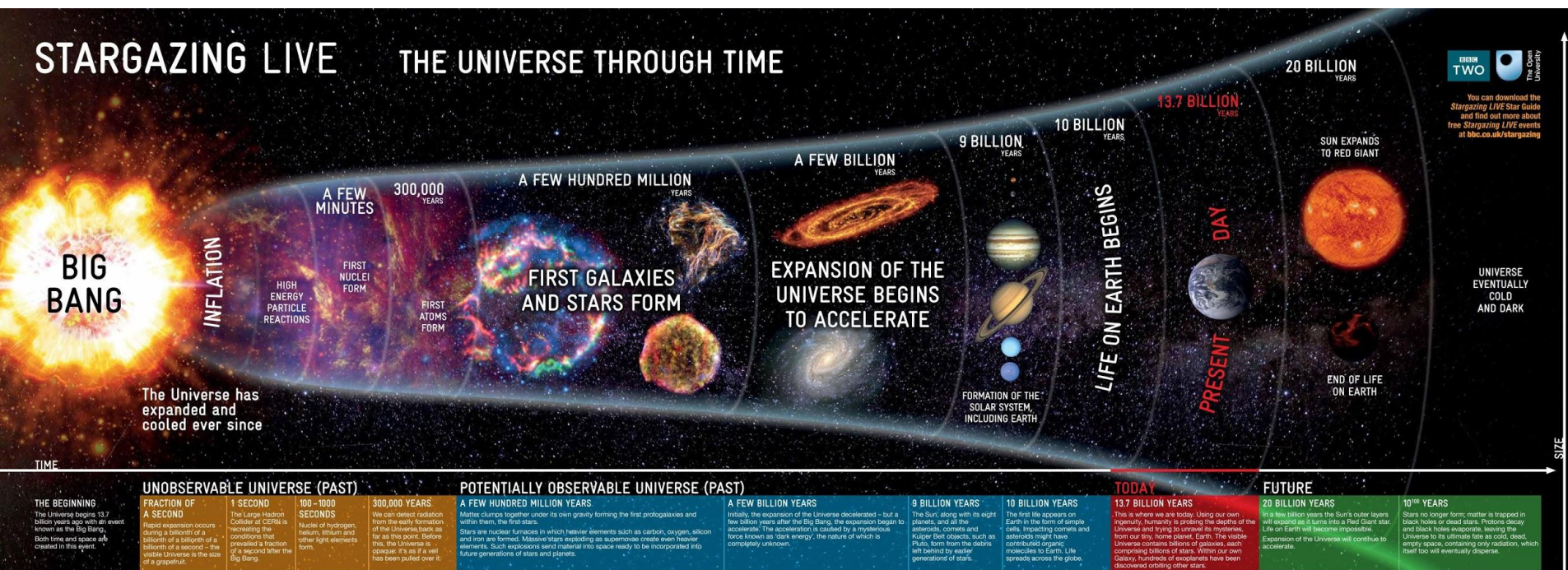
The age of the universe

The estimated age of universe is 14 billion years. That is the same as **14, 000,000,000 years.**

Can you write the number using scientific notation?

Answer: 1.4×10^{10} years

→ Read through history of mathematics when you're in high school
(Ex*: The Nature and Growth of Modern Mathematics*)

→ Take as many math classes as possible when you're in college
(Ex: Statistics, Linear Algebra, Calculus, Tensor Analysis)

Things you can do to become astronomer

→ Go to college! Study mathematics and science while you're there.

→ PhD degree: About 10 years of college!!!
(Other careers are possible with less education)

The end!

Works cited

- https://www.sokanu.com/careers/astronomer/
- http://curious.astro.cornell.edu/about-us/147-people-in-astronomy/careers-in-astronomy/being-an-astronomer/913-how-do-astronomers-use-math-in-their-jobs-beginner
- https://teachable.uk/228-powers-of-10-ks3/
- https://www.pinterest.com/pin/26106872818453185/
- http://slideplayer.com/slide/5742578/
- http://www.physics.drexel.edu/~hoyle/week1.html