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Introduction and Context

4/4 points earned (100%)

Retake

Course Home

Excellent!

✔ 1 / 1
points

1.

[#111] **Clouds of Magellan**

The Clouds of Magellan are

⬤ galaxies containing billions of stars

Correct

◯ collections of water vapour that appear in otherwise clear skies

◯ optical illusions reported by a Portuguese navigator

✔ 1 / 1
points

2.

[#112] **Democritus and Ajivika** (only look them up if you're interested)

I pour the contents of a full bottle of water into *four* glasses, equal amounts in each. I then take one of the glasses and and divide it in *four* equal parts. Then one of those parts into four equal parts. Ignoring the practicalities of the division, what's the maximum number of times I can do this and still have at least one molecule in each portion?

(Hint: reviewing the movie may help. And 4 is twice 2, but it is also 2 squared!)

◯ Between 0 and 20

⬤ Between 20 and 50

Correct

◯ Between 50 and 100

◯ More than 100

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1 / 1 points

3.
[#113] **What's your bus voltage?**

(Hint: for this question, reviewing the movie may help. We want you to get in the habit!)

The human brain uses binary signals with typical voltages of:

○ ~ 0.01 volt (i.e. roughly between 0.003 V and 0.03 V)

◉ ~ 0.1 volt (i.e. roughly between 0.03 V and 0.3 V)

Correct
The answer is about 100 millivolts or 0.1 V. Yes, it's binary in voltage because the pulses (action potentials) are either there or not, like the pulses in digital electronics. (By the way, several physicists have won the Nobel prize for Medicine and Physiology for their research in neurobiology.)

○ ~ 1 volt (i.e. roughly between 0.3 V and 3 V)

○ ~ 10 volt (i.e. roughly between 3 V and 30 V)

○ ~ 100 volt (i.e. roughly between 30 V and 300 V)

○ ~ 1 killervolt (sorry, I couldn't help myself)

○ 5 V in the TTL model, but mine is CMOS

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1 / 1 points

4.
[#114] **The age of the universe**

Going back to one of those big questions: Cosmologists tell us that the universe is 14 billion years old. Hooee, that's quite a while! But how long is that in seconds? Hint: Use the 'multiply by 1' technique. And think carefully about how you write your answer and *how precisely you know it*. This question introduces a topic that we'll treat in detail in the next segment.

Give your answer in scientific notation, i.e. with one digit before the decimal point. For example, 0.0254 metres (which is one inch) would be written as 2.54×10^{-2} m in **scientific notation***.

When inputting your answer, use the following format: 2.54 * 10^-2. You can click 'Preview' before submitting your answer. Do not include units.

The universe is _____ seconds old.

* Scientific notation is part of the assumed knowledge for this course. When we write 10^2 (also written 10^2), we mean 10 squared or 100. When we write 10^{-2} (also written 10^-2), we mean 1/100 or 0.01.

Preview

4.4×10^{17}

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  4.4 * 10^(17)
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Correct Response
Worked solution:

$$14 \text{ billion years} = 1.4 \times 10^{10} \text{ years} * \frac{365.242 \text{ days}}{1 \text{ year}} * \frac{24 \text{ hrs}}{1 \text{ day}} * \frac{3600 \text{ seconds}}{1 \text{ hr}} = 4.41797 * 10^{17} \text{ seconds}$$

according to the calculator.

However, the single correct answer is 4.4×10^{17} (with 2 significant figures). Don't worry if you had too many figures: its a bit subtle and we'll discuss significant figures in the next video.
Your answer, 4.4 * 10^(17), is equivalent to the instructor's answer 4.4 * 10^(17).