

chapter 1 questions to answer

Can science tell you what is right and what is wrong?

Can scientific conclusions about the universe negatively influence religious / political beliefs?

If “science” concludes that free will is an illusion, would you be wise or silly to start behaving like a machine?



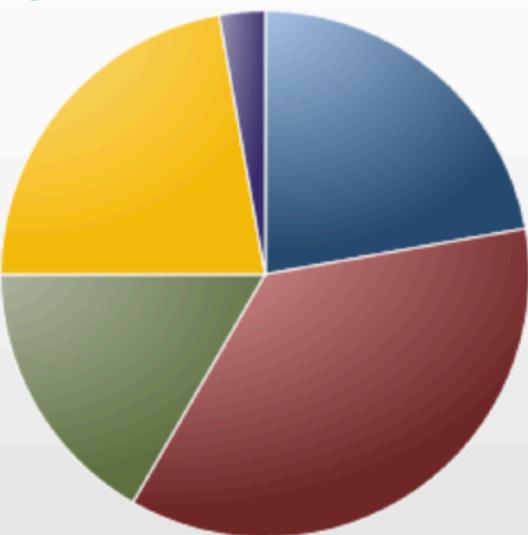
What (exactly) are the characteristics of life? (as we know it)

QtA: How might you decide whether a particular object is alive or not?

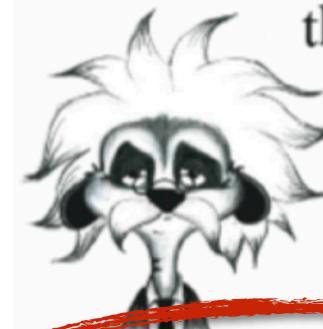
2.1: Life's and its origins first read p. 24-33 first

If you had to offer an opinion, would you argue that life in the universe is (pick all that apply or add your own)

- common and arose independently and is present widely, throughout the universe
- rare, and perhaps restricted to the Earth
- uncommon, but once life arose, it has probably been spread through space travel
- almost certainly a supernatural event
- not a question that can be answered scientifically



“Intelligent life on other planets?
I'm not even sure there is



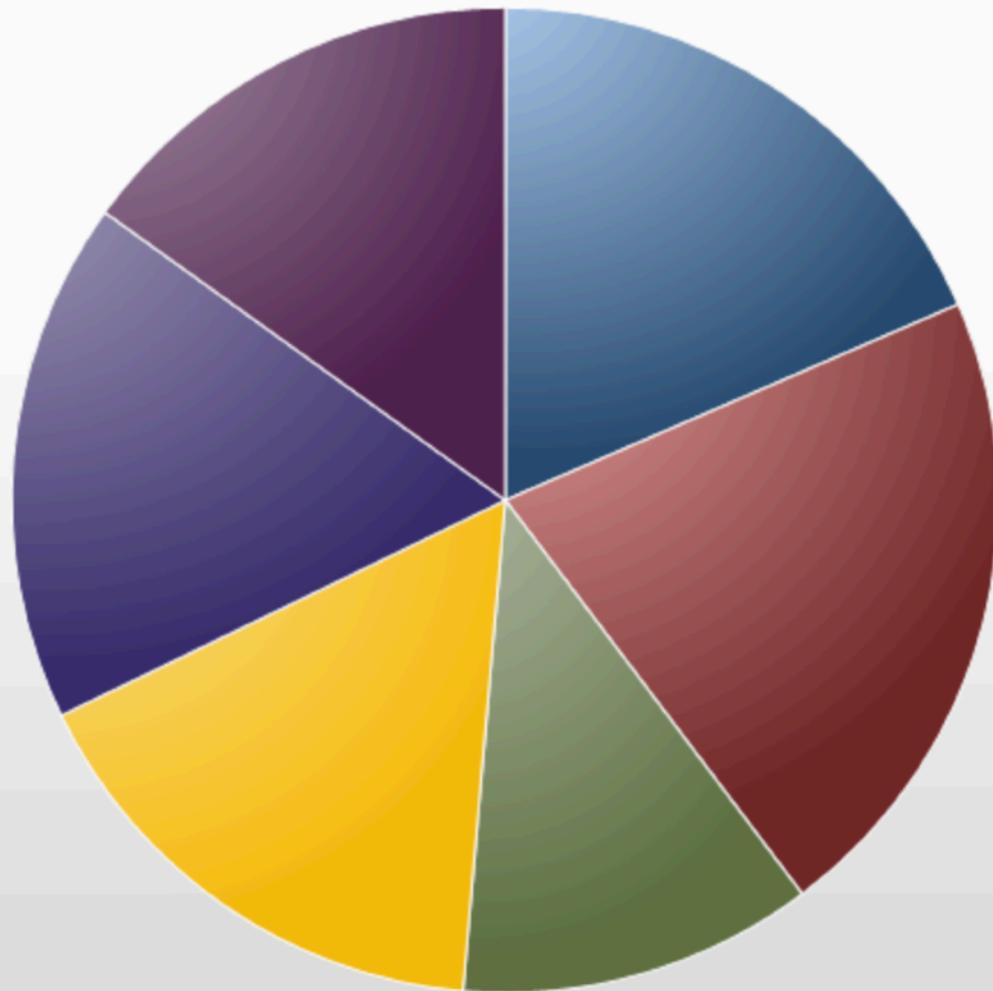
on earth!”
Albert Einstein

What is the main reason for your answer?

- common and arose independently and is present widely, throughout the universe
- rare, and perhaps restricted to the Earth
- uncommon, but once life arose, it has probably been spread through space travel
- not a question that can be answered scientifically
- see below

You are asked to consider the key features of a living system: they would necessarily include ..

- a non-equilibrium state
- the ability to reproduce



- a non-equilibrium state
- the ability to reproduce
- catalysts
- a mutable genetic material
- DNA
- proteins

You are asked to consider the key features of a living system: they would necessarily include ..

What are the properties of a boundary layer compatible with life? Make a drawing (below) of a living system and explain (text box)

- a non-equilibrium state
- the ability to reproduce
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Draw

Erase ▾

Reset

You are asked to evaluate the key resources of a living system... they could necessarily include ...

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Page 4 of 4

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Page 4 of 4

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Page 4 of 4

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Page 4 of 4

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What are the properties of a boundary layer surrounding a cell? There is a defining feature of a living system and explain (200 words)



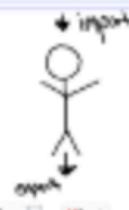
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Page 4 of 4

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Page 4 of 4

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Page 4 of 4

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Page 4 of 4

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Page 4 of 4

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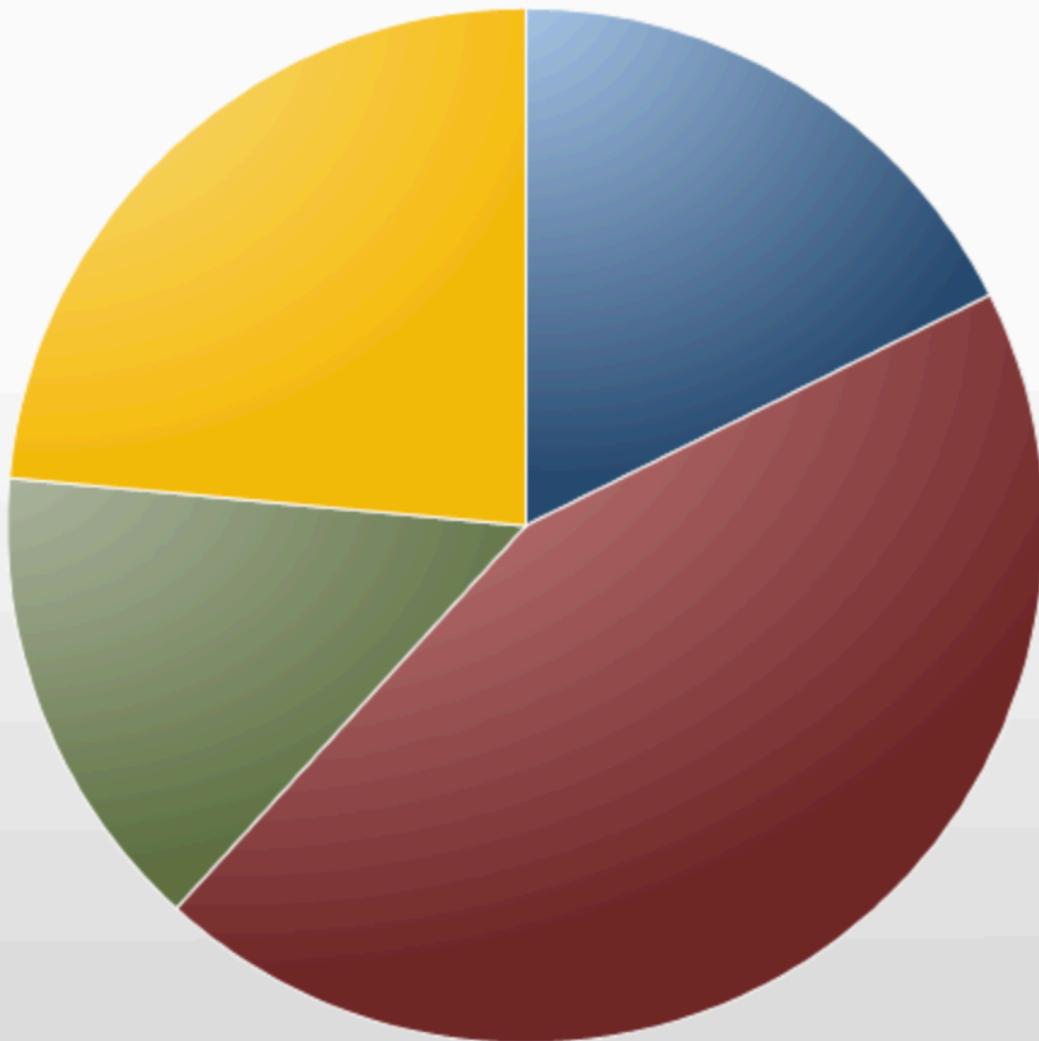
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Page 4 of 4

We can think of the number of times that life arose on Earth versus the number of types organisms present (are they the same?)

- many times
- at least once
- impossible to know



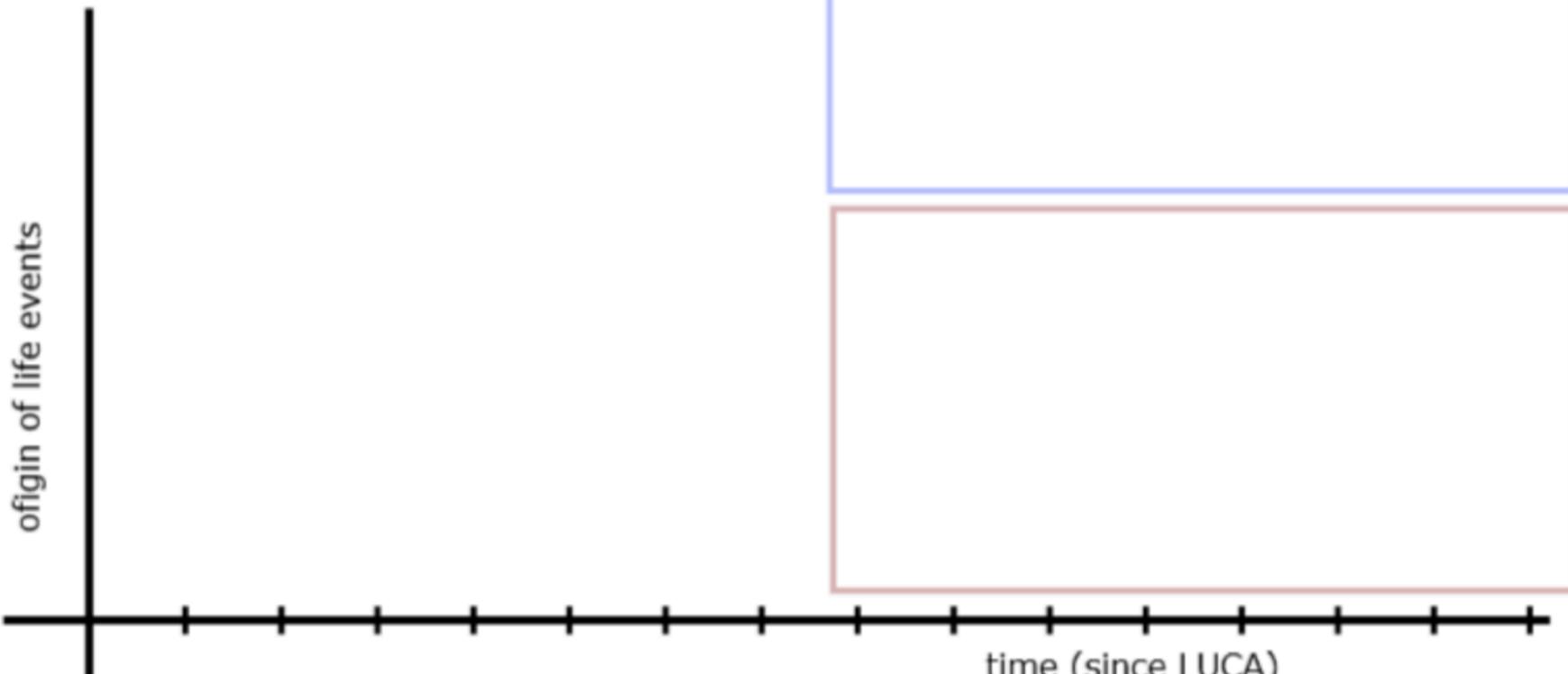
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Assume that LUCA was alive at t=0; on the graph indicate its presence on new (unrelated organisms). In the box, explain your logic

explain your logic



Draw

Adjust

Erase

Reset

What is the probability that a particular organism will die?

- 1:1000
- 1:100
- 1:10

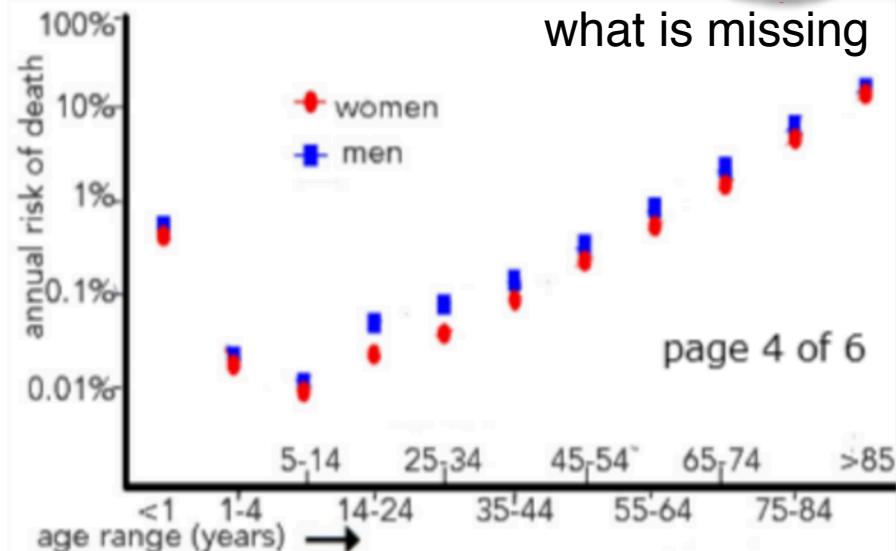
Consider the graph, which displays the probability of death (for women & men) in a group of humans as a function of age.

Why does it have the shape it has?

Which makes more sense, to connect the dots or to draw a "best fit" curve that comes close to, but does not necessarily connect the individual dots. Please explain

what is missing

page 4 of 6



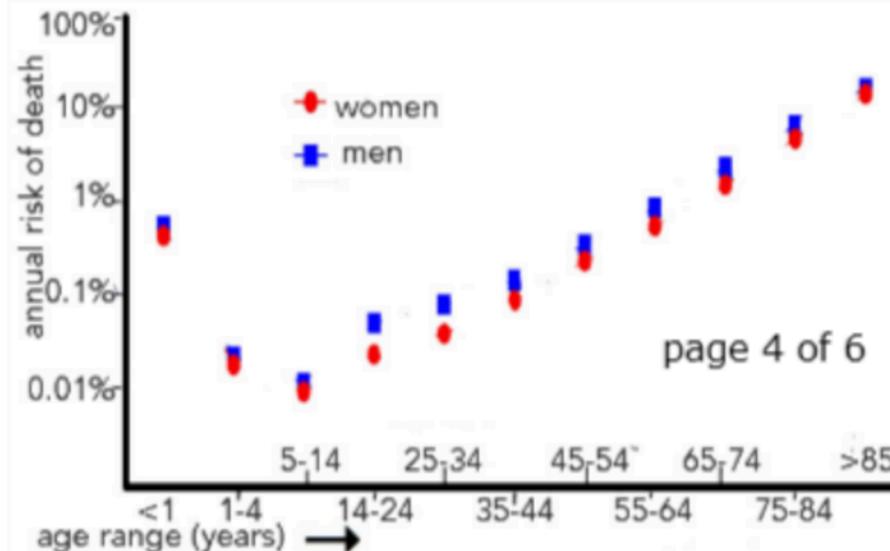
Why don't the points lie on a smooth line?

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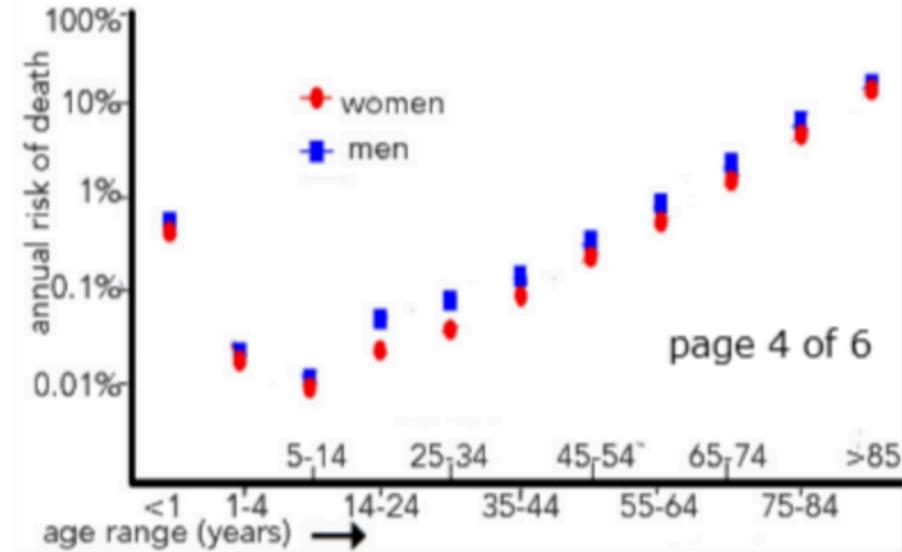
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page 4 of 6

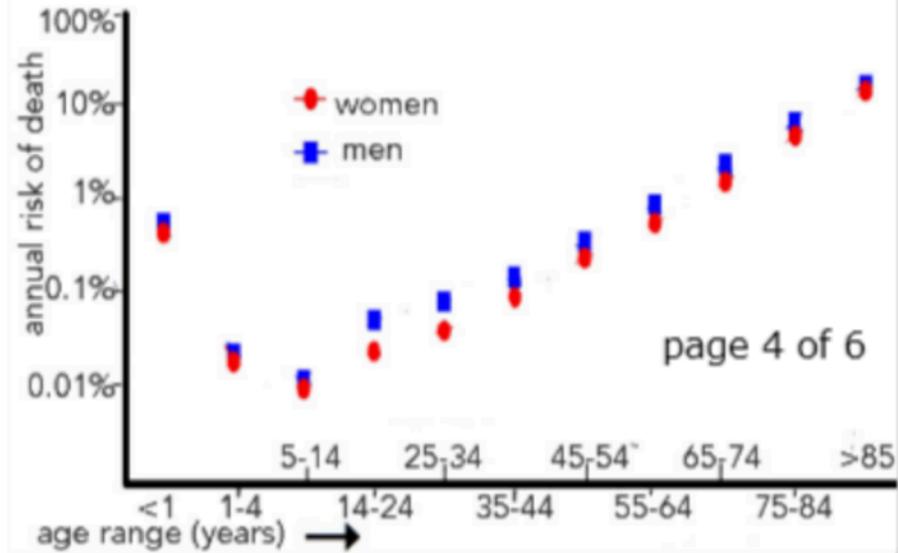
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page 4 of 6

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Why don't the points lie on a smooth line?

Questions to answer (page 26):

7. Using the graph on risk of death as a function of age in humans, provide a plausible explanation for the shape of the graph. In your answer, consider that factors that influence the various regions of the curve and how they might be different for different types of organisms?
8. Consider the effects of population size on the curve; would the graph be exactly the same if you collected data from different populations?

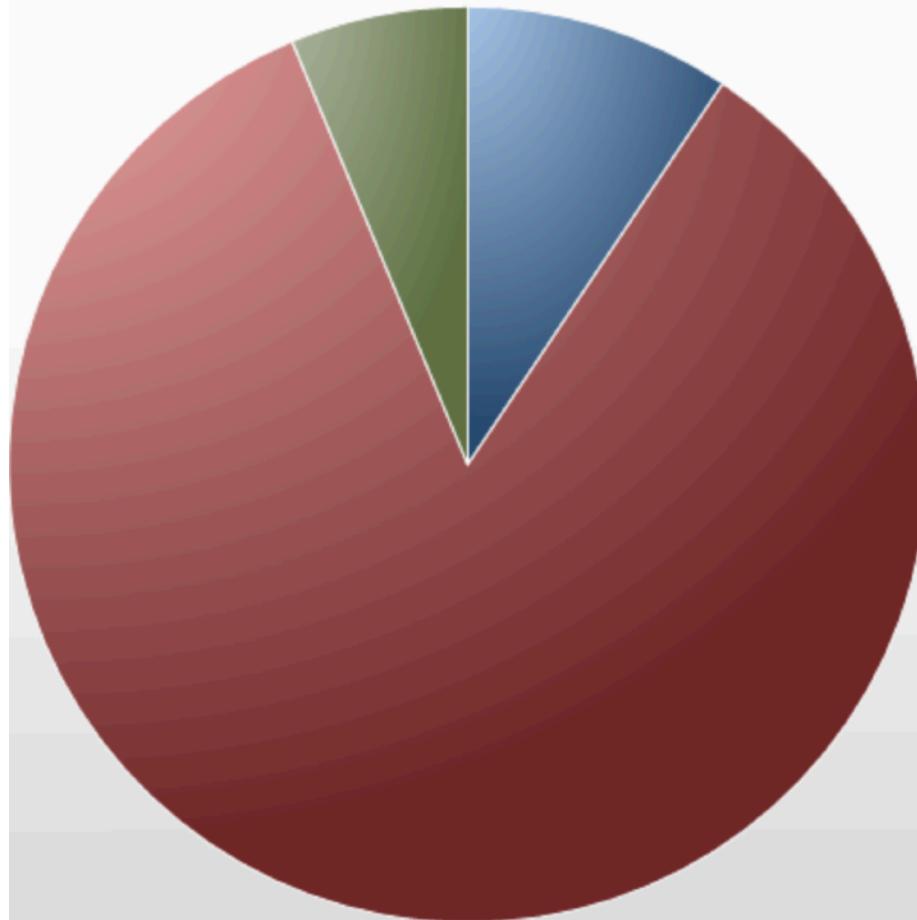
Questions to ponder:

Should the points in the graph be connected?

Is life a natural or a supernatural process?
How can we decide?

Pasteur's experiment ...We often think about experiments in terms of "controls", which enable us to isolate the various factors involved in a process. When Pasteur broke the neck of a flask, what type of control was it?

what does a positive control test for?

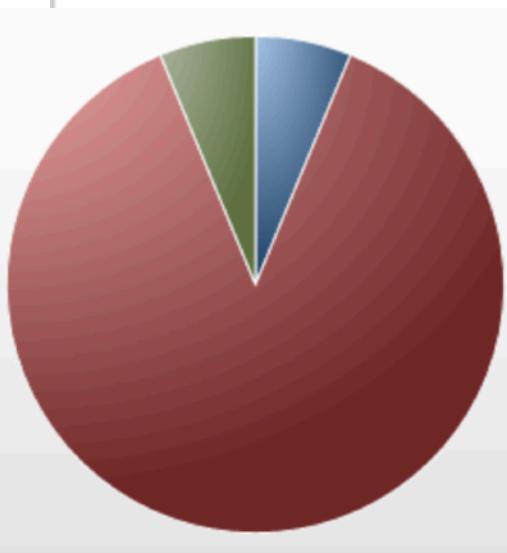


- negative control
- positive control
- not a control at all, just part of the experiment

Assume that Pasteur found **no** growth in the broth after he broke the flasks' necks; how would that have altered the interpretation of his experimental results?

Wohler's synthesis of uream and subsequent studies proved ...

- a. that the origin of life occurred soon after the formation of the earth
- b. simple and more complex organic molecules can be synthesized outside of cells
- c. The mechanism of spontaneous generation is simple
- d. The origin of life involved electricity



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explain why is the correct answer correct and wrong answers wrong.

Questions to answer (page 32/33):

9. What does the result of a positive control experiment tell you?
10. Why did the discovery of bacteria reopen the debate on spontaneous generation?
11. Explain how Wöhler's synthesis of urea transformed thinking about organic molecules.
12. What types of evidence would support the view that the origin of life (or consciousness) requires supernatural intervention?

Questions to ponder:

Is the assumption of spontaneous generation inherently unscientific?

Explain your reasoning. Can you imagine an observation that would lead scientists to reject the naturalistic perspective?

Friday
8 Sept Chapter 2.2 Life's origins and diversity

34-41

Complete [beSocratic #4](#)