

Welcome to Class 9: Life on Earth

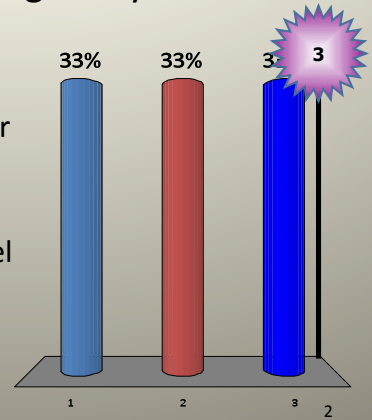
What is life?

What is the debate over Evolution?

What is the *scientific* debate over Evolution?

Which Learning Objective seems most challenging today?

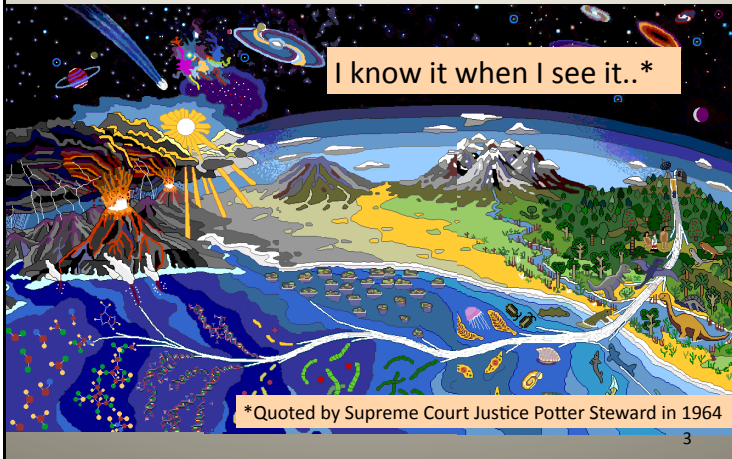
1. List key properties shared by all life.
2. Darwin mechanism for driving evolution compare to Lamarck.
3. Draw Tree of Life, label domains and give examples of each.



Remember to set your responder to 80!

What is life?

I know it when I see it.*



It's not easy to define LIFE!

Instead, biologists can simply tell you there is a list of key properties that appear to be shared by most or all living organisms on Earth.

THEY ARE: **Response to Environment**

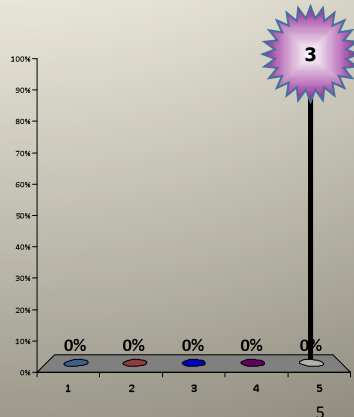
ORDER **Growth & Development**

Energy utilization **Reproduction**

Evolutionary Adaption

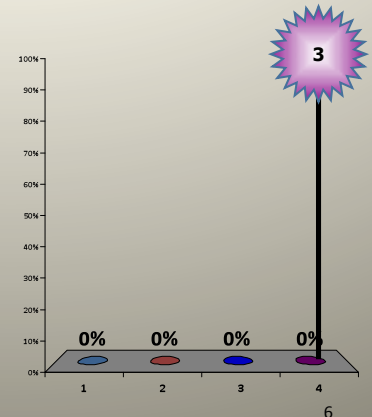
Living organisms _____ to fuel their many activities

1. Use energy
2. Reproduce
3. Respond
4. Adapt
5. Develop



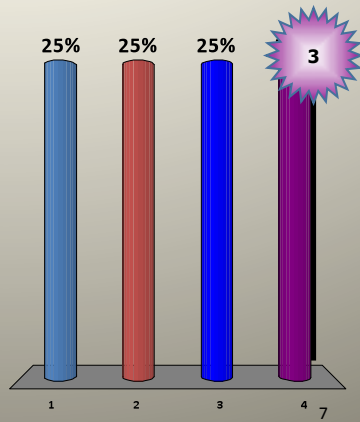
Living organisms exhibit _____ in their internal structure

1. Reproduction
2. Evolutionary adaptation
3. Growth and development
4. Order



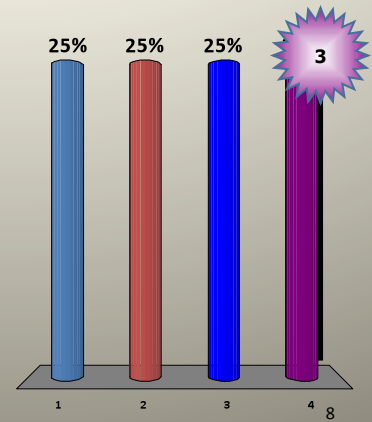
Life actively _____ to changes in its surroundings

1. evolves
2. responds
3. develops
4. organizes



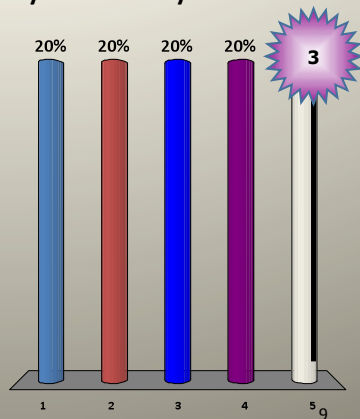
Living organisms _____ their own kind.

1. adapt to
2. respond to
3. reproduce
4. utilize



Living organisms _____ in patterns determined in part by heredity.

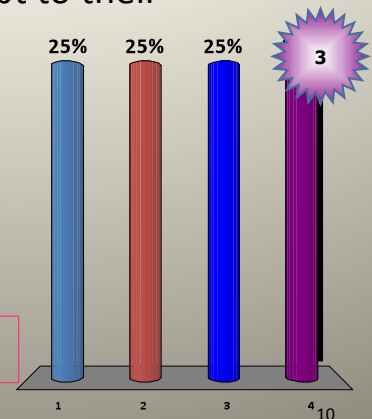
1. reproduce
2. adapt
3. respond
4. grow and develop
5. use energy



Life _____ in a way that leads to organisms that adapt to their environment

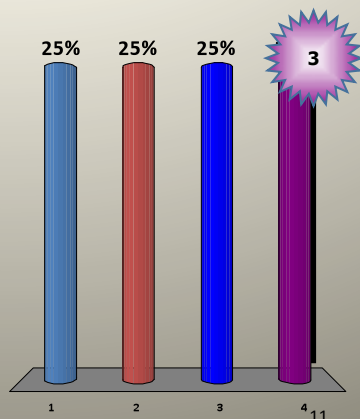
1. reproduces
2. grows and develops
3. evolves
4. responds

The necessity of Evolution in life, ANY LIFE, is virtually absolute.



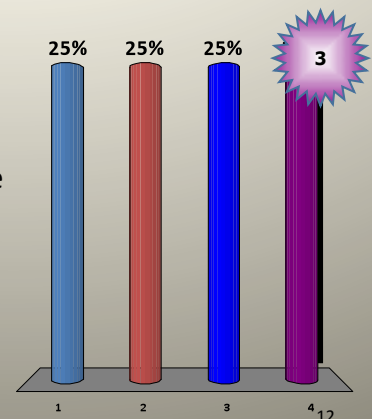
Gravity is _____

1. a scientific theory.
2. an observed phenomenon.
3. a theory for how the universe came to be.
4. All of the above.



Evolution is _____

1. a scientific theory
2. an observed phenomenon.
3. a theory for how the life came to be.
4. All of the above.



If evolution is an observed phenomenon, then what is the 'theory' part about?



1. How long evolution has been going on.
2. Does all life evolve.
3. What drives evolution.



Example of two theories for Evolution: Lamarck (~1800) vs. Darwin (~1850)

Why do giraffes have such long necks?



Lamarckian Theory: The constant stretching to reach for the highest leaves caused their necks to stretch.

Darwinian Theory: The giraffes with the longest neck ate best and lived to produce offspring with equally long necks.

We can only pass down traits in our DNA. Stretching your neck doesn't change your DNA.

Can you think of other examples?

"Bummer of a birthmark, Hal."

Movie Time.. !!



The success of one generation is passed on to the next generation.

Life evolves, driven by advantageous characteristics.

'Survival of the fittest'

But some characteristics are advantageous in a different way:

'Sexual selection' is an equally effective method for driving evolution

All of these drivers fall under the category of: **Natural Selection**

This is Darwin's theory for *what drives* evolution to occur.



What is the *public* debate about then?



Creationism VS Evolution

(Creationism = Intelligent Design)

But evolution is an OBSERVABLE, not a THEORY

Evolution is no more a 'theory' than gravity or earthquakes.

Evangelical Scientists Refute Gravity With New 'Intelligent Falling' Theory

August 17, 2005 | [ISSUE 41•33](#)



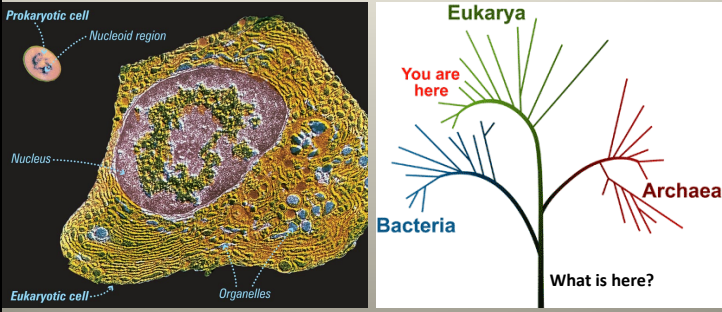
KANSAS CITY, KS—As the debate over the teaching of evolution in public schools continues, a new controversy over the science curriculum arose Monday in this embattled Midwestern state. Scientists from the Evangelical Center For Faith-Based Reasoning are now asserting that the long-held "theory of gravity" is flawed, and they have responded to it with a new theory of Intelligent Falling.

See the full story here:

<http://www.theonion.com/articles/evangelical-scientists-refute-gravity-with-new-int,1778/>

On Earth: Two kinds of 'Cells' and Three kinds of 'Life' (domains)

Prokaryotes are always single-celled microorganisms. Eukaryotes are single and multi-celled

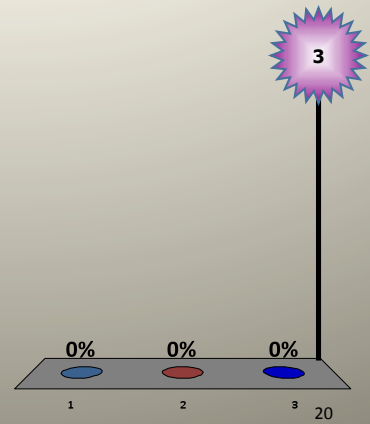


Bacteria & Archaea are Prokaryotes. Eukarya are Eukaryotes

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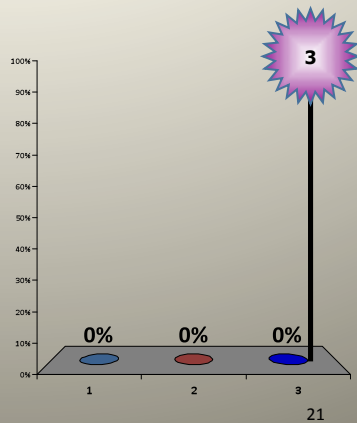
From what Domain are Humans?

1. Bacteria
2. Eukarya
3. Archaea



From what Domain is *E. Coli*

1. Bacteria
2. Eukarya
3. Archaea

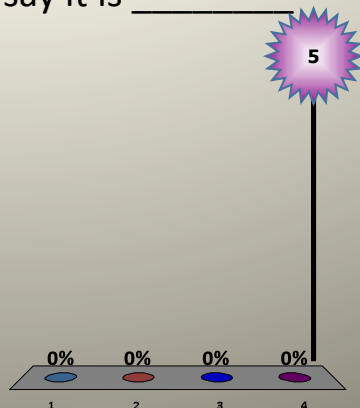


Let's do a final check of today's Learning Outcomes.

Please: use just one clicker for yourself.

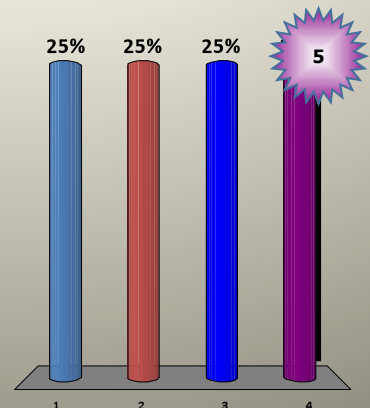
1. When a life form actively changes to its environment, we say it is _____

1. developing
2. responding
3. evolving
4. reproducing



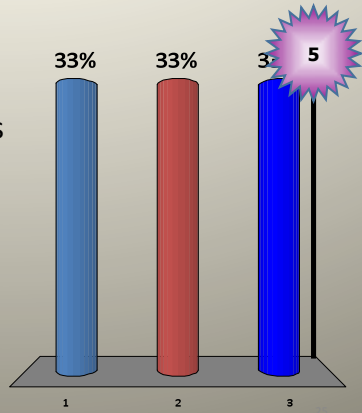
2. If you lift weights, your offspring will be stronger. Who's theory predicted that?

1. Newton's
2. Galileo's
3. Darwin's
4. Lamarck's



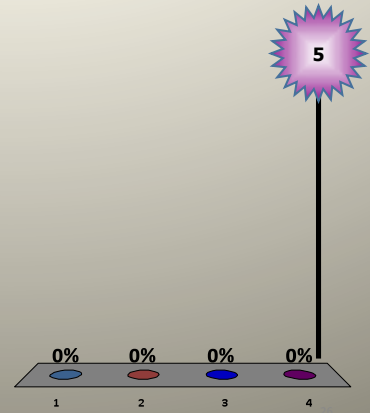
3. Sexual Selection is

1. one form of natural selection which drives evolution
2. A theory of Lamarck's
3. A new dating show.



4. Which is not a domain of Life?

1. Archaea
2. Bacteria.
3. Eucalyptus
4. Eukarya



5. Single-celled life is always

1. Prokaryotic
2. Eukaryotic
3. It can be either.

