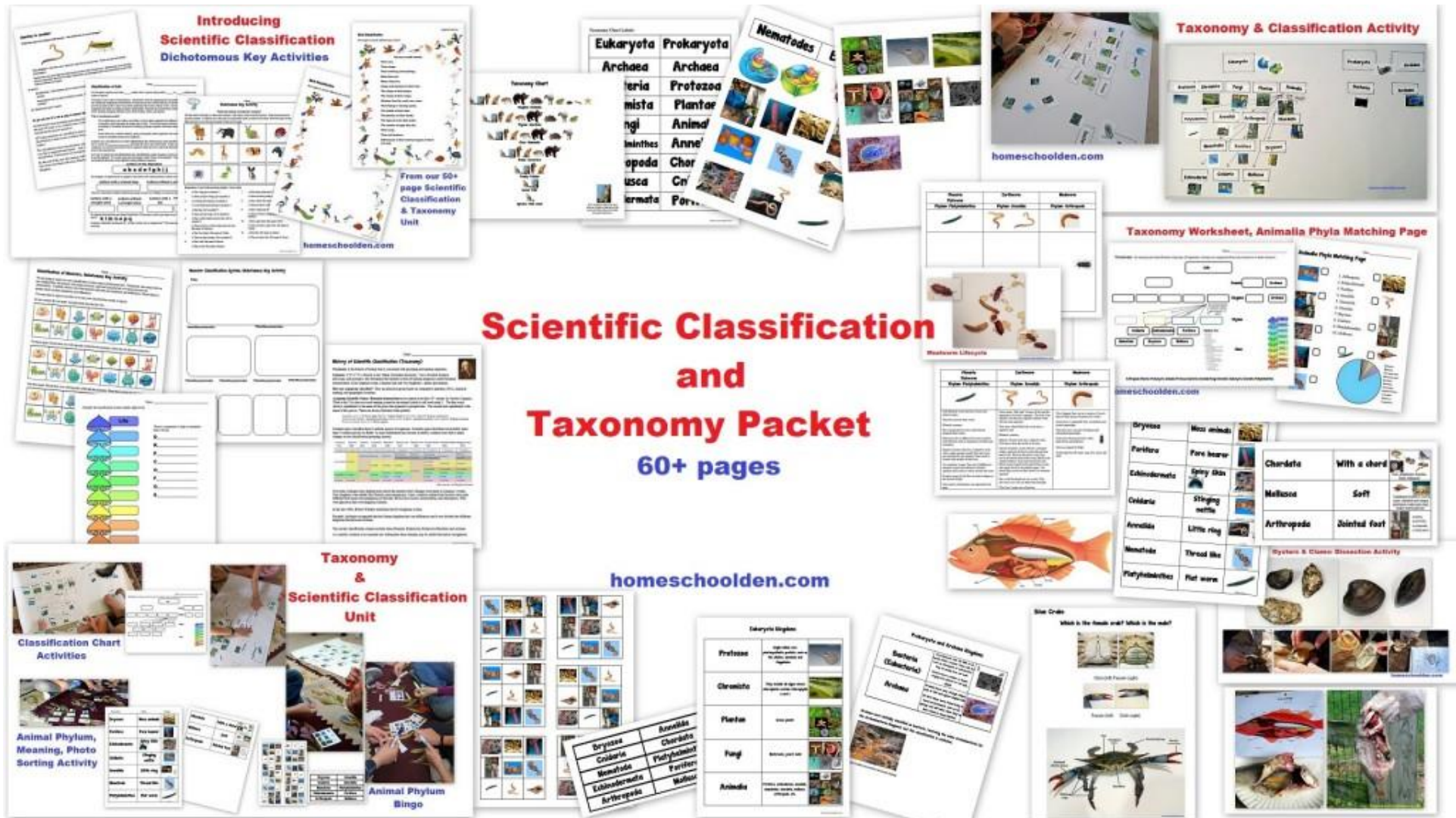


Scientific Classification & Taxonomy

Packet Quick Preview



What is taxonomy and why do we need to study it?! Taxonomy is the science of classification. Our biosphere supports more than 7 million *known* species and probably 4 or 5 million more *unknown* species! Taxonomists work on organizing the vast quantity of species. They are continually updating the classifications to keep up with new research and new discoveries.

What is in the Scientific Classification and Taxonomy Packet?

As we started off this unit, we started off by talking about **why we classify things**. We learned about the **dichotomous key** and did a number of activities to understand how they work. We talked about why classification is useful and how we can do that in a way that is organized and logical.

Then we went into more detail about the **history of classification**. Scientists have been grouping and categorizing different species for most of human history. In the past 300 years or so, scientists have worked on developing a logical, organized system for classifying the species around us.

All living organisms are classified by their characteristics. We keep adding to and adjusting the classification system as new evidence become available through DNA research and molecular studies! We talked about **Linnaeus** and his contributions to the classification of animals and his system of naming organisms (**binomial nomenclature**).

We talked about the **current system of classification** and by the end of the unit, the kids were readily able to identify the types of organisms that have been classified as Bryozoa, Platyhelminthes, Porifera and other phyla in the Animalia Kingdom.

We did a number of **hands-on activities** studying and observing various species and even did some simple dissections at the end of the unit.

Introducing Scientific Classification Dichotomous Key Activities

Question to consider:

Which has more in common with human - an earthworm or a grasshopper?



Grasshoppers - they have eyes; they have legs for moving around. There are male and female grasshoppers.
Earthworms can sense light and dark but do not have fully formed eyes. Earthworms move through muscle contractions; they have no legs. Earthworms are hermaphrodites - each individual carries both male and female sex organs.

Or maybe...

Earthworms - (like humans) have a closed circulatory system.
Grasshoppers have an open circulatory system. Females lay eggs.

P.S. Earthworms have 5 hearts!

As you can see, it is not as easy to answer this!
Scientists have been grouping and categorizing the past 300 years or so, scientists have been classifying the species around us.

All living organisms are classified by their classification system as new evidence becomes studies!

We will talk first about classification: why way that is organized and logical. And, v classification. Taxonomists are biologists. By the end of this unit, the students will have been classified as Bryozoa, Planula Kingdom.

Classification of Life

Our biosphere supports more than _____ million known species and probably _____ or _____ million more unknown species!

Taxonomy is the science of classification. Taxonomists work on organizing the vast quantities of organisms into a system that keeps up with new research and new discoveries. They provide an order to life so that we can better understand the world in which we live. All living organisms are classified according to genetic relationships. Currently the classification system levels: Domain, Kingdom, Phylum, Class, Order, Family, Genus, and Species.

Why is classification useful?

If you think about your clothes, most likely you have them organized into different categories in one place, shirts and pants in another and so forth. You do this because it helps you find everything. You identify the piece of clothing, grouping it together with others based on traits.

In the same way, scientists identify, group, and properly name organisms with a system based on similarities found in the organisms.

Scientists use a classification tool called a **dichotomous key**. Dichotomous means divided in two. A key is a series of questions that leads the user to the correct name. When a key is used, it is based on the premise that an organism either possesses a physical characteristic or it does not.

Let's try to create our own dichotomous key classification system. Imagine we had to create a key for the alphabet. We would create one big category called "letters of the alphabet." Then we would subdivide the letters of the alphabet creating different categories.

Letters of the Alphabet:

a b c d e f g h i j

For example, we might decide to organize it into letters with a loop and letters without a loop.

Letters with a closed loop

Letters without a closed loop

Then we would need to further subdivide the group in some way. Perhaps we could use the shape of the letters.

Letters with a straight stem

Letters without a straight stem

Letters with a loop and a dot

If scientists discovered the new letters listed below. Would they be able to put them in the categories above?

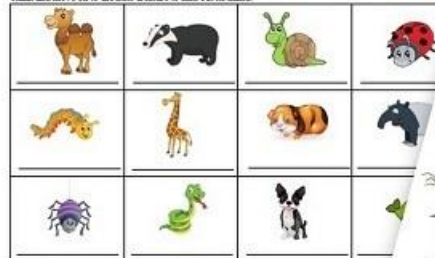
k l m n o p q

Scientists continually ask themselves, "Is there a better way to organize this?" They then make changes as necessary.

Dichotomous Key Activity

Find out these creatures' names!

The key below will help you find each creature's silly name. Look at the first picture. Then read and answer question number 1. Continue on to the next set of questions until you find out its name! Write the name on the blank and move on to the next creature to find out its name.

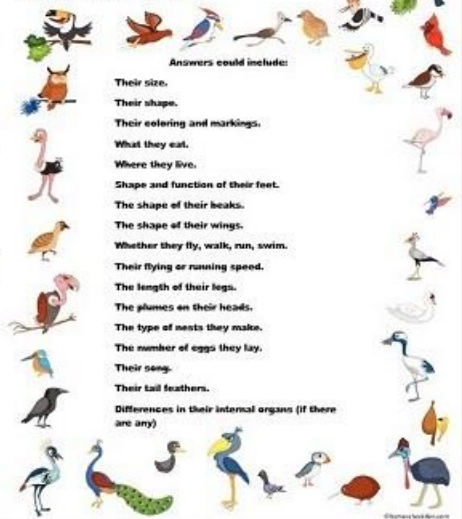


Remember to start with question number 1 every time!

- a. Has 4 legs go to number 2.
b. Does not have 4 legs go to number 3.
- a. Is black and white go to number 4.
b. Is not black and white go to number 5.
- a. Has legs. Go to number 7.
b. Does not have legs. Go to number 8.
- a. Has a white stripe down its face. Go to number 6.
b. Does not have a white stripe down its face. His name is Clarence.
- a. Has two humps. Her name is Nellie.
b. Does not have humps. Go to number 9.
- a. Has a tail. Her name is Rosie.
b. Has no tail. His name is Ernest.
- a. Has black polka dots. His name is Herbert.
b. Does not have polka dots. His name is Mabel.
- a. Has a shell. His name is Mabel.
b. Does not have a shell. His name is Oscar.
- a. Has a long neck. His name is Herbert.
b. Does not have a long neck. His name is Mabel.
- a. Has a grey face. His name is Ray.
b. Does not have a grey face. Her name is Mabel.
- a. Has fins. Her name is Mabel.
b. Does not have fins. His name is Oscar.

Bird Classification

How might we classify different types of birds?



Answers could include:

- Their size.
- Their shape.
- Their coloring and markings.
- What they eat.
- Where they live.
- Shape and function of their feet.
- The shape of their beaks.
- The shape of their wings.
- Whether they fly, walk, run, swim.
- Their flying or running speed.
- The length of their legs.
- The pheromones on their heads.
- The type of nests they make.
- The number of eggs they lay.
- Their song.
- Their tail feathers.
- Differences in their internal organs (if there are any).

From our 60+
page Scientific
Classification
& Taxonomy
Unit

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Dichotomous Key Activity



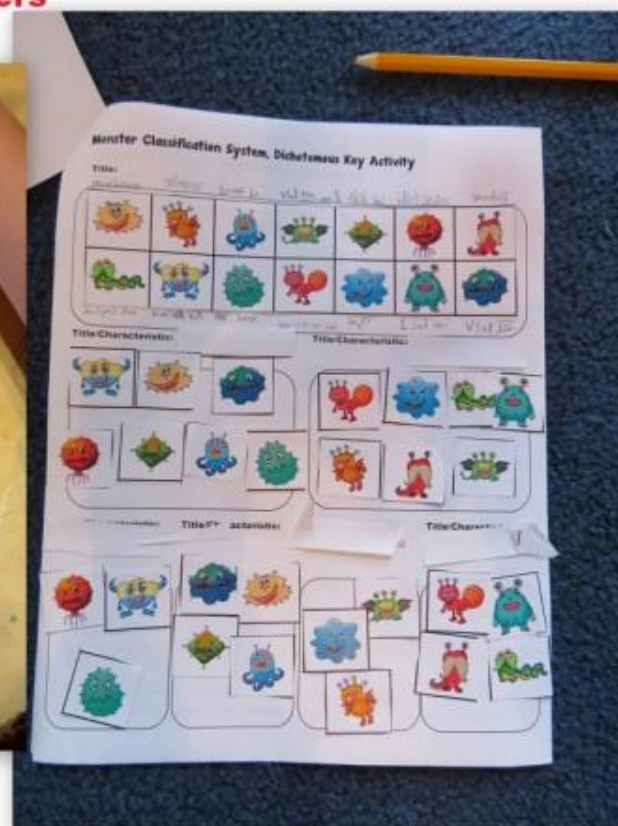
Dichotomous Key Activity with Monsters



First grouping: those with eye-stalks and those without



First grouping: Those with black and white eyes, those with colored eyes.



First grouping: Those with spikes/protrusions, those without

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History of Scientific Classification/Taxonomy Notebook Pages

Name: _____

History of Scientific Classification (Taxonomy)

Taxonomy is the branch of biology that is concerned with grouping and naming organisms.

Linnaeus, 1707-1778 - Known as the "father of modern taxonomy" was a Swedish botanist, physician, and zoologist, who formalized the modern system of naming organisms called binomial nomenclature. In his original system, Linnaeus had only two kingdoms - plants and animals.

How are organisms classified? They are placed in group based on comparative anatomy, DNA, chemical makeup, and geographic locations.

Assigning Scientific Names: Binomial nomenclature was started in the late 18th century by Carolus Linnaeus. What is this? It is the two-word naming system he developed (which is still used today!). The first word (always capitalized) is the name of the genus the organism is grouped into. The second (not capitalized) is the name of the species. These are always italicized when printed.

Examples: grey wolf: *Canis lupus* Red fox: *Vulpes vulpes* Eastern Gray Squirrel: *Sciurus carolinensis*
African bush elephant: *Loxodonta africana* African forest elephant: *Loxodonta cyclotis* Asian elephant: *Elephas maximus*
What are humans known as? *Homo sapiens*

Scientists have classified about 2 million species of organisms. Scientists guess that there are more than 10 million species on Earth! As more information has become available, scientists have made changes to the classification groupings (taxa).

Linnaeus 1735	Huxford 1866	Chatwin 1925	Copeland 1939	Whittaker 1969	Woese et al. 1990	Woese et al. 1990	Cavalier-Smith 1986	Cavalier-Smith 1990	Woese et al. 1990
2 kingdoms	3 kingdoms	2 kingdoms	4 kingdoms	5 kingdoms	3 domains	3 domains	6 kingdoms	7 kingdoms	3 domains
Plantae	Plantae	Plantae	Plantae	Plantae	Eukarya	Eukarya	Plantae	Plantae	Eukarya
Animalia	Animalia	Animalia	Animalia	Animalia	Bacteria	Bacteria	Protista	Protista	Bacteria
					Eukarya	Eukarya	Fungi	Fungi	Eukarya
					Eukarya	Eukarya	Chlorophyta	Chlorophyta	Eukarya
					Eukarya	Eukarya	Chlorophyta	Chlorophyta	Eukarya
					Eukarya	Eukarya	Chlorophyta	Chlorophyta	Eukarya

Over time, biologists have learned more about the natural world. Changes were made. New kingdoms were added (first Protista, microorganisms). Later, scientists realized that many microorganisms are that they did not have nuclei, mitochondria were placed in their own kingdom, Monera.

In the late 1960s, Robert Whittaker established the five-kingdom system.

Recently, biologists recognized that the Monera kingdom had vast differences. Kingdoms Bacteria and Archaea.

The current classification scheme includes three Domains: Eukaryota, Bacteria, and Archaea. As scientists continue to accumulate new information these domains may be subdivided and/or reorganized.

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Taxonomy Chart

Kingdom: Animalia

Phylum: Chordata

Class: Mammalia

Order: Carnivora

Family: Felidae

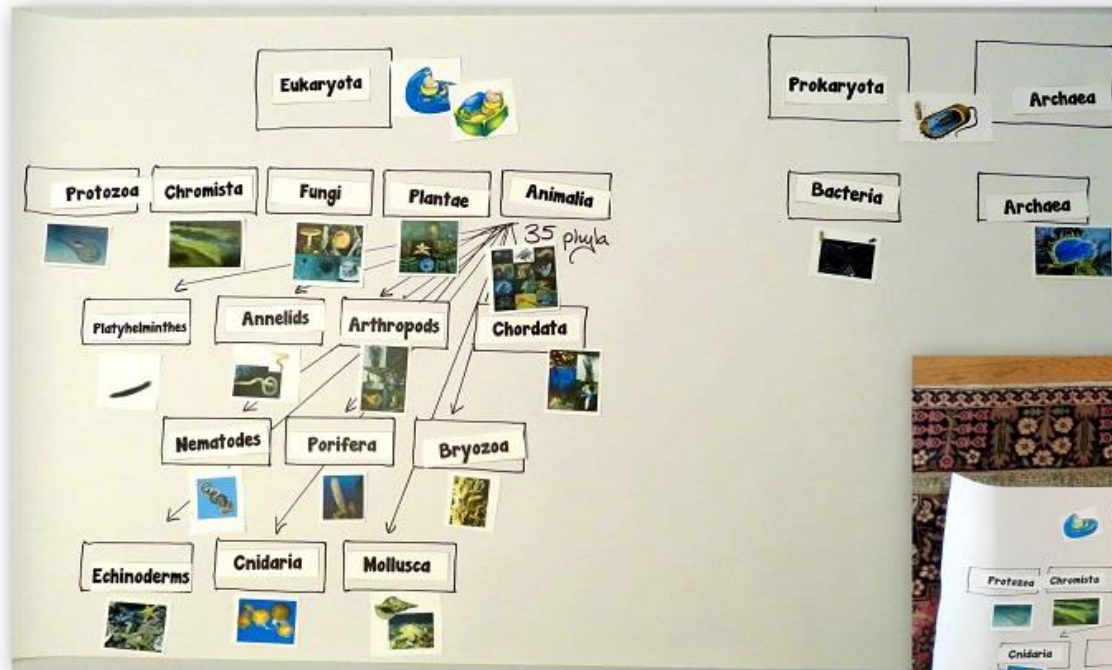
Genus: *Felis*

Species: *Felis catus*

Felis margarita would not be valid. *Acinix*, listed on that tree in the desert of North Africa, the Middle East and Central Asia.

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Taxonomy and Classification Activity

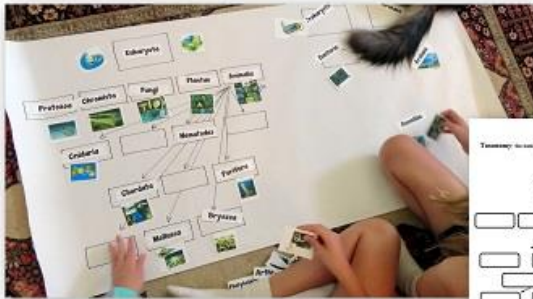


Eukaryota	Prokaryota	Nematodes	Bryozoa
Archaea	Archaea		
Bacteria	Protezoa		
Chromista	Plantae		
Fungi	Animalia		
Platyhelminthes	Annelida		
Arthropoda	Chordata		
Mollusca	Cnidaria		
Echinodermata	Porifera		

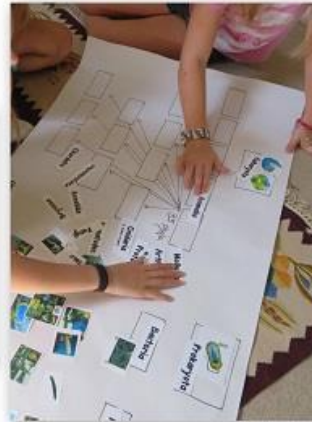
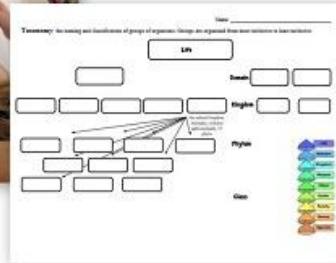
labels & pictures



Taxonomy & Scientific Classification Unit



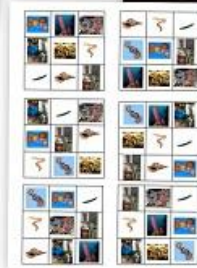
Classification Chart Activities



Animal Phylum, Meaning, Photo Sorting Activity

Phylum/Class	Meaning	Example
Bryozoa	Moss animals	
Porifera	Pore bearer	
Echinodermata	Spiny Skin	
Cnidaria	Stinging nettle	
Annelida	Little ring	
Nematoda	Thread like	
Platyhelminthes	Flat worm	

Chordata	With a chord	
Mollusca	Soft	
Arthropoda	Jointed foot	



Bryozoa	Annelida
Cnidaria	Chordata
Nematoda	Platyhelminthes
Echinodermata	Porifera
Arthropoda	Mollusca



Animal Phylum Bingo

Taxonomy Worksheet, Animalia Phyla Matching Page

Name: _____

Taxonomy: the naming and classification of groups of organisms. Groups are organized from most inclusive to least inclusive.

Life

Domains: Bacteria, Eukarya, Archaea

Kingdoms: Animalia, Plantae, Fungi, Protista, Eubacteria

Phyla: Cnidaria, Echinodermata, Perifera, Nematoda, Bryozoa, Mollusca

Class: (List of 15 phyla: Cnidaria, Echinodermata, Perifera, Nematoda, Bryozoa, Mollusca, Annelida, Chordata, Platyhelminthes, Rotifera, Mollusca, Arthropoda, Echinodermata, Cnidaria, Mollusca)

Arthropoda, Platyhelminthes, Protista, Animalia, Protista, Bacteria, Annelida, Fungi, Chordata, Eukarya, Chordata, Platyhelminthes

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Name: _____

Animalia Phyla Matching Page

1. Arthropoda
2. Echinodermata
3. Porifera
4. Annelida
5. Nematoda
6. Chordata
7. Bryozoa
8. Cnidaria
9. Platyhelminthes
10. Mollusca

Legend for Pie Chart:

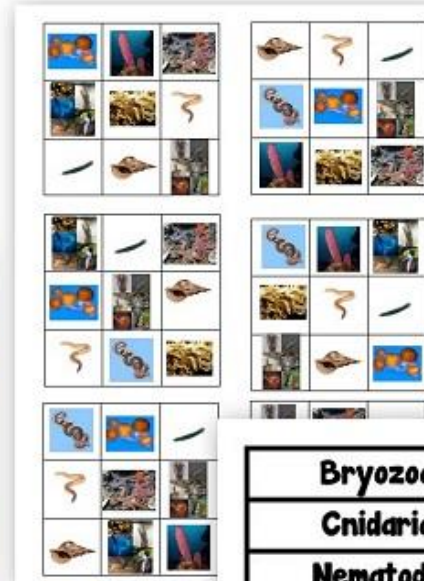
- Arthropoda
- Mollusca
- Platyhelminthes
- Chordata
- Cnidaria
- Echinodermata
- Porifera
- Bryozoa
- Annelida
- Nematoda

Major Phyla of the Kingdom Animalia

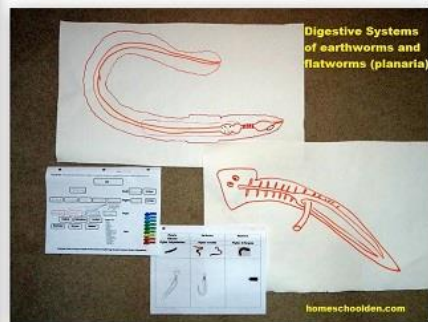
Tic-Tac-Toe Game!



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Bryozoa	Annelida
Cnidaria	Chordata
Nematoda	Platyhelminthes
Echinodermata	Porifera
Arthropoda	Mollusca






Hands-On Study & Observation of mealworms, earthworms, Planaria, oysters & clams, crabs, fish



Taxonomy
What phylum is...
mealworm arthropod
planarian platyhelminthes
earthworm annelida
clam mollusca
shrimp arthropod
fish Chordata

Planaria	Earthworm	Medworm
Phylum: Platyhelminthes	Phylum: Annelida	Phylum: Arthropoda
		
		

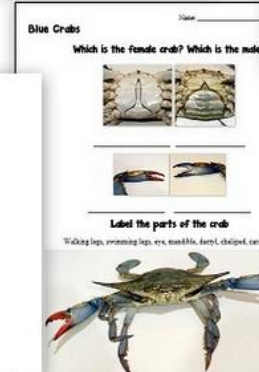
Planaria	Earthworm	Medworm
Phylum: Platyhelminthes	Phylum: Annelida	Phylum: Arthropoda
		
<p>Small, flattened animals that have a head and lateral organs.</p> <p>They have just one body cavity.</p> <p>Reproductive system:</p> <p>Male and female reproductive organs are located in the same body cavity.</p> <p>Planaria are able to regenerate lost body parts (such as head, tail, and eyes).</p> <p>Planaria are able to regenerate lost body parts (such as head, tail, and eyes).</p> <p>Planaria are able to regenerate lost body parts (such as head, tail, and eyes).</p>	<p>Planaria are able to regenerate lost body parts (such as head, tail, and eyes).</p> <p>Planaria are able to regenerate lost body parts (such as head, tail, and eyes).</p> <p>Planaria are able to regenerate lost body parts (such as head, tail, and eyes).</p> <p>Planaria are able to regenerate lost body parts (such as head, tail, and eyes).</p> <p>Planaria are able to regenerate lost body parts (such as head, tail, and eyes).</p>	<p>Planaria are able to regenerate lost body parts (such as head, tail, and eyes).</p> <p>Planaria are able to regenerate lost body parts (such as head, tail, and eyes).</p> <p>Planaria are able to regenerate lost body parts (such as head, tail, and eyes).</p> <p>Planaria are able to regenerate lost body parts (such as head, tail, and eyes).</p> <p>Planaria are able to regenerate lost body parts (such as head, tail, and eyes).</p>



Oysters & Clams: Dissection Activity



Observing Live Crabs



Scientific Classification & Taxonomy Unit (60+ page packet)

