

ZOOLOGY- THE CRUSTACEANS IN RESPONSE TO CONVID 19 APRIL 2, 2020

Dear students and parents,

April 2nd, 2020

Beginning two days prior to our last day at school I issued work packets to all students in all classes; the content of which was spanning a two-three week period. Now that our removal from school will continue to at least May 1st, I have provided the following work packets which will span the remainder of the year, should our crisis continue. **The following folders are available:**

ANATOMY – PHYSIOLOGY

1. **Packet – THE HUMAN REPRODUCTIVE AND ENDOCRINE SYSTEMS.**
2. **Packet- THE HUMAN NERVOUS SYSTEM**
3. ***Packet handed out prior to our last day: THE HUMAN EXCRETORY SYSTEM***

ZOOLOGY

1. **Packet- STUDY OF THE CRUSTACEANS**
2. **Packet- STUDY OF THE INSECTS**
3. ***Packet- handed out prior to our last day- INTRODUCTION TO THE ARTHROPODS- CLASSES MYRIAPODA AND ARACHNIDA***

AP BIOLOGY – as per the newly devised topics of study focus, structure of adapted test, test dates and supports provided as per the guidelines and policies of The College Board

TO ALL STUDENTS! THESE PACKETS WILL BE GUIDED BY THE SAME PROCEDURES WE EMBRACED DURING FALL TECH WEEK WHERE YOU ARE RESPONSIBLE FOR THE WORK IN THE PACKETS- DELIVERED UPON YOUR RETURN TO SCHOOL OR AS PER UNFORESEEN CHANGES WHICH COME OUR WAY. COLLABORATION IS ENCOURAGED- SO STAY IN TOUCH AND DIG IN! YOUR PACKETS WILL BE A NOTEBOOK GRADE. EVENTUALLY YOU SHALL TAKE AN INDIVIDUAL TEST OF EACH PACKET = AN EXAM GRADE! SCHOOL IS OFF SITE BUT NOT SHUT DOWN SO PLEASE DO THE BODY OF WORK ASSIGNED IN THE PACKETS PROVIDED. YOU CAN'T PRINT THEM THEN WRITE YOUR ANSWERS ON SEPARATE PAPER AND TRANSFER THEM LATER UPON OUR RETURN! IF LEARN TOGETHER- ELECTRONICALLY THAT IS! STAY SAFE! BE SMART! BE A CITIZEN! RIZZO- EMAIL PRIVATE: forestlone@earthlink.net

ELECTRONIC LIBRARY –THE CRUSTACEANS

The **12 of the organism types below belong to the**

Phylum Arthropoda – CLASS CRUSTACEA

*Lobsters, Swimming Crabs, Fiddler Crabs, Spider Crabs, Copepods, Shrimp, Barnacles, Krill. Crayfish, Amphipods, Isopods, Edible Crabs, Hermit Crabs
World’s Largest Crustaceans*

Using you classroom devices, create a PHYLUM ARTHROPODA – CLASS CRUSTACEA electronic library which contains a Title (the organism group) followed by 10 different pictures of each of the 14 organism groups listed above. This does not mean 10 pics of the SAME specie, but 10 pics of 10 different species from each group as they all each contain many, many species .

GUIDELINES :

- 1.YOUR LIBRARY ENTRIES MUST BE IN THE SAME ORDER AS THEY APPEAR IN THE LIST OF THE 14 ORGANISMS ABOVE.**
- 2. Each animal frame must be set up in the same format as illustrated in the Phylum Mollusca example below**

Example . **The SQUID** **PHYLUM MOLLUSCA- Class Cephalopoda -**



SO WHEN YOU ARE COMPLETED YOU SHOULD HAVE A TOTAL OF **12** ENTRIES AS YOU SEE EXHIBITED IN THE EXAMPLE FOR THE SQUID. This includes a title set up in the EXACT SAME manner as you see above, followed by the photo collection. When you are finished you may transfer your Cyber Library to your **phones for review and grading !**

“CYBER LIBRARY “ THE FOLLOWING GROUPS

- 1. Library in the order that it appears below**
- 2. Label Each of the 14 Groups**
- 3. 10 pics from each group**

HERE'S YOUR REQUIRED CHECK LIST:

**Lobsters,
Swimming Crabs,
Fiddler Crabs,
Spider Crabs,
Copepods,
Shrimp,
Barnacles,
Krill,
Crayfish,
Amphipods,
Isopods,
Edible Crabs,
Hermit Crabs
World's Largest Crustaceans**

CRUSTACEAN VIDEOS – MEETING THE HARDBODIES

OVERVIEW: Our learning approach to this Class Crustacea of the Phylum Arthropoda will be very interactive as we survey many actual specimens and view many “Living World” video. During these experiences your notation on the space provided beneath each Crustacean group on the MEETING THE HARDBODIES- PICTURE SUPPORT PORTFOLIO will be the expectation.

CRABS

1. Callinectes sapidus - blue claw crab...1:36 <http://www.youtube.com/watch?v=iqpRkaSM6PI>

2. Giant Spider Crab Molting (time-Lapse)...1:41 <http://www.youtube.com/watch?v=4QIgW639Oog>

3. Crab molting2:10 <http://www.youtube.com/watch?v=ZJsggH0I1Wo>

4. Frantically Waves to Flirt With Mate..1:10 <http://www.youtube.com/watch?v=vCn6g3pXc1s>

5, Crabby Hermit Chooses Right Home...1:11 <http://www.youtube.com/watch?v=TSq-mhMMMy3E>

6. red king crab in Unalaska, Alaska....44 sec <http://www.youtube.com/watch?v=g4qFoJoKKvg>

7. Bering Sea King Crab Fishing: Loading up with Red King Crab ...1:40

<http://www.youtube.com/watch?v=SRA65VPkjkc>

8. Tatos the Terror Coconut Crab...40 sec <http://www.youtube.com/watch?v=4DZ0VEjJZs4>

9. Giant Robber crab on Christmas Island .22 secs <http://www.youtube.com/watch?v=yqPBVBskD-M>

10. Claude, Giant Crab - 15 Pound Monster Tasmanian King Crab...1:03

<http://www.youtube.com/watch?v=yqPBVBskD-M>

11. Science Screen Report: The Amazing Red Crab of Christmas Island ! ...2:23

<http://www.youtube.com/watch?v=LNKgh6TfWXo>

12. Great Migrations: Millions of Crab Babies...2:23

<http://www.youtube.com/watch?feature=fvwp&v=SLoXDFDeD9E&NR=1>

13. Sand Crabs...21 secs http://www.youtube.com/watch?feature=endscreen&v=RagnvMO_FqY&NR=1

14. Bob the mole crab catch and release,,,1:06 <http://www.youtube.com/watch?v=pFn2YCP6F5k>

15. 719) Deadliest Catch - Fishing Crab Film...5:15 <http://www.youtube.com/watch?v=a8NkxIw9P0c>

16. Crab With 9-Foot Claws Arrives at a UK Aquarium...1:14

<http://www.youtube.com/watch?v=Y2sBVf873Ro>

17. Blue Battalion...1:14 <http://www.youtube.com/watch?v=b5atHFeZduo>

SHRIMP

18. Pistol Shrimp sonic weapon - Weird Nature - BBC wildlife ...1:37

<http://www.youtube.com/watch?v=XC6I8iPiHT8>

COPEPODS

19. Copepods flash and discharge depth charges in the darkness to confuse predators....1:22

<http://www.youtube.com/watch?v=GDeY6snQw6s>

20. Copepod Motion and Excretion – HD...1:56 <http://www.youtube.com/watch?v=O8g1rotoVhk>

21. Tisbe harpacticoid copepods in the mandarin fish fry tank....:34

<http://www.youtube.com/watch?v=6dSdIV4cwyw>

ISOPODS AND AMPHIPODS

22. The giant Isopod1:33 http://www.youtube.com/watch?v=L5lrbcLX_rw

23. Big Rolly Polly...30 secs <http://www.youtube.com/watch?v=SY1pWrMPW9s>

24. 'Supergiant' amphipods...16 sec <http://www.youtube.com/watch?v=Pmd2fSsZttc>

LOBSTERS

25. Commercial spiny lobster fishing, Tropical lobster..2:49

<http://www.youtube.com/watch?v=Y4iB96qmfs>

26. Lobster Symbolism....1:24 <http://www.youtube.com/watch?v=DSTfEmgFhNU>

27. Lobsters Give Birth....1:08 <http://www.youtube.com/watch?v=ti1qKu8MFnA>

CRAYFISH

28. Fishing for American signal crayfish - Gordon Ramsay....3:00

<http://www.youtube.com/watch?v=QIMGeV7met4>

29. Crayfish: Music Video.... 48 secs <http://www.youtube.com/watch?v=2cfAdw870kU>

30. Raising Southeast Texas Crawfish.....1:49 <http://www.youtube.com/watch?v=LwRB9KP9mQs>

KRILL

31. Ocean Today - Animals of the Ice: Antarctic Krill...1:29 <http://www.youtube.com/watch?v=2EWgA9Ou6QM>

32. Humpback Whale: Hunting Technique ...1:29 <http://www.youtube.com/watch?v=vJvfjiCTvq4>

BARNACLES

33. Barnacles...1:22 <http://www.youtube.com/watch?v=r6N4mVMR4vE>

34. Mating barnacles1:03 <http://www.youtube.com/watch?v=mBtBAYYfrEE&NR=1&feature=fvwp>

35. Barnacles feeding...1:27 <http://www.youtube.com/watch?v=25F7xMVNt-w>

ENVIRONMENTAL CONCERNS

36. Seafood Deformities In The Gulf Of Mexico...2:28

<http://www.youtube.com/watch?v=SqoC5dGQPqU>

37. Giant Alien Shrimp Invades Gulf of Mexico...1:03

<http://www.youtube.com/watch?v=Vu33YQeA2GU>

38. Gulf of Mexico Shrimp Anomalies2:56 <http://www.youtube.com/watch?v=arKqAjIcRz4>

THE CRUSTACEAN NATION *“What’s The Word?”*

1. CRABS As you can see from the sketches, crabs are always wider than they are long, usually have a pair of claws at the anterior end and have either walking legs, swimming legs, or both. Crabs are limited in their movement because, with but one or two exceptions, they can only swim or walk sideways. With bodies low to the ground, and with their armored tipped exoskeletons, they are a mini fortress in the own right. Many species are edible, yet a few are outright poisonous. The most noted edible crabs are the Blue Crab from the Eastern Atlantic Ocean area, the Dungeness Crab from the Pacific Coast and the Snow Crab and Alaskan King Crab from the Northwestern Pacific Ocean near Alaska. Harvesting the Alaskan King Crab is considered one of the most dangerous jobs in North America because it involves setting and collecting traps the size of a small car as the ship speeds along in very rough and cold winter season seas. Many men are simply swept off the ship as

waves crash over the railing or are caught in the ropes of the traps as the coils peel off the deck when a trap is dropped over the sides. This danger shows up in the price tag in the stores, as King Crab may range from \$13 to \$20 a pound! How could a scavenger and cannibal tastes so good? The dead man's crab in the Sea of Japan is the largest measured crab at 11ft. and is given its name because when a person drowns, they first sink for a couple of days and then float to the surface. Well sailors in the area who have drown, eventually come to the surface a bit lighter than they were when they died, as their bodies have been snacked on by these crabs, hence their name: Dead Man's Crabs. Pirates used crabs for torture purposes as they tied someone to a post when the tide was out. They then covered them with rotted fish oils and made cuts on their legs. As the tide waters rose over a 6 hour period the crabs came and slowly ate the person alive, from the toes up. Note: it takes a long time and a lot of little crab bites to reach an artery in the leg where you could then, hopefully bleed to death and die !

2. LOBSTERS: Lobsters are decisively different than crabs because their bodies are longer than they are wide. Lobsters only have walking legs because they live on the bottom of the sea. Movement is accomplished by either walking or by a rapid powerful flipping of their finned tail region which pulls them backwards, tail end first. This is because they will seek protection in a hole or under a rock crevice where they back in tail end first and then use their claws or antennae for defense. Claws, like those present in the North Atlantic Lobster will be used for the fight, but are also used for eating. One claw has large molar-like teeth which are used to grasp and/or crush their food. The other claw is highly toothed with small sharp teeth which are then used to shred and mince their food. In the Spiny Lobsters the claws are absent. They instead have very long and spiked antennae which are whipped rapidly to confuse their predators. If you eat a lobster tail in a restaurant or buy them frozen in the store, you can easily tell which type of lobster you are eating because the Spiny Lobsters tail (and body) has distinct spots on it, while the North Atlantic Lobster does not. Unlike crabs, lobsters take about 7 years to become just barely legal, which is about a pound and a half. Driving along a coastal bay in a New England state is quite colorful as one can see hundreds of very colorfully painted **buoys** (floats) which mark the presence of a lobster trap. The variation in painted buoy colors and patterns serves the sole purpose of telling a lobsterman what traps are his and which are not. Touching another lobsterman's traps is considered a breaking of a golden cultural and business rule, possibly resulting in fines and/or an out-casting by the community. The lobster business is aided by lobster **hatcheries** which raise lobsters in **captivity** to a certain size, whereupon they are then released into the area seas. Lobsters are so aggressive and cannibalistic that even as tiny minute babies the water in a hatchery is vigorously bubbled to keep them from latching and snacking on each other.

3. CRAYFISH: What has been said in # 2 above about lobster structures and behaviors is also true about crayfish except they live in freshwater and are considerable smaller in size. Both claws are equal in size and tooth structure. The Cajun culture (a mix of French, Black, and Native American) of the Louisiana Bayou area has long used crayfish as a major food source. This has become a growing market of interest and consumption throughout the states in the last decade. They taste much like a rich shrimp and are actually farmed as fields that use to lay dormant during the non-growing season for crops, but are now instead dammed up a flooded with a few feet of water. They are then seeded with small crayfish and regularly fed. After a few moths, they are drained and the crayfish are harvested. Crayfish are very active burrowers and may even burrow into land areas near water. This results in numerous holes and in the case of some species, a large mud chimney measuring 3 to 4 inches in width and over 1 ft. in height as the crayfish digs his burrow and brings the earth he had removed to the surface; hence the chimney resulting from his efforts. These are very common in this area around farm country by ponds and creeks because our soil, rock and streams a rich in the **lime** or calcium carbonate that crayfish use to make their exoskeleton.

4. BARNACLES: Barnacles are a type of Crustacean which attaches to objects in or around ocean habitats and the are not edible. They are actually like a skinny shrimp in appearance, although we do not see this because they build and live concealed in a jagged volcano shaped calcium carbonate housing just like the corals and Mollusks. This is why they are often mistaken as a coral or Mollusk life form. They are common along the tidal zones where the water rises and falls each day. When the tide is in, they open up and stick out their feathery legs and gills to filter plankton out of the water. Likewise, when the tide is out, they retract into their housing and close up. Barnacles may attach to living creatures like crabs and whales too. This is the real reason

why whales leap out of the water and crash back down; to chip off the barnacles which have settled on their skin, and not to show off their vertical leaping skills. Yes, as you may have guessed, they attach to ships too, which off course would slow them down and cost more fuel because of the extra weight and water resistance the housing of the barnacles would present. This was a big issue in WW2 because it slowed down warships and made them more vulnerable to attack by German U-Boats (submarines). Therefore the ships had to be brought to a port once a year, haul out by cranes so the barnacles could be removed by scraping the ship down to the smooth metal. This in turn required many coats of special marine paint as well. The cost in money and manpower was astronomical, not to mention that the ship was totally vulnerable, unable to fire its guns, less the recoil fracture the ship. Also, the ship was not out in the sea fighting the war or defending our national waters. This was remedied by a team of scientists who took population studies on the species of barnacles that attached to the ships. They then defined the level of salinity (saltiness) that they could survive. Once the tolerance numbers were found, they simply sailed the ships up into ports (water line cities) where the salinities were low enough (far enough from the sea like Philadelphia and Baltimore) for a few days until the barnacles died and fell off. War ships could get back into the sea in a few hours if our coast was attacked (a real fear of the times)and they could also defend themselves if openly attacked by planes etc.. Given the time period, world crisis and level of war technology back then, this certainly played a monumental role in winning the war at sea. Another unimaginable thing involving the barnacle animal was the old sailing ship days punishment called “Keel Hauling”. A ship has a large strong main beam straight down the hull (bottom) of the ship called the “keel”. In keel hauling you were de-clothed, and your hands were tied together and lead into a long rope where a few men waited. Your feet were also bound and lead into a rope the same way, yet to another group of men waiting. You were then tossed over the side into the sea, then both ropes were pulled so as to press your body tight against the barnacle covered keel bottom of the boat. As the men holding your feet fed the rope out the men on the other end were pulling your hand tied end towards them. The result was that you were literally shredded by the cutting edges of the barnacle’s cone shaped shells. If you didn’t drown, then you died from a loss of blood or sharks attacking your profusely bleeding body. Sometimes a rare soul survived keel hauling; something that was a punishment in its own right; that is to live so hideously scared for life. You see, you were keel hauled face down, against the keel and the sharp barnacles. No learning curve here! See it once, and you are very clear and obedient to the rules, whatever they be!

5. SHRIMP- Shrimp are probably the most commonly eaten Crustacean simply because they are very numerous; traveling in schools of thousands in the more calm and concealed bodies of saltwater such as our Gulf of Mexico near Louisiana, Mississippi, Alabama, Florida and Texas. Their basic body shape is like that of the lobsters and crayfish in that they are more long than they are wide. However, they do not have any large claws of any kind which leaves them with the need to passively defend themselves by swimming away from their threat. Some live on the sea bottom, but most live in the open sea water, or, in a few cases, freshwater. When we buy shrimp, their heads have been removed, leaving only the edible tail.

6. COPEPODS– The role that insects play on land is so huge that it is hard to imagine a balanced planet without them, despite the many annoyances that they present to us. Well, there are NO insects in the salt water ecosystem. This is where the Copepods have taken the lead on their absence, and have taken on the same roles as the insects on land. They exist in billions, are microscopic and are at the beginning of most food chains. The Copepods are a type of plankton (microscopic life) or more technically called zooplankton (animal forms of plankton). They eat the phytoplankton (plant forms of plankton) which grow and live at the surface regions of the seas where sunlight powers their photosynthetic activity. Well, Copepods hate the sunlight and so they only graze on the phytoplankton at night time. During the day they will swim down in the water column to about 100ft, just pass the intense sunlight. There are so many of these creatures that they form a murky a 50 ft. thick band at the 100 ft.] mark in depth. This band is so concentrated that SONAR readings picked it up as the bottom of the sea. Well, the German Navy knew that this was not the bottom of the Mediterranean Sea, but instead the Deep Scattering Layer (DSL) of concentrated Copepods who were hanging out, avoiding the sunlight of day, waiting to return to the surface at night to eat the phytoplankton. The German submarines were simply devastating to the Allied Forces navy , sinking well over 700 ships. We knew that they were sneaking through

Straight of Gibraltar, a very narrow passage of water leading from the Atlantic Ocean into the Mediterranean Sea. We controlled both banks of this narrow passage; the Rock of Gibraltar on the Spanish coastline and the coast of Morocco on the other. We knew that the German subs had to get to Italy in order to get refueled, stocked, repaired and rearmed with their deadly torpedoes. We patrolled the Straight of Gibraltar day and night, yet somehow they were getting through the straight and on to Italy. What the Germans had discovered first was this DSL of Copepods and how it resembled the bottom of the sea on SONAR, and so they used it by shutting down their engines, dropping to a depth right in the middle of the DSL and drifting in on the inflowing tide, undetected on SONAR, shielded by the billions of Copepods making up the DSL. Eventually we discovered this too, and then blew them out of the water with depth charges.

7. AMPHIPODS- The prefix “amphi” means to enlarge or magnify, and “poda” means foot. So the Amphipods have very large oversized feet/legs which may be longer than the rest of the entire body regions combined. They often live in sands and dunes on the beach, will bite and feed on your skin and body fluids, and can jump phenomenal distances. This is why they are sometimes called “sand fleas”. although they are certainly not insects. Looking at them head on, they are very skinny and narrow, much like looking straight at the edge of a butter knife.

8. ISOPODS – Isopods are flattened shape which is close to the ground, so they are very wide, yet very minimal in height. Our common sow bug or pill bug is an isopod, and is perhaps one of the few land dwelling Crustaceans in our local ecosystem. The deep sea ones can reach a foot or more across, truly resembling some sort of creature from a creep movie.

9. KRILL- These little shrimp-like Crustaceans exist in schools containing so many billions that the sea may appear a brownish red color over areas sometimes exceeding a mile. They are the most plentiful food resource in the sea, which is why the largest of the whales have adapted to collecting and eating them at a rate of 2,000- to 6,000 pounds a day. The baleen whales are those which eat krill and can be identified by the stripe-like marks on their lower jaw area. These in fact are pleats which allow the whale’s mouth to expand and gulp thousands of gallons of krill filled sea water in one gulp. It then squeezes the water out by using its tongue to push the water and krill up against the baleen plates along the jaw/gum lines. These baleen plates are matted ridges of sticky compacted hair along the gums which allow water to drain out, while retaining the krill. Baleen whales may work in groups by making whirlpools to concentrate the krill in a compacted area at the center of the whirlpool. Then they dive down and come up into the bottom of the krill whirlpool, gulping up the water and 100’s of pounds of krill in a single gulp. Baleen whales would starve to death without krill because they would not be able to get enough food to power their immense bodies. Did you know that a Blue Whale (a baleen whale) is over 100 ft. long and may weigh as much as 7 fully loaded 18 wheeler trucks (300,000 pounds or 150 tons.) Yes, you may have thought that we should harvest krill to feed our ever growing world population. Well, we Americans don’t because it tastes lousy. But it is harvested, dried and compressed into protein rich tablets for the starving of many impoverished nations of the world.

THE CRUSTACEAN NATION “What’s The Word?” **QUESTIONS!**

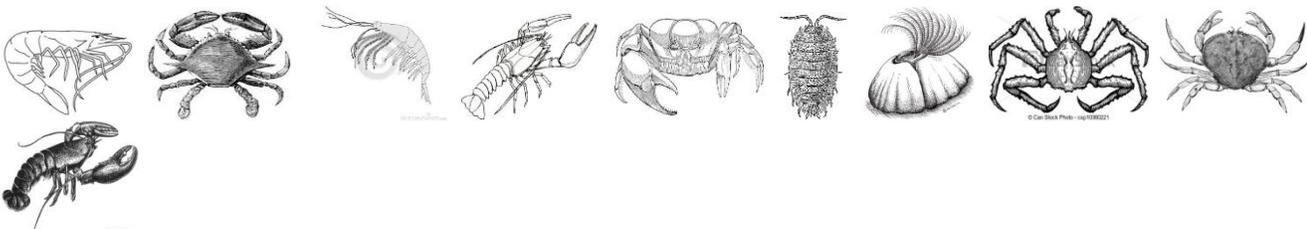
Use the 11x 17 picture page handout “CRUSTACEAN TYPES” and “THE CRUSTACEAN NATION- What’s The Word” support text to figure out the content related riddles below.

1. W L = _____ and L W = _____
2. We are a **streamline design** of another related kind. _____
3. Our “**Zorro**” is more to scare than impair our predators. _____

4. We are both “ **in the Navy now**” because we hold the “**how**”! _____ and _____
5. **Dunk Bowl** champions, hands down! _____
6. We have an **armadillo –like behavior**. _____
7. If you are in a scrape with us because you did not maintain an even keel with your behaviors. _____
8. We are a **name – alike** and an **are- alike** to the Class Arachnida. _____ and _____
9. We have a bit of a Medieval look and name. _____
10. The *baleens* said , kill the _____.
11. What are the three major differences between the crayfish and the northern lobster?

12. And so this crustacean said;
“*Play me a tune, I’ll be mating soon*”. _____
13. “*Fields of harvest year round, is good for the wallet and good for the ground.*”
To what crustacean does this apply? _____
14. This is the rhyme; “ *Three in one makes a _____* ”.
15. “ *We are color coded so we are owner noted.*” _____
16. “*When Face to face, I show little space*”. _____
17. “*Paint me a sea, rusted as can be*”. _____
18. “*We certainly are a 5 state business*” _____
19. We are real squatters who cause an ____ **W**, an ____ **F**, and a ____ **S** which all adds up to an increase in **F** and/or \$
20. “*We are American Veterans of foreign war*” _____ and _____

NATURAL HISTORY OF THE CLASS CRUSTACEA



The **Class Crustacea** is a member of the huge Phylum Arthropoda. The name “Crustacean” means ‘hard bodied animals’, which include *lobsters, crabs, shrimps, crayfish, sow bugs, amphipods, isopods, copepods, barnacles*. With a few exceptions like the sow bug and amphipods, the members of this group live in **aquatic environments**(water). Like all classes of the Phylum Arthropoda, the crustaceans have an **exoskeleton**. However, their exoskeleton is unusually hard and tough when compared to the arachnids, insects and myriapod members of Phylum Arthropoda. It is also well armored with many spikes, sharp angles and cutting claws. Upon review of their structure, it is very obvious that they are Arthropods with their many jointed appendages composing their exoskeleton outer covering.

Like all Arthropods we can determine that they are crustaceans because they never have 6 legs, like the insects, or 8 legs, like the arachnids. They often have 10 legs which may either be walking legs, swimming paddles or **chelipeds** (claws). In addition to their numerous legs, the Crustaceans are the only Arthropod to have 2 pairs of antenna structures. One pair is the antennae, and the other is called the antennules. Together they serve as sensory organs for tastes, smell, touch and vibration (hearing). Their **visual** sense is accomplished by two eyes that are **mounted** on **periscope-like** stalks that can move in all directions so that they can survey their surroundings from all angles. Another amazing feature about this class of organisms is that they can **regenerate** the body appendages **mentioned**. (mentioned earlier).

All Crustaceans must undergo a **molting process** (shedding of exoskeleton) in order to increase in size because their exoskeleton does not grow as does our endoskeleton structure. They do this as often as growth rates demand, which is of course governed by the availability of food to grow. The process is really a chemical and structural wonder as a **hormone** signals the need to molt, the body undergoes a **dehydration** process whereby it shrinks (inside the exoskeleton) by one third its body weight/size. Then the exoskeleton opens up at a designated **seam** region on its body. Then, over many hours, it backs out of the old exoskeleton and discards it. At this point in time he looks like a perfect **replica** of what he was prior to molting, except he is very soft and vulnerable, and so he hides for a few days until the new exoskeleton hardens. During this time he **rehydrates** (restores lost water) his body to the “new size” that he will be, which is usually about 1/3 larger than he was before. During a lifetime, a Crustacean may undergo 25 or more molting events.

Reproduction is sexual, having both a male and female gender. **Copulation** (sexual act) occurs when the female has molted. With her armored exoskeleton off , the male can access her reproductive area and fertilize her. This is a “give and get” situation because the male protects her during this process, something she **direly** needs when her exoskeleton is soft and vulnerable. As her eggs mature the egg mass resembles a large clump of tan to orange Cream of Wheat Cereal. They are held by the flap like structures called **swimmerets**, which are located on the ventral side of the posterior end. When ready, she simply expels the 100’s of eggs into the water, where a *by chance* situation for survival occurs. While the Crustaceans are scavengers, we certainly do not rule out **cannibalization** as they frequently eat their own eggs, babies and fellow members.

With the Crustacean membership including all crabs, lobsters and shrimps, the commercial value of these animals need not be emphasized if you have ever purchased them to eat. Expensive! On that note, it is important to know that all Crustaceans have a **“green gland”** in their digestive system which becomes **lethally toxic** to humans soon after the Crustacean has died. Therefore, all edible members of this class must be either cooked alive or clean alive. You can always tell that a Crustacean has been cooked because the exoskeleton turns a bright orange color.

The Crustaceans occupy a very critical **niche** (roll or service) in the **world food pyramid** because they play the same role in the **marine habitats** (oceans) as do the insects in the **terrestrial habitats**(on land.) That’s right! There are NO insects in saltwater environments! This is where the Crustacean members called the isopods, amphipods and most largely, the copepods serve to fill this roll as they exist by the billions, making up the greatest portion of what we call **zooplankton** (microscopic animal life in the water).

It is interesting to know that the current geography of the world might very well have been considerably different had not certain biological research of the Crustacean barnacles and copepods been conducted. We will talk later about this topic as well as a bit of blood chilling examples of how the pirates used the Crustaceans to do their **dastardly deeds**. *German –U Boats, “Keel Hauling” and TORTURE ...!*

NATURAL HISTORY OF THE CLASS CRUSTACEA

FORMAL OUTLINE FROM READING ABOVE

A. TAXONOMY-

1. PHYLA- _____
2. CLASS- _____
3. DEFINE THE CRUSTACEAN ORDERS FOR : (research these)

ORDER	CRUSTACEAN GROUP	# OF SPEICES
	<i>Lobsters</i>	
	<i>Crabs,</i>	
	<i>Copepods,</i>	
	<i>Shrimp,</i>	
	<i>Barnacles,</i>	
	<i>Krill,</i>	
	<i>Crayfish,</i>	
	<i>Amphipods,</i>	
	<i>Isopods,</i>	

B. Member Groups- Common names

C. Range of Habitat –

D. Meaning of the name Crustacea= _____ and bear many _____, _____ and 10 highly specialized _____ which may be used for _____, _____ or _____.

E. HEAD has a _____ eyes which are capable of a _____-like rand of _____ and _____ pairs of _____ which house the senses of _____, _____ and _____

F. Has numerous different types of _____ which are highly specialized, have many _____ which enables a high range of movement/uses and are capable of _____ should they be lost for any reason.

G. GROWTH is defined each time they _____ or lose exoskeleton. The frequency of this is decided by the amount of available _____ which supports their growth.

8-10 When compared to other Arthropods, the exoskeleton of the Crustaceans is considerably 8. _____ than that of other Arthropods and therefore more likely to inflict injury if you were to step on them in bare feet. And uniquely speaking, the exoskeletons of Crustaceans will turn 9. _____ when they are 10. _____.

11-17 Serving as a huge industry some Crustaceans which are consumed regularly are 11. _____, 12. _____, 13. _____ and 14. _____. All of these must be either 15. _____ or 16. _____ alive due to a toxin that is released by digestive glands not long after they 17. _____.

18-20 Because the exoskeleton is not 18. _____ like our bones, it is incapable of 19. _____ and therefore must be molted/shed as the animal within grows. How often this occurs depends on the volume of available 20. _____

WHO AM I ????

21. _____



22. _____



23. _____



24. _____



25. _____

26. _____



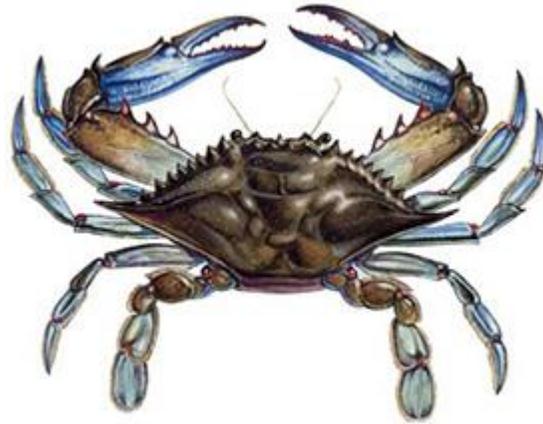
27. _____



28. _____



29. _____



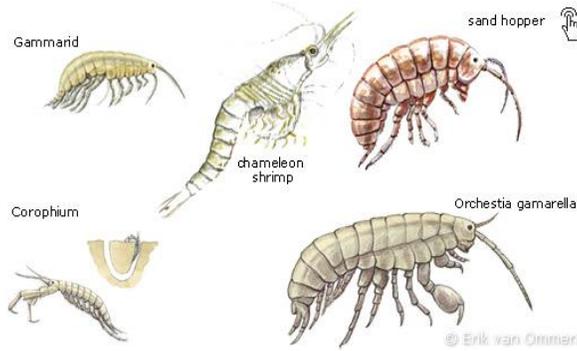
30. _____

(FLAT AND WIDE)



31.. _____

(TALL AND NARROW)



Given pictures 21-31

32.____ How many are completely land dwellers?

33. ____ How many are completely sessile?
34. ____ How many may defend and hunt with chelipeds?
35. ____ How many swim sideways?
36. ____ How many swim backwards ?
37. ____ How many feed and annoy whales ?
38. ____ By virtue of size and numbers, and the fact that no insect can live in saltwater, how many are often termed “ the insects of the sea”?
39. # ____ and # ____ Which two stopped the U-Boats?
40. # ____ Who participated in Pirate torture?