"What Darwin Never Knew" Video Worksheet Name_____

****To find the video online, do a Google video search for What Darwin Never Knew and select either the PBS NOVA option or the Youtube option (8 parts). One option may work better on your computer than the other.**

1. Charles was offered a place on the British Navy ship, The H.M.S. _____, whose mission was to survey the waters around South America.

2. But one port of call on Darwin's voyage proved more important than all the others: the_____. This cluster of 13 isolated islands lies 600 miles off the coast of Ecuador, in the Pacific Ocean.

3. Originally, there must have been just one type of _____ on the Galapagos, but over time it had diversified into many kinds, with different beak shapes; the same for the tortoises. One type of _____ must have turned into many kinds, with different shells depending on which island they lived on.

4. Darwin had this amazingly bold idea: the tree of life—that all _____ were connected.

5. Ultimately one type of _____ could be transformed into something utterly different. It's a process Darwin called "descent with modification."

6. The pattern that Darwin saw was that the creatures that survived were those best _____to the specific environments they lived in.

7. Darwin realized that _____ must be the starting point for change in nature. In any generation, the animals in a litter are never quite the same. And in the wild, such a tiny _____ might make all the difference between life and death.

8. These variations accumulate and eventually new species branch off. This is evolution by_____ _____. It is one of the keys to how new species are formed.

9. The _____ molecule is one of the real secrets of life. It's a perfect system for storing the vast amounts of information that's necessary for building all kinds of creatures.

10. _____ is a critical ingredient in the recipe for evolution. Without mutation, everything would stay constant, generation after generation. Mutation generates _____, differences between individuals.

11. People were freaked out by the relatively small number of genes. It's down to something like _____ protein-coding genes in a human genome.

12. The _____ genes determine where the head goes; where the limbs go, and what form they take: whether they are arms, legs or wings.

13. It's not the genes you have but how you use them that creates _____ in the animal kingdom.

14. Switches are not _____. They don't make stuff like hair, cartilage or muscle, but they turn on and off the genes that do.

15. But eventually, hunting through the vast stretch of D.N.A. that does not code for proteins, he found it, a section of D.N.A. that had _____ in the lake stickleback. These mutations meant that the switch was broken. It didn't turn on the gene that makes spikes.

16. This was a revelation. The same genes were responsible for the beaks in all types of finch. Any differences were in _____ and _____.

17. Scientists now realize that not all genes are created equal. Some make the stuff of our bodies, and _____ are needed to turn many of these stuff genes on and off. The _____ genes are what throw these switches, which tell the stuff genes what to do and when.

18. It all goes back to Darwin's idea of the tree of life, that all life-forms are ultimately _____, and from the earliest common ancestor, over billions of years, they have _____ and diversified, so that creatures that started out looking the same, evolved to become completely different.

19. If Darwin were right, somewhere out there, there had to be a transitional form, a fossil that was part_____, but had the beginning of _____.

20. Tiktaalik is a perfect _____ form. Much of its body is that of a fish. It's covered in scales. But it also had something very un-fishlike, an arm-like fin, or, perhaps, a fin-like arm. Tiktaalik had the bone structure that is seen in the arms and legs of every _____ limbed animal: one big bone at the top; two bones underneath, leading to a cluster of bones in the wrist and ankle.

21. Hox genes have been found in all complex animals, from the velvet worm that dates back some 600 million years, to the modern human. And in all that time, the letters of their D.N.A. have remained virtually _____.

22. These genes determine where the _____ and the _____ of the animal's going to be; the top, the bottom; the left, the right; the inside, the outside; where the eyes are going to be; where the legs are going to be; where the gut's going to be; how many fingers they're going to have.

23. Amazingly, in all four limbed animals, even us, exactly the same _____ create the long, upper arm bone.

24. Oftentimes, the origin of whole new structures in evolution don't involve the origin of new _____ or whole new genetic recipes. Old genes can be reconfigured to make marvellously wonderful new things.

25. Given all the obvious differences between humans and chimps, you might expect our D.N.A. to be really different. But, in fact, it's more like _____ percent identical.

26. One percent may not sound like much, but it's still some _____ of D.N.A.'s chemical letters: As, Ts, Cs and Gs.

27. In total, he has found some 21 different mutations responsible for microcephaly. Sometimes, one of the D.N.A.'s chemical letters is _____ with another letter, sometimes letters are _____ entirely, but whatever the defect is, they all stop the brain cells from dividing at a very early stage of development.

28. The gene in humans was radically different from that found in chimps. There had been a large series of_____.

29. When she looked at that D.N.A. in chimps and compared it to the same D.N.A. in a chicken, it was different in just _____letters. But in humans it was different by _____ letters. A massive mutation.

30. Basically, you can make _____ changes, just changing those switches. So a _____ change, a couple of D.N.A. letters, could have a profound effect.