Name: _____

Natural Selection at Work! Option 1

You may access this video on www.biologybynapier.com , Evolution Unit page, scroll to the link **"Stickleback Evolution"**

Section A: The Making of the Fittest --- Evolving Bodies, Evolving Switches

http://www.hhmi.org/biointeractive/making-fittest-evolving-switches-evolving-bodies

1. Identify if the following statements are true or false. Explain your answer.
   a. "Having pelvic spines is always advantageous to a stickleback." _____
   _____
   b. "All mutations are bad." _____
   _____
2. What special features of the environment in Bear Paw Lake, Alaska, may have favored the survival and reproduction of stickleback fish with reduced pelvis? _____
   _____
3. In the film, Dr. Bell notes that in multiple freshwater populations and at multiple times in history, the frequency of stickleback fish with pelvic fins decreased and frequency of stickleback fish with reduced pelvises increased. This demonstrates that __.
   a. only fish with smaller pelvises migrate to freshwater
   b. similar environments select for similar genetic changes
   c. the pelvis of the marine fish is destroyed by freshwater
4. Circle whether each statement is true or false.
   a. True or False Evolutionary change always takes millions of years.
   b. True or False Dramatic changes in traits, such as the loss of limbs, can occur through mutations affecting a single gene.

5. In the diagram, the gray dots represent regulatory switches; each one allows a specific binding protein to interact with it and turn on the Pitx1 gene in a particular tissue. When expressed, the Pitx1 gene is transcribed and then translated to generate the Pitx1 protein. Read each question below and write a 'yes' or 'no'.
   a. A deletion in the Pitx1 gene causes a frameshift mutation. How likely is it that a functional Pitx1 protein would be produced in the jaw? _____ In the pelvis? _____ Explain your answers.
   _____
   _____
   _____
   _____
   b. The regulatory gene for hindlimbs was deleted. Would you see a functional Pitx1 protein in the jaw? _____ In the pelvis? _____ Explain your answers. _____
   _____
   _____
   _____