Gene Sequence Exercise

The letters form pairs, which gather together
in groups we call genes that instruct your cells whether
to make your hair curly, your eyes brown or blue.
They tell every part of you just what to do.

What is a gene? **DNA** is made up of four **bases:** A, T, G and C. In groups these bases form **genes**. These genes are like instructions for the cell, and together they build every part of living plants, animals, **bacteria** and **fungi**. Similar living things share similar DNA sequences. Scientists can line up DNA sequences, to look and see how closely they match. For example, if a scientist has found a bone, but they don't know what animal it belongs to, they can use a machine to **sequence** the DNA, and run it through a computer to look for matches.

Instructions

Step 1: Pick a card

Your card will reveal an animal and a gene sequence.

Step 2: Build your gene

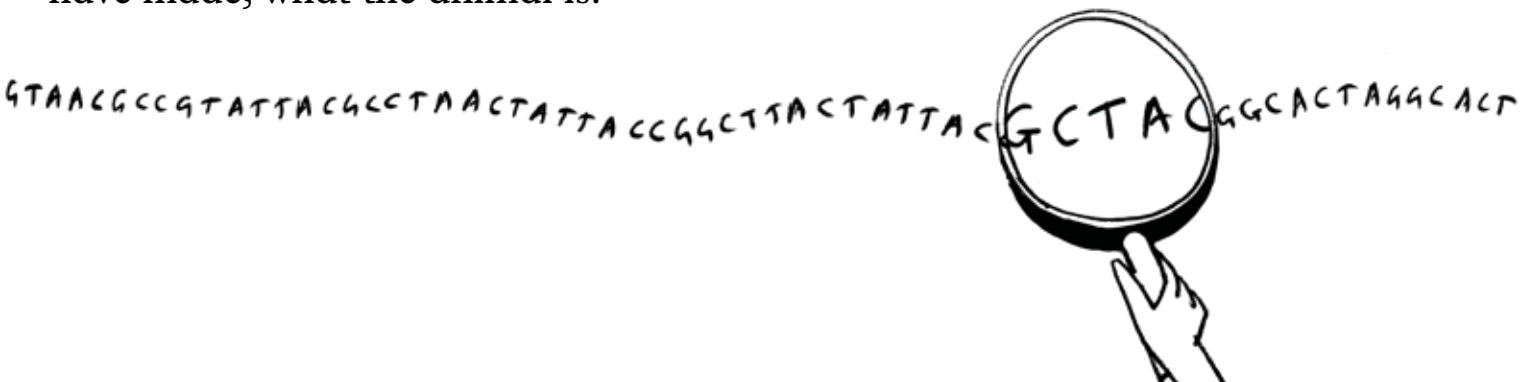
Each base will be given a different colour. Using coloured 'bases' given to you by your teacher, copy the sequence on your card.

Step 3: Match your genes

Compare your genes with your classmates. Can you guess which of you has the same cards by matching your sequences? Are some sequences more similar than others?

Step 4: Solving a mystery

A scientist has found some bone and wants to know what animal it comes from. She removes the DNA from the cells, and sequences it. Your teacher will show you the sequence. Can you figure out, by matching the sequences you have made, what the animal is?



Walk-through instructions and options for advanced learners for teachers/carers

Materials:
- Approximately 20 objects in 4 different colours that can be used to represent the 4 different bases (A, T, G and C). E.g. lego, beads, tiddlywinks, counting blocks, coloured card/paper, pom poms...
- Some string/tape/glue/lego baseplate etc. to hold the 'bases' in place
- Enough cards printed so that there is one mystery card per table (or this can be projected at the front) and a card with a sequence of known origin for each person.

1. Begin with your mystery sequence made up with your 'bases', this will act as an example for those building their sequences.

2. The learners can then begin to build their own sequences on their cards. Get them to show each other their sequences. Can they guess which have mathcing cards from just the sequences they've built?

3. Get them to look at the different sequences:
Which are the most similar? (answer: the monkey and human)
Are they the ones you might of expect? (answer: animals that are more closely *related*, i.e. more similar, will share more bases)
Why? (answer: because they have had less time to mutate and accumulate differences between genes, but this is getting very advanced!)

4. Advanced learners could work out what fraction of bases are shared between the different animals (answer: the bases must be in the same position, e.g. Monkey shares 7/10 bases with a human, 3/10 bases with a cat, 5/10 bases with a rabbit and 6/10 bases with a rinkidink.

5. Match up the sequences from the cards with the mystery sequence to identify what animal the mystery sequence belongs to (answer: it's the rinkidink). Well done! You've identified what animal the bone belongs to.