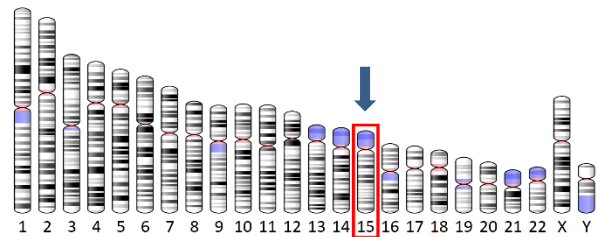


# DNA Gizmo

**Part A:** Answer the following questions as you work your way through the DNA Gizmo.

- Construct the left side of your DNA strand, and record the letter sequence here: \_\_\_\_\_
- What type of molecule must you add to connect the whole strand together? \_\_\_\_\_
- Now construct the corresponding right side and record those letters: \_\_\_\_\_
- In this simulation, why can't a *Cytosine* base connect with a *Thymine* base?
- What happens when you release the enzyme *DNA helicase*?
- Before one cell divides into two (this is called *mitosis*) it must make an exact replica of the original DNA strand. What enzyme must be released in order for the nucleotide molecules to begin filling in the empty slots?
- After the base pairs are matched up, we end up with DNA two strands that are opposite / identical. (circle one)
- Take the Gizmo quiz and record your score here: \_\_\_\_\_ / 5
- The strands of DNA you just constructed were each just \_\_\_\_\_ base pairs in length. Most human genes actually contain hundreds, or even up to millions, of these base pairs.

10. The OCA2 gene, responsible for melanin pigmentation in skin, hair and eyes, is located on chromosome #15 (see image to the right). It begins at base pair 28,000,020 and ends at base pair 28,344,457. How many of these letters (A, T, G & C) would you have to line up in a row to make this single gene?



- Each chromosome contains hundreds or thousands of genes. And each human has two complete sets of these chromosomes in every cell. One set comes from \_\_\_\_\_ and the other from \_\_\_\_\_.
- The X and Y chromosomes are called sex chromosomes because they determine a person's biological sex. A developing embryo with **two X chromosomes** (genotype XX) will become a \_\_\_\_\_ and one with **both an X and a Y** (genotype XY) will become a \_\_\_\_\_.
- Including these sex chromosomes, humans \_\_\_\_\_ pairs of chromosomes, for a total of \_\_\_\_\_.
- Complete the following Punnett square for eye color in which Brown eyes (B) are dominant to blue eyes (b).
- Complete the following Punnett square for the sex-determining chromosomes (XX or XY).

		B	Mom	b
Dad	B			
	b			

		X	Mom	X
Dad	X			
	Y			

- Mom's eye color: \_\_\_\_\_
- Dad's eye color: \_\_\_\_\_
- Likelihood of blue-eyed offspring: \_\_\_\_\_%
- Likelihood of brown-eyed offspring: \_\_\_\_\_%

- Likelihood of having a baby boy: \_\_\_\_\_%
- Likelihood of having a baby girl: \_\_\_\_\_%

**Part B:** Use the chart below to count up how many different bases there are between each animal compared to human DNA. Record the number below each column.

Human	Bonobo	Gibbon	Chimp	Gorilla	Orangutan
A	A	A	A	A	A
C	G	G	C	G	G
C	C	T	C	T	T
T	T	G	T	G	G
A	A	C	A	C	C
G	G	T	G	G	G
C	A	A	A	A	A
G	G	A	G	G	G
A	A	C	A	C	C
G	G	G	G	G	G
T	T	C	T	C	C
C	G	G	G	G	G
A	A	C	A	A	A
A	A	C	A	C	C
A	A	A	A	A	A
T	T	A	T	T	A
G	G	C	G	G	C

- 1) What group (within mammals) do all of these animals belong to?
- 2) Which two species are the closest relatives of humans?
- 3) Out of the five, which species is the most distant relative of humans?
- 4) If we lined up an entire strand of your DNA and compared it to someone else in the class, would all the base pairs match? Explain.

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Total number of different bases, as compared to human DNA

**Part C:** A *phylogenetic tree* (also called a *cladogram*) shows how closely different species are related to one another based on when they branched off from a common ancestor. Based on their DNA, place the animals from Part B on the phylogenetic tree below, ending with humans on the right side of the tree.

