

Mutations

A mutation is any change in DNA sequence. Recall: DNA → mRNA → protein → Traits
Some mutations in DNA cause a different protein to be made, because they change what's in the mRNA. If you change the coding in the mRNA, you change the amino acid sequence, which changes the protein. In many cases, however, a mutation does NOT affect the final protein product (a *silent* mutation), and thus has no effect on traits.

Only mutations in _____ cells can be inherited by offspring.

Mutations in _____ cells are not passed on to offspring, but could cause major problems such as _____, (uncontrolled cell growth and division).

In rare cases, mutations may have _____ effects, resulting in an adaptation.

Redundancy in the code minimizes the effect of some genetic mistakes

	<u>Part of Normal Gene</u>	<u>Part of Mutated Gene</u>
DNA--	TAC <u>AGT</u> CTT <u>CAG</u> TTT	TAC <u>TCG</u> CTT <u>CAA</u> TTT
mRNA-	AUG UCA GAA GUC AAA	AUG AGC GAA GUU AAA
AA--	Met Ser Glu Val Lys	Met Ser Glu Val Lys

In the above case, major mistakes in the DNA copying mechanisms did not affect the protein product of the gene.

Sometimes a small mistake in the DNA can make a big difference in the protein product.

Point Mutations: change in a single base pair in DNA... can be silent.

	<u>Part of Normal Gene</u>	<u>Part of Mutated Gene</u>
DNA-	TAC GGG CTT CTT TTT	TAC GGG <u>CAT</u> CTT TTT
mRNA-	AUG CCC GAA GAA AAA	AUG CCC GUA GAA AAA
AA-	Met Pro Glu Glu Lys	Met Pro Val Glu Lys

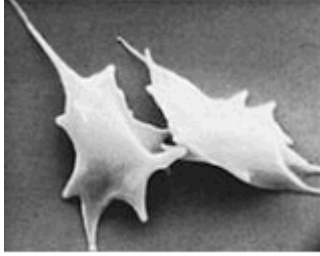
Frameshift Mutations: A single base is added or deleted from DNA

	<u>Part of Normal Gene</u>	<u>Part of Mutated Gene</u>
DNA-	TAC GAC TCA AAG UGC	TAC <u>GCT</u> CAA AGU GC
mRNA-	AUG CUG AGU UUC ACG	AUG <u>CGA</u> GUU UCA CG
AA-	Met Leu Ser Phe Thr	Met Arg Val Ser ??

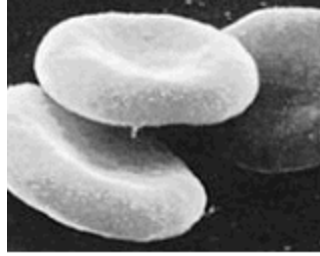
What kind of mutation seems to have the greatest effect on a cell? Explain your answer below.

Sickle Cell Anemia:

Use your book (p.150, 194, 763) to describe how this mutation in blood cells occurs.



Sickled Red Blood Cells



Normal Red Blood Cells

What is a mutagen?

What is a carcinogen?

List common mutagens in each category:

Radiation

Chemical

List common mutagens in each category:

Radiation

UV light

X-rays

Cosmic rays

Gamma radiation

Beta radiation

Chemical

asbestos

benzenes

cyanide

formaldehyde

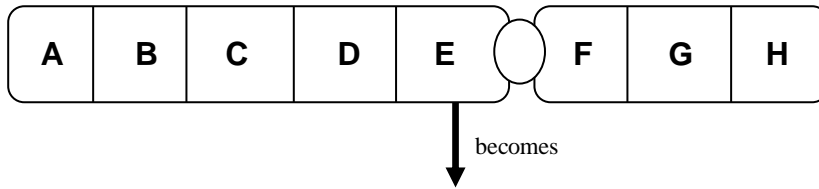
dioxins

Acrylamide- found in potato chips, French fries, toast

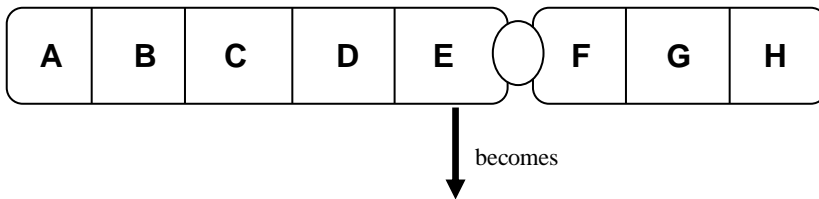
Chromosomal Mutations: (Use your book for a definition):

Draw ***and color code*** the resulting chromosome for each type for mutation:

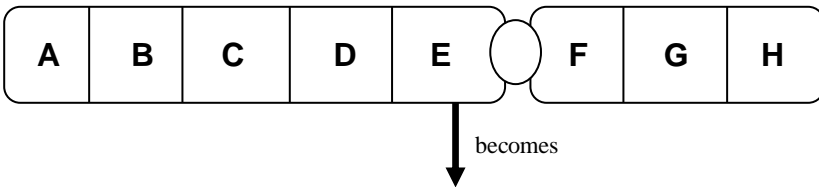
Deletion: (Use your book for a definition):



Duplication Insertion: (Use your book for a definition):



Inversion: (Use your book for a definition):



Translocation: (Use your book for a definition):

