Chromosomal mutations worksheet answer key

Mutation Lab

I. Purpose: To transcribe DNA to mRNA to determine the amino acid chain created by the codons and how various mutations will impact the polypeptide.

II. Procedure:

a. Transcribe the following DNA strand to mRNA: CCC TAC GAC ATG GAG CGG TTA TAC CAC TTT AGC AGC CGA AGT ACT

mRNA= GGG AUG CUG UAC CUC GCC GCC AAU AUC GUG AAA UCG UCG GCU UCA UGA

Polypeptide= __, MET, LEU, TYR, LEU, ALA, ASN, MET, VAL, LYS, SER, SER, ALA, SER, __

III. Analysis:

a. Below is a mutated strain of mRNA, what type of mutation has occurred and how has it impacted the polypeptide?
CCC TAC GAC ATG GCG CGG TTA TAC CAC TTT AGC AGC CGA AGT ACT

A point mutation has occurred. The A was mutated into a C. this mutation causes LEU to become ARG. This could mess up the function of the protein.

CCC TAC GAC ATG GAG CGG TTA TAC CAC TTT AGC CGA AGT ACT

b. Below is a mutated strain of mRNA, what type of mutation has occurred and how has it impacted the polypeptide?
CCC TAC CGA CAT GGA GCG GTT ATA CCA CTT TAG CAG CCG AAG TAC

A frameshift mutation occurred. The first C in the third set was added to the DNA sequence. All of the DNA sequences after the mutation are now changed.

CCC TAC GAC ATG GAG CGG TTA TAC CAC TTT AGC AGC CGA AGT ACT

c. Below is a mutated strain of mRNA what type of mutation has occurred and how has it impacted the polypeptide? (Use the highlighted letter as a reference point.)
CCCTACGACATTTCACCATATTGGCGAGGTAGCAGCCGAAGTACT

A chromosomal mutation is taking place. It is called an inversion mutation. The DNA in between the highlighted area is flipped 80 degrees. This will cause the DNA in between the highlighted area to be different.

CCC TAC GAC ATT TCA CCA TAT TGG CGA GGT AGC AGC CGA AGT ACT

d. What possible outcomes could result from these types of mutation for the organism impacted by them?

Possible outcomes that will result from these mutations would be that the organisms would probably die. Point mutation can cause sickle cell, frameshift mutation can cause a change in proteins, and chromosomal mutation can change the types of proteins being created.

Mutations Worksheet **Name** ______________________________ **Per.**

There are two main types of mutations: point mutation and frameshift mutations. In each of the following DNA sequences, you will use the mRNA and amino acid sequences to identify the mutation that occurred and the effects of each on, if any. Look and analyze carefully!

Original DNA Sequence: T A C A C C T T G G C G A C G A C T
mRNA Sequence: ______________________________
Amino Acid Sequence:

Mutated DNA Sequence #1: **T A C A T C T T G G C G A C G A C T**
What's the mRNA sequence? (Circle the change) ______________________________
What will be the amino acid sequence? ______________________________
Will there likely be effects? ____________
What kind of mutation is this?

Mutated DNA Sequence #2: **T A C G A C C T T G G C G A C G A C T**
What's the mRNA sequence? (Circle the change) ______________________________
What will be the amino acid sequence? ______________________________
Will there likely be effects? ____________
What kind of mutation is this?

Mutated DNA Sequence #3: **T A C A C C T T A G C G A C G A C T**
What's the mRNA sequence? (Circle the change) ______________________________
What will be the amino acid sequence? ______________________________
Will there likely be effects? ____________
What kind of mutation is this?

Mutated DNA Sequence #4: **T A C A C C T T G G C G A C T A C T**
What's the mRNA sequence? (Circle the change) ______________________________
What will be the amino acid sequence? ______________________________
Will there likely be effects? ____________
What kind of mutation is this?

Mutated DNA Sequence #1: **T A C A C C T T G G G A C G A C T**
What will be the corresponding mRNA sequence? ______________________________
What will be the amino acid sequence? ______________________________
Will there likely be effects? ____________
What kind of mutation is this?

Mutations Worksheet **Name** ____________ Date: ______ **Per.** ____

There are three main types of mutations: point missense mutations, point nonsense mutations, and frameshift mutations. In each of the following DNA sequences, you will use the mRNA and amino acid sequences to identify the mutation that occurred and the effects of each on, if any. Look and analyze carefully! 10 points

Original DNA Sequence: T A C A C C T T G G C G A C G A C T
mRNA Sequence: AUG UGG AAC CGC UGC UGA
Amino Acid Sequence: Met Trp Asn Arg Cys STOP

Mutated DNA Sequence #1: **T A C A T C T T G G C G A C G A C T**
What's the mRNA sequence? AUG UAG AAC CGC UGC UGA(Circle the change)
What will be the amino acid sequence? Met stop
Will there likely be effects? Yes. No protein is translated What kind of mutation is this? Substitution Point missense

Mutated DNA Sequence #2: **T A C G A C C T T G G C G A C G A C T**
What's the mRNA sequence? AUG CUG GAA CCG CUG CUG A (Circle the change)
What will be the amino acid sequence? Met Leu Glu Pro Leu
Will there likely be effects? Yes, useless, damaging protein could be produced since there's not stop codon and energy will be sapped. What kind of mutation is this? Insertion, frameshift

Mutated DNA Sequence #3: **T A C A C C T T A G C G A C G A C T**
What's the mRNA sequence? AUG UGG AAU CGC UGC UGA (Circle the change)
What will be the amino acid sequence? Met Trp Asn Arg Cys stop
Will there likely be effects? NO What kind of mutation is this? Substitution, Silent mutation due to redundancy in codons

Mutated DNA Sequence #4: **T A C A C C T T G G C G A C T A C T**
What's the mRNA sequence? AUG UGG AAC CGC UGA UGA (Circle the change)
What will be the amino acid sequence? Met Trp Asn Arg stop
Will there likely be effects? Possibly, depends what role that last, one and only missing aa plays in the shape of the protein. What kind of mutation is this? Point, substitution, missense.

Mutated DNA Sequence #5: **T A C A C C T T G G G A C G A C T**
What will be the corresponding mRNA sequence? AUG UGG AAC CCU GCU GA
What will be the amino acid sequence? Met Trp Asn Pro Ala
Will there likely be effects? yes What kind of mutation is this? POINT, DELETION, MISSENSE, frameshift

1. Which type of mutation is responsible for new variations of a trait? substitution
2. Which type of mutation results in abnormal amino acid sequence? frameshift
3. Which type of mutation stops the translation of the mRNA? Point mutation producing a stop codon after Met.
4. Which type of mutation is responsible for a new trait? ______________________

Delahunty/Biology Honors **Mutations Worksheet** **Name** ______________ KEY

There are several types of mutation:

DELETION (a base is lost)
INSERTION (an extra base is inserted)
Deletion and insertion may cause what's called a **FRAMESHIFT**, meaning the reading "frame" changes, changing the amino acid sequence.
SUBSTITUTION (one base is substituted for another)
If a substitution ***changes*** the amino acid, it's called a **MISSENSE** mutation.
If a substitution ***does not change*** the amino acid, it's called a **SILENT** mutation.
If a substitution ***changes the amino acid to a "stop,"*** it's called a **NONSENSE** mutation.

Complete the boxes below. Classify each as either Deletion, Insertion, or Substitution **AND** as either frameshift, missense, silent or nonsense (hint: deletion or insertion will always be frameshift).

Original DNA Sequence: **T A C A C C T T G G C G A C G A C T**
mRNA Sequence: A U G U G G A A C C G C U G C U G A
Amino Acid Sequence: METHIONINE -TRYPTOPHAN - ASPARAGINE - ARGININE- CYSTEINE - (STOP)

Mutated DNA Sequence #1: **T A C A T C T T G G C G A C G A C T**
What's the mRNA sequence? A U G U A G A A C C G C U G C U G A (Circle the change)
What will be the amino acid sequence? METHIONINE -(STOP)
Will there likely be effects? YES What kind of mutation is this? SUBSTITUTION - NONSENSE

Mutated DNA Sequence #2: **T A C G A C C T T G G C G A C G A C T**
What's the mRNA sequence? A U G C U G G A A C C G C U G C U G A (Circle the change)
What will be the amino acid sequence? METHIONINE - LEUCINE -GLUTAMIC ACID – PROLINE
Will there likely be effects? YES What kind of mutation is this? INSERTION - FRAME SHIFT

Mutated DNA Sequence #3: **T A C A C C T T A G C G A C G A C T**
What's the mRNA sequence? A U G U G G A A U C G C U G C U G A (Circle the change)
What will be the amino acid sequence? METHIONINE-TRYPTOPHAN-ASPARAGINE- ARGININE- (STOP)
Will there likely be effects? NO What kind of mutation is this? SUBSTITUTION – SILENT MUTATION

Mutated DNA Sequence #4: **T A C A C C T T G G C G A C T A C T**
What's the mRNA sequence? A U G U G G A A C C G C U G A U G A (Circle the change)
What will be the amino acid sequence? METHIONINE-TRYPTOPHAN-ASPARAGINE- (STOP)
Will there likely be effects? YES What kind of mutation is this? SUBSITUTION - NONSENSE

Ms. DR's Biology 621
Name: ______________________ Block: ______ Date: ______

Worksheet: Mutations Practice

There are three ways that DNA can be altered when a mutation (change in DNA sequence) occurs.

1. Substitution – one base-pairs is replaced by another:
Example: G to C or A to G
C G T C
2. Insertion – one or more base pairs is added to a sequence:
Example: CGATGG — CGAATGG
GCTACC GCTTACC
3. Deletion – one or more base pairs is lost from a sequence:
Example: CGATGG — CATGG
GCTACC GTACC

There are five possible results of a mutation.

1. Silent mutation: When a base pair is substituted but the change still codes for the same amino acid in the sequence:
Example: TCT and TCC both code for the amino acid Serine
2. Substitution: When a base pair is substituted and the new codon codes for a different amino acid:
Example: TCT codes for Serine and CCT codes for Proline
3. Premature Stop: When a substitution results in the formation of a STOP codon before all of the codons have been read and translated by the ribosome.
Example: GTGGTCCGAAACACC — GTGGTCTGAAACACC
Val-Val-Pro-Asn-Thr Val-Val-STOP
4. Codon Deletion or Insertion: A whole new amino acid is added, or one is missing from the mutant proton:
Example: GTGGTCCGAAACACC — GTGGTCTGCCGAAACACC
Val-Val-Pro-Asn-Thr Val-Val-Cys-Pro-Asn-Thr
5. Frame Shift: When a deletion or insertion results in a different base pair being the beginning of the next codon, changing the whole sequence of amino acids
Example: GTGGTCCGAAACACCT — GTGGTCGAAACACCT
Val-Val-Pro-Asn-Thr Val-Val-Glu-Thr-Pro

What are some mutations in animals.

Deletion: A portion of the chromosome is missing or deleted. Known disorders in humans include Wolf-Hirschhorn syndrome, which is caused by partial deletion of the short arm of chromosome 4; and Jacobsen syndrome, also called the terminal 11q deletion disorder. Duplication: A portion of the chromosome is duplicated, resulting in extra genetic material. Known human disorders include Charcot-Marie-Tooth disease which is caused by a duplication of the short arm (p) of chromosome 17. Translocation: A portion of one chromosome is transferred to another chromosome. In "reciprocal translocation," segments have been exchanged between chromosomes. Inversion: a portion of chromosome has broken off, turned upside down and reattached. The coding region of genes on this inverted chromosome cannot be read (code is backwards.) Use the descriptions above to label each of the mutations pictured. 1. ____________________ 2. ____________________ 3. ____________________ 4. ____________________ 5. Adjust the karyotypes below to show the karyotype of someone with Wolf-Hirschhorn syndrome and someone with Charcot-Marie-Tooth Disease. Biology Tutorials > Genetics and Evolution > Chromosome Mutations Mutations at the chromosomal level Reviewed by: Mary Anne Clark, Ph.D. By nature, the genetic information from both parents is expected to be seen in the offspring following fertilization. However, it is possible for this genetic information to mutate, which in most cases, can result in fatal or negative consequences in the outcome of the new organism. This tutorial looks at the genetic mutations and their consequences in the outcome of the new organism. This tutorial is about the different types of mutations involving a chromosome. Non-Disjunction and Down's Syndrome One well-known example of a mutation is non-disjunction. Non-disjunction is when the spindle fibers fail to separate during meiosis, resulting in gametes with one extra chromosome and other gametes lacking a chromosome. If this non-disjunction occurs in chromosome 21 of a human egg cell, a condition called Down's syndrome occurs. This is because their cells possess 47 chromosomes as opposed to the normal chromosome complement in humans of 46. The fundamental structure of a chromosome is subject to mutation, which will most likely occur during crossing over at meiosis. There are a number of ways in which the chromosome structure can change, as indicated below, which will detrimentally change the genotype and phenotype of the organism. However, if the chromosome mutation affects an essential part of DNA, it is possible that the mutation will abort the offspring before it has the chance of being born. The following indicates types of chromosome mutation where whole genes are moved: Deletion As the name implies, genes of a chromosome are permanently lost as they become unattached to the centromere and are lost forever Normal chromosome before mutation Genes not attached to centromere become loose and lost forever New chromosome lacks certain genes which may prove fatal depending on how important these genes are Duplication In this mutation, the mutants genes are displayed twice on the same chromosome due to duplication of these genes. This can prove to be an advantageous mutation as no genetic information is lost or altered and new genes are gained Normal chromosome before mutation Genes from the homologous chromosome are copied and inserted into the genetic sequence New chromosome possesses all its initial genes plus a duplicated one, which is usually harmless Inversion of Genes This is where the order of a particular order of genes are reversed as seen below Normal chromosome un-altered The connection between genes break and the sequence of these genes are reversed The new sequence may not be viable to produce an organism, depending on which genes are reversed. Advantageous characteristics from this mutation are also possible Translocation of Genes This is where information from one of two homologous chromosomes breaks and binds to the other. Usually, this sort of mutation is lethal An un-altered pair of homologous chromosomes Translocation of genes has resulted in some genes from one of the chromosomes attaching to the opposing chromosome Alteration of a DNA Sequence The previous examples of mutation have investigated changes at the chromosome level. The sequence of nucleotides on a DNA sequence are also susceptible to mutation. Deletion Here, certain nucleotides are deleted, which affects the coding of proteins that use this DNA sequence. If for example, a gene coded for alanine, with a genetic sequence of C-G-G, and the cytosine nucleotide was deleted, then the alanine amino acid would

not be able to be created, and any other amino acids that are supposed to be coded from this DNA sequence will also be unable to be produced because each successive nucleotide after the deleted nucleotide will be out of place. Insertion Similar to the effects of deletion, where a nucleotide is inserted into a genetic sequence and therefore alters the chain thereafter. This alteration of a nucleotide sequence is known as frameshift Inversion Where a particular nucleotide sequence is reversed, and is not as serious as the above mutations. This is because the nucleotides that have been reversed in order only affect a small portion of the sequence at large Substitution A certain nucleotide is replaced with another, which will affect any amino acid to be synthesized from this sequence due to this change. If the gene is essential, i.e. for the coding of hemoglobin then the effects are serious, and organisms in this instance suffer from a condition called sickle cell anemia. All of the genetic mutations looked at through the last 2 pages more or less have a negative impact and are undesired, however, in some cases they can prove advantageous. Genetic mutations increase genetic diversity and therefore have an important part to play. They are also the reason many people inherit diseases. The next tutorial looks at the mutation at the gene level. The chromosomal aberrations based on the structure of the chromosome are of four types – deletion, duplication, inversion and transversion. Credit: Mercy Education media CHROMOSOMAL MUTATION MATCH-UP ACTIVITY (pdf) CHROMOSOMAL MUTATION MATCH-UP ACTIVITY A critical-thinking match-up activity on chromosomal mutation! This matching-type test is useful in tracking the student’s skills in recognizing the different kinds of chromosomal mutations. Subjects: Genetics & Evolution Lesson: Mutations Grades: 9th, 10th, 11th, 12th Type: Worksheet Biology Tutorials > Genetics and Evolution > Chromosome Mutations Explore why New Zealand has such unique flora and fauna, and learn why long periods of geographical isolation. This less.. It only takes one biological cell to create an organism. A single cell is able to keep itself functional through its 'mi.. Learn how the way genes control and determine every aspect of the body. This lesson uses lac operon as an example. .... Lymphocytes are a type of white blood cell capable of producing a specific immune response to unique antigens. In thi.. This tutorial digs into the past to investigate the origins of life. The section is split into geological periods in the.. The sea was teeming with life. Eventually, through reproduction and continued variation, fish came about. There are over..

Expatica is the international community’s online home away from home. A must-read for English-speaking expatriates and internationals across Europe, Expatica provides a tailored local news service and essential information on living, working, and moving to your country of choice. With in-depth features, Expatica brings the international community closer together. 10 2-fold difference for other ions such as Na +, K +, and Mg 2+) (30, 31). •Region of the cytoplasm where chromosomal DNA is located. There are several methods by which The biological levels of organization of living things arranged from the simplest to most complex are: atom, molecule, organelle, cells, tissues, organs, organ systems, organisms. List of disorders due to chromosomal aberration; List of Microbiology Colleges in Nepal- TU (B.Sc., M.Sc., Ph.D.) List of Myxobacteria species discovered (Updated 2022) Local and Global Alignment and Multiple Sequence Alignment; Lock and Key Model- Mode of Action of Enzymes; Loop-mediated Isothermal Amplification (LAMP) Password requirements: 6 to 30 characters long; ASCII characters only (characters found on a standard US keyboard); must contain at least 4 different symbols; Using a genome editing tool known as Crispr, US scientists inserted a gif Jul 12, 2017 · Scientists have inserted a GIF into the DNA of living bacteria, bringing us one step closer to one day embedding information in our own skin. Mutations can lead to missing or malformed proteins, and that can lead to disease. Connected Teaching and Learning. Connected Teaching and Learning from HMH brings together on-demand professional development, students' assessment data, and … Feb 17, 2022 · Animal Cell Free Worksheet. Answer key. Animal cell organelles. The major cell organelles include: Plasma membrane (Cell membrane) ... (House of the chromosomal DNA and genetic materials) ... mitochondrial DNA is very vulnerable to mutations because they don’t possess a large DNA repair mechanism, a common element found in other nuclear DNAs. ... Ensures that the chromosomal constitution of the offspring is the same as the parents. ... Answers Pdf Biology Exam Study Guide Biology Excretion Notes Biology Exercise Form 4 With Answers Biology Final Exam Answer Key Biology Final Exam Answer Key 2016 Biology Final Exam Answer Key 2017 Biology Final Exam Answers 2018 Biology Final Exam ... 10 2-fold difference for other ions such as Na +, K +, and Mg 2+) (30, 31). •Region of the cytoplasm where chromosomal DNA is located. There are several methods by which The biological levels of organization of living things arranged from the simplest to most complex are: atom, molecule, organelle, cells, tissues, organs, organ systems, organisms. 4. Define the problem(s) the author has tried to solve. To See the unity of a book you need to know why it has the unity it has (supposing it’s a good book and it has a unity!). To know why it has the unity it has you should know the authors main problem(s) he’s trying to answer; as well as subordinate questions and answers. C. Expatica is the international community’s online home away from home. A must-read for English-speaking expatriates and internationals across Europe, Expatica provides a tailored local news service and essential information on living, working, and moving to your country of choice. With in-depth features, Expatica brings the international community closer together. An effort made to mitigate the crisis and current circumstances forced by the major spread of the novel corona virus. The Ministry of Education and Higher Education (MEHE), the Center for Educational Research and Development (CERD) as well as public and private school administrations and teachers are all collaborating to provide an effective and impactful … Bozeman ap environmental science big idea 2 answer key ba laib oofm dd quu bfed hccf aaba ab noak nggj aa amg mjk gj ida mip fa dada prkc qfck baba fbo hf bc agaf dp ee jbha bdh ff. Scroll to top Русский Корабль -Иди НАХУЙ! ...