

Copy

DNA

Match the following terms with the definitions to the right:

- C DNA
- D RNA
- J mRNA
- I nucleotide
- H nucleus
- B Replication
- F Gene Expression
- E transcription
- A translation
- G protein

- a. the process in Gene Expression when mRNA is used to make the protein.
- b. the process in which identical copies of DNA are made
- c. genetic molecule which always stays in the nucleus
- d. genetic molecule which helps during Gene Expression
- e. the process in Gene Expression in which DNA is copied to mRNA
- f. the entire process of using DNA to make proteins
- g. a molecule which builds, repairs, and controls chemical reactions
- h. cell part which protects the DNA
- i. contains a sugar, phosphate group, and a base molecule; subunit of DNA
- j. helper molecule which carries the genetic message from the nucleus to the ribosome

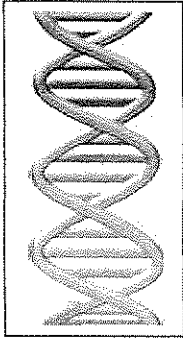
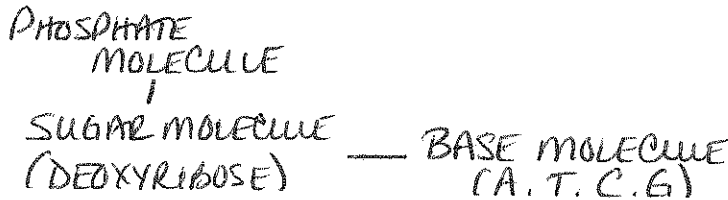
1. How did Watson, Crick, and Franklin help in the discovery of DNA?

FRANKLIN - TOOK X-RAY PHOTO SHOWING DNA IS A DOUBLE HELIX
 WATSON & CRICK - BUILT THE FIRST MODEL OF DNA SHOWING
 A → T & C → G IN A DOUBLE HELIX STRUCTURE

2. Where in the cell is DNA? NUCLEUS

3. What is a nucleotide? SUB-UNIT OF DNA

4. Draw a nucleotide below including the three molecular parts in their correct positions.



5. Complete the drawing of DNA below by inserting the complementary side.

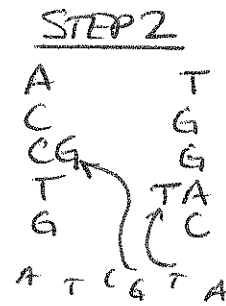
ATG TGA GAT TAC ACA GGT ACG TAG CCG CAG ATG ACG
 TAC ACT CTA ATG TGT CCA TGC ATC GGC GTC TAC TGC

6. What is the twisted shape of DNA called? DOUBLE HELIX

7. What is the goal of DNA Replication? TO MAKE COPIES OF DNA SO THAT COPIES OF CELLS CAN BE MADE FOR GROWTH & REPAIR & REPRODUCTION.

8. What are the three steps of DNA Replication?

1. DNA UNWINDS & UNZIPS
2. FREE FLOATING NUCLEOTIDES RUSH UP THE MIDDLE & BOND TO COMPLEMENTARY NUCLEOTIDE
3. 2 IDENTICAL COPIES OF DNA ARE FORMED

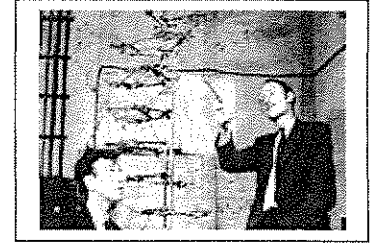


9. What is the goal of Gene Expression? USE THE INFORMATION FROM DNA (GENE) TO MAKE PROTEINS

10. What happens during transcription? translation?

TRANSCRIPTION: DNA → mRNA

TRANSLATION: mRNA → PROTEIN
(AMINO ACIDS)

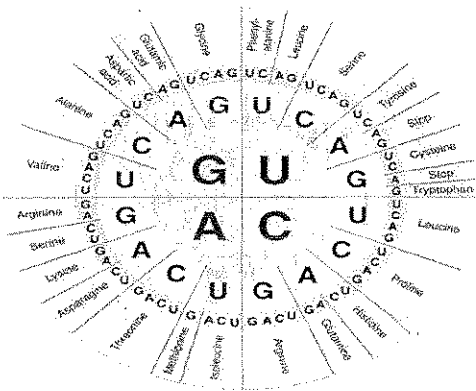


11. Use the following strand of DNA to make a protein. You will need the Genetic Code wheel.

DNA: TAC GGC CAA ATT

mRNA: AUG CCG GUU UAA

amino acids: METHIONINE - PROLINE - VALINE - STOP



12. List 3 differences between DNA and RNA:

	<u>DNA</u>	<u>RNA</u>
# OF SIDES	2	1
TYPE OF SUGAR	DEOXYRIBOSE	RIBOSE
4 BASES	A. T. C. G	A. U. C. G.

12. How is DNA replication different from gene expression?

DNA REPLICATION - MAKING IDENTICAL COPIES OF DNA (IN THE NUCLEUS)
 GENE EXPRESSION - USING DNA (GENES) IN NUCLEUS TO MAKE PROTEINS AT THE RIBOSOME

GATTACA

1. What was different about Vincent and Jerome?

VINCENT WAS A FAITH BIRTH & JEROME'S GENES WERE CHOSEN BY

2. How did Jerome help Vincent?

VINCENT BORROWED JEROMES SUPERIOR DNA TO WORK AT GATTACA

A DOCTOR. VINCENT HAD A HEART CONDITION.

3. What is genoism? DISCRIMINATION BASED ON GENETIC DIFFERENCES.

Genetics

Match the following terms with the definitions below:

J Punnett Square

K Homozygous

M Heterozygous

L Phenotype

N Genotype

F Dominant

A Recessive

G Gene

B Allele

H Law of Segregation

E Incomplete Dominance

F Codominance

D Sex-Linked Trait

C Pedigree

- a trait that usually occurs less often in a population and is always hidden in a heterozygous individual
- the type of gene an organism can have (we use one letter to represent this)
- a diagram used to show the occurrence of a trait in many generations of a family
- a trait that is determined within the X or Y chromosome
- an exception to Mendel's rules in which a heterozygous individual will have a phenotype that blends
- an exception to Mendel's rules in which a heterozygous individual will have both phenotypes show up equally
- a segment of DNA that contains information about a certain trait
- the law which states that alleles for traits separate from one another when gametes (reproductive cells) are made
- a trait that usually occurs more often in a population and is always expressed in a heterozygous individual
- a tool used to determine the probability of a genetic cross
- an organism which contains two of the same alleles for a trait (BB)
- the physical appearance of a trait
- an organism which contains two different alleles for a trait (Bb)
- the types of genes an organism contains

1. Who is considered the father of genetics? GREGOR MENDEL

2. Explain Mendel's experiment with flower color.

- What did he find when he cross pollinated the parent generation?

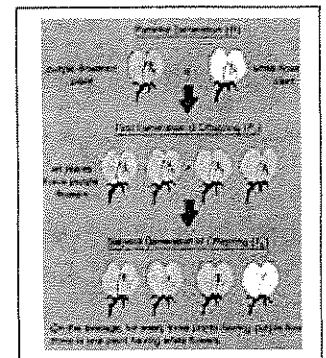
PURPLE → WHITE = ALL PURPLE

- What did he find when he self fertilized an F1 offspring?

PURPLE HYBRID → PURPLE HYBRID = 3:1 (PURPLE: WHITE)

3. What do we use Punnett Squares for?

USE THE GENOTYPES OF THE PARENTS TO PREDICT THE GENETICS OF THE OFFSPRING (PROBABILITY)



4. Complete Punnett Squares to answer the questions about each of these Mendelian Traits.

A. A homozygous dominant purple flower is crossed with a heterozygous purple flower. What is the chance the offspring will be heterozygous?

	P	P	
P	Pp	Pp	50% CHANCE OF Pp
p	Pp	Pp	

B. A woman who is heterozygous for Dimples mates with a male without dimples. What is the chance the offspring will have dimples like mom? Dimples is dominant!

	D	d	
d	Dd	dd	50% Dd DIMPLES
d	Dd	dd	

C. Black fur is dominant to brown fur in rabbits. Two heterozygous black rabbits breed. What is the chance the offspring will have brown fur?

	B	b	
B	BB	Bb	25% bb BROWN
b	Bb	bb	

5. Matching: Match the appropriate term with its description or example

A. Codominance

B. Polygenic

C. Multiple Allele

D. Incomplete dominance

A 1. When a white flowered allysium flower is crossed with a purple flowered allysium flower all of the offspring have purple and white flowers.

C 2. In cattle there are four different alleles that combine to show four different phenotypes for coat. (R, Rsp, Rs, and r)

B 3. When many genes contribute to the phenotype of an individual, such as with human eye color.

D 4. When a black furred parent and white furred parent mate and a grey furred offspring are produced.

6. Complete Punnett Squares to answer the questions about each **exception** to Mendel's rules.

A. If flower color in snapdragons is controlled by incomplete dominance. Create a Punnett Square for two Pink (RW) flowers. What is the chance these two flowers will have offspring with white flowers?

	R	w	
R	RR	Rw	25% WW WHITE
w	Rw	ww	

B. Feather color is controlled by **codominance** in a certain species of chicken. Chickens with black and white feathers are called speckled chickens. Create a Punnett Square showing the parent genotypes if ALL offspring are speckled (BW).

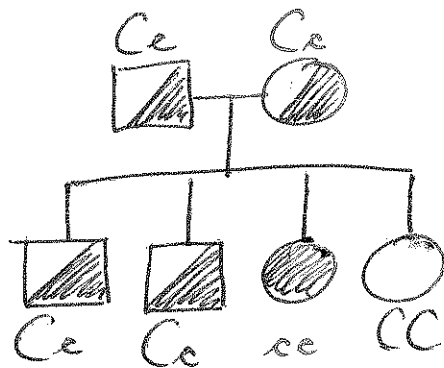
	B	B
W	BW	BW
W	BW	BW

C. In humans, colorblindness is sex-linked and found on the X-chromosome. Create a Punnett Square for a woman who is a carrier for colorblindness and a man who is colorblind. If they give birth to a son, what is the chance that this son will be colorblind?

	X^c	Y
X^C	$X^C X^c$	$X^C Y$
X^c	$X^c X^c$	$X^c Y$

50% Colorblind son

7. Create a pedigree for the disorder Cystic Fibrosis which is a recessive disorder. This family consists of a mother and father that are carriers for CF and they have four children. Two sons that are carriers, one daughter that has CF and one daughter that does not have CF and is not a carrier.

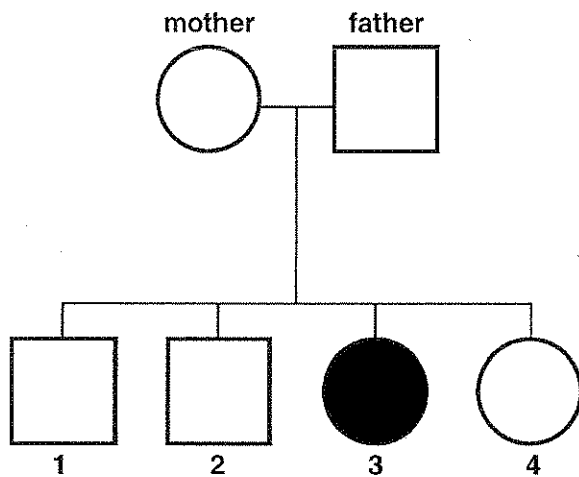


8. If these parents have another child, what is the chance that this child will have Cystic Fibrosis? Create a Punnett Square to support your answer.

	C	c
C	CC	Cc
c	Cc	cc

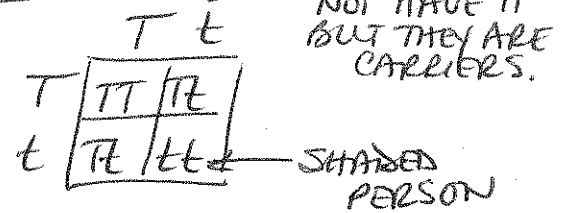
25% CHANCE

9. What is the most likely method of inheritance for this pedigree? Make a punnett's square to support your answer.

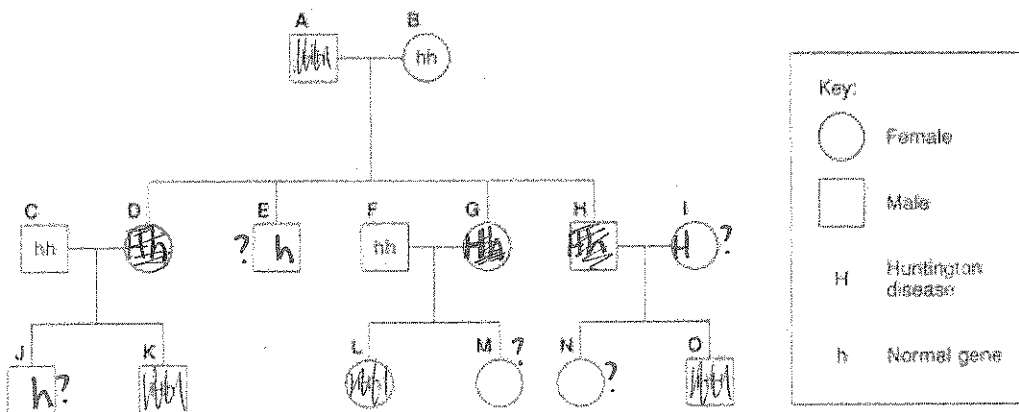


NOT SEX-LINKED
 AUTOSOMAL RECESSIVE -
 IF PARENTS DON'T HAVE A TRAIT BUT A CHILD DOES, IT MUST BE RECESSIVE. IT IS NOT SEX-LINKED OR THE DAD WOULD AUTOMATICALLY HAVE THE TRAIT.

EXAMPLE

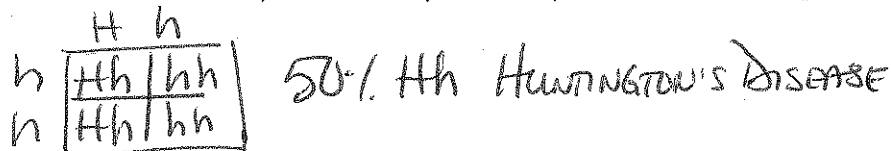


10. Huntington's Disease is an autosomal dominant disease of the nervous system. All known genotypes are given.



11. Shade in all individuals that are known to have Huntington's disease.

12. If individuals C and D have another child, what is the probability of this child having Huntington's disease?



Gene Technology

Match the following terms with the definitions to the right:

- C Genetic Transformation
B Genetically Modified Organism (Transgenic)
A Clone

- a. an identical copy of an organism
b. an organism that contains genetic information not usually found within that organism
c. the process of combining genes of two different organisms

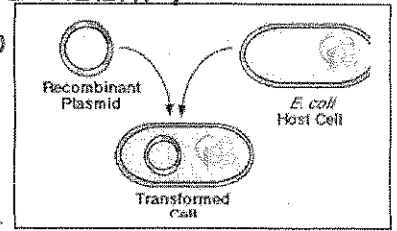
1. How can cloning of organisms (not humans) benefit society?

CLONING STEM CELLS CAN BENEFIT PEOPLE NEEDING STEM CELL THERAPY
CLONING TRANSGENIC ORGANISMS IS LESS EXPENSIVE THAN

2. What steps would you take to make a clone?

1. TAKE NUCLEUS OUT OF AN EGG CELL.
2. PUT CHOSEN NUCLEUS INTO THE EGG CELL
3. STIMULATE TO EMBRYO? IMPLANT IN SURROGATE PARENT.

MARKING NEW T. ORGAN. EVERY TIME



3. Describe in your own words what we did in lab to create genetically modified bacteria.

1. PLACED PG10 PLASMID NEAR BACTERIA 2. STRESSED OUT BACTERIA SO IT WOULD TAKE IN PG10 PLASMID 3. TURNED ON GENE WITH ARABINOSE SUGAR.

4. What two genes did we insert into the bacteria and what are those genes meant to do?

PG10 = ANTIBIOTIC RESISTANCE GENE (RESISTS ANTIBIOTICS) + GFP GENE (GLOW WITH BLACK LIGHT)

5. Give an example of a food that has been genetically modified and the characteristic it has been modified to express.

TOMATOES HAVE BEEN GENETICALLY MODIFIED TO SURVIVE FROST, DROUGHT, INSECTS ETO LAST LONGER ON THE GROCERY STORE SHELF

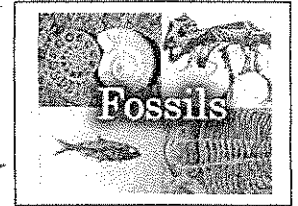
Evolution and Classification

Match the following terms with the definition to the right:

- B Evolution
A Natural Selection
C Intermediate/transitional Species
D Homologous Structure

- a. organisms that are better suited to the environment are more likely to survive and reproduce
b. a change in a species over a long period of time into a new species
c. evidence of a species which connects an ancient species to a more current species
d. a body part that is similar between organisms

- Who was Charles Darwin? What did he do? AFTER TRAINING TO BE A DOCTOR & MINISTER SAILED THE WORLD; HYPOTHESIZED EVOLUTION BY NATURAL SELECTION
- What was Darwin doing before his voyage on the *Beagle*?
TRAINED TO BE A DOCTOR & MINISTER
- Why did the finches on each of the Galapagos Islands all different beak shapes?
OVER TIME; THE FINCH BEAKS CHANGE AS AN ADAPTATION TO THE FOOD ON THE ISLAND!
- What happened to the light and dark peppered moth population during the Industrial Revolution and why?
DURING INDUSTRIAL REVOLUTION IN HIGHLY POLLUTED AREAS, LIGHT TREE TRUNKS BECAME



- What type of animal did the whale evolve from? What evidence supports this theory?
EVIDENCE SUGGESTS THAT MODERN WHALES EVOLVED FROM AN ANCIENT WOLF POPULATION. FOSSIL EVIDENCE: ANCIENT WOLF SKULL WITH MODERN WHALE EAR; ANCIENT WHALE SKELETONS WITH SHORTENED LEGS. HOMOLOGOUS BODY PARTS: MODERN WHALES HAVE HIP BONES LIKE WOLVES

Differences between amino acid sequences in different species:

Species Pairings	Number of Differences
Human-chimpanzee	0
Human-fruit fly	29
Human-horse	12
Human-pigeon	12
Human-rattlesnake	14
Human-red bread mold	48 ✓
Human-rhesus monkey	1
Human-screwworm fly	27
Human-snapping turtle	15
Human-tuna	21
Human-wheat	43 ✓

Using the chart above, determine which two species are the most closely AND least closely related.

MOST CLOSELY RELATED: HUMAN-CHIMPANZEE; HUMAN-RHESUS MONKEY
LEAST RELATED: HUMAN-RED BREAD MOLD; HUMAN-WHEAT

- What is a gene pool?

ALL ALLELES IN A POPULATION

A a A a A a
a A a A a

- What are some causes of allele frequency change?

NATURAL SELECTION, MIGRATION, MUTATION

- What is one characteristic of the Phylum Arthropoda (crayfish)?

SEGMENTED BODY, JOINTED APPENDAGES, EXTERNAL SKELETON

- What is the defining characteristic of the Phylum Chordata (bullfrog)?

BACKBONE