

CRACKING THE GENETIC CODE PRACTICE

Use the Chart on the right and the directions below to translate and transcribe the nucleotide sequences below into the appropriate amino acid.

1. CGTCCACTT

- Translate the sequence into mrna strand

GCAGGUGAA

- Group the translated sequence into groups of three

GCA GGU GAA

- Transcribe each set of three into its correct amino acid

Ala

Gly

Glu

		Second letter				
		U	C	A	G	
First letter	U	UUU } Phe UUC } UUA } Leu UUG }	UCU } UCC } Ser UCA } UCG }	UAU } Tyr UAC } UAA Stop UAG Stop	UGU } Cys UGC } UGA Stop UGG Trp	U C A G
	C	CUU } CUC } Leu CUA } CUG }	CCU } CCC } Pro CCA } CCG }	CAU } His CAC } CAA } Gln CAG }	CGU } CGC } Arg CGA } CGG }	U C A G
	A	AUU } AUC } Ile AUA } AUG Met	ACU } ACC } Thr ACA } ACG }	AAU } Asn AAC } AAA } Lys AAG }	AGU } Ser AGC } AGA } Arg AGG }	U C A G
	G	GUU } GUC } Val GUA } GUG }	GCU } GCC } Ala GCA } GCG }	GAU } Asp GAC } GAA } Glu GAG }	GGU } GGC } Gly GGA } GGG }	U C A G

2. CGATCTTAC

3. CGTTCGGTA

4. ACACGATCT

5. CCACGAGAT

Model 2 – Comparing Substitution Mutations

Original DNA: ... T A C C C T A G G A A T A T C A A A...
mRNA: A U G G G A U C C U U A U A G U U U...
Amino acid: Met Gly Ser Leu stop

Mutation A: ... T A C C C T A G G A A A A T C A A A...
mRNA: A U G G G A U C C U U U U A G U U U...
Amino acid: Met Gly Ser Phe stop

Mutation B: ... T A C C C T A G C A A T A T C A A A...
mRNA: A U G G G A U C G U U A U A G U U U...
Amino acid: Met Gly Ser Leu stop

Mutation C: ... T A C A C T A G G A A T A T C A A A...
mRNA: A U G U G A U C C U U A U A G U U U...
Amino acid: Met stop

Mutation D: T A G C C T A G G A A T A T C A A A...
mRNA: A U C G G A U C C U U A U A G U U U...
Amino acid: No protein will be translated because there is no start codon.

15. For each of the mutations A – D in Model 2, circle the substitution that occurred by comparing the mutated DNA with the original DNA.



16. As a group, describe the range of changes in the amino acid sequence that can result from this type of mutation.



Codominance (Blood types)



Human blood types are determined by genes that follow the **CODOMINANCE** pattern of inheritance. There are two dominant alleles (A & B) and one recessive allele (O).

Blood Type (Phenotype)	Genotype	Can donate blood to:	Can receive blood from:
O	ii (OO)	A,B,AB and O (universal donor)	O
AB	I ^A I ^B	AB	A,B,AB and O (universal receiver)
A	I ^A I ^A or I ^A i (I ^A O)	AB, A	O,A
B	I ^B I ^B or I ^B i (I ^B O)	AB,B	O,B

1. Write the genotype for each person based on the description:

- Homozygous for the "B" allele _____
- Heterozygous** for the "A" allele _____
- Type O _____
- Type "A" and had a type "O" parent _____
- Type "AB" _____
- Blood can be donated to anybody _____
- Can only get blood from a type "O" donor _____

1. Complete the punnett square showing all the possible blood types for the offspring produced by a type "O" mother and a Type "AB" father. **What are percentages for each offspring?**

- Offspring 1: _____
- Offspring 2: _____
- Offspring 3: _____
- Offspring 4: _____

Dihybrid Crosses. Set up the crosses using the rules and the letters from the other page.

1. If a woman who is a non-PTC taster (recessive) with heterozygous hitchhikers thumb has children with a man who is a heterozygous PTC taster with straight thumbs (recessive), what is the probability of them having each of the following types of children? (Fill in the Punnett Square and the blanks).

Parents' genotypes _____ X _____

- How many PTC taster, Hitchhikers thumb _____
- How many PTC taster, straight thumb _____
- How many Non-PTC taster, Hitchhikers thumb _____
- How many Non- PTC taster, straight thumb _____
- What is the phenotypic ratio? _____

2. If a woman who has no hair on her mid-digit (recessive) and is homozygous attached earlobes (dominant) has children with a man who has hair on his mid-digit and has attached earlobes (heterozygous for both traits), what is the probability of them having each of the following types of children? (Fill in the Punnett Square and the blanks).

Parents' genotypes _____ X _____

- How many hair, attached earlobes _____
- How many hair, not attached earlobes _____
- How many hairless, attached earlobes _____
- How many hairless, not attached earlobes _____
- What is the phenotypic ratio? _____

3. John Doe and Jane Doe want to have children and are thinking about how their childrens' hands might look. What would their children look like if they are both heterozygous for straight pinky and hitchhikers thumb? (Fill in the Punnett Square and the blanks).

Parents' genotypes _____ X _____

- Straight pinky, hitchhikers thumb _____
- Straight pinky, Straight thumbs _____
- bent pinky, hitchhikers thumb _____
- bent pinky, Straight thumbs _____
- What is the phenotypic ratio? _____
