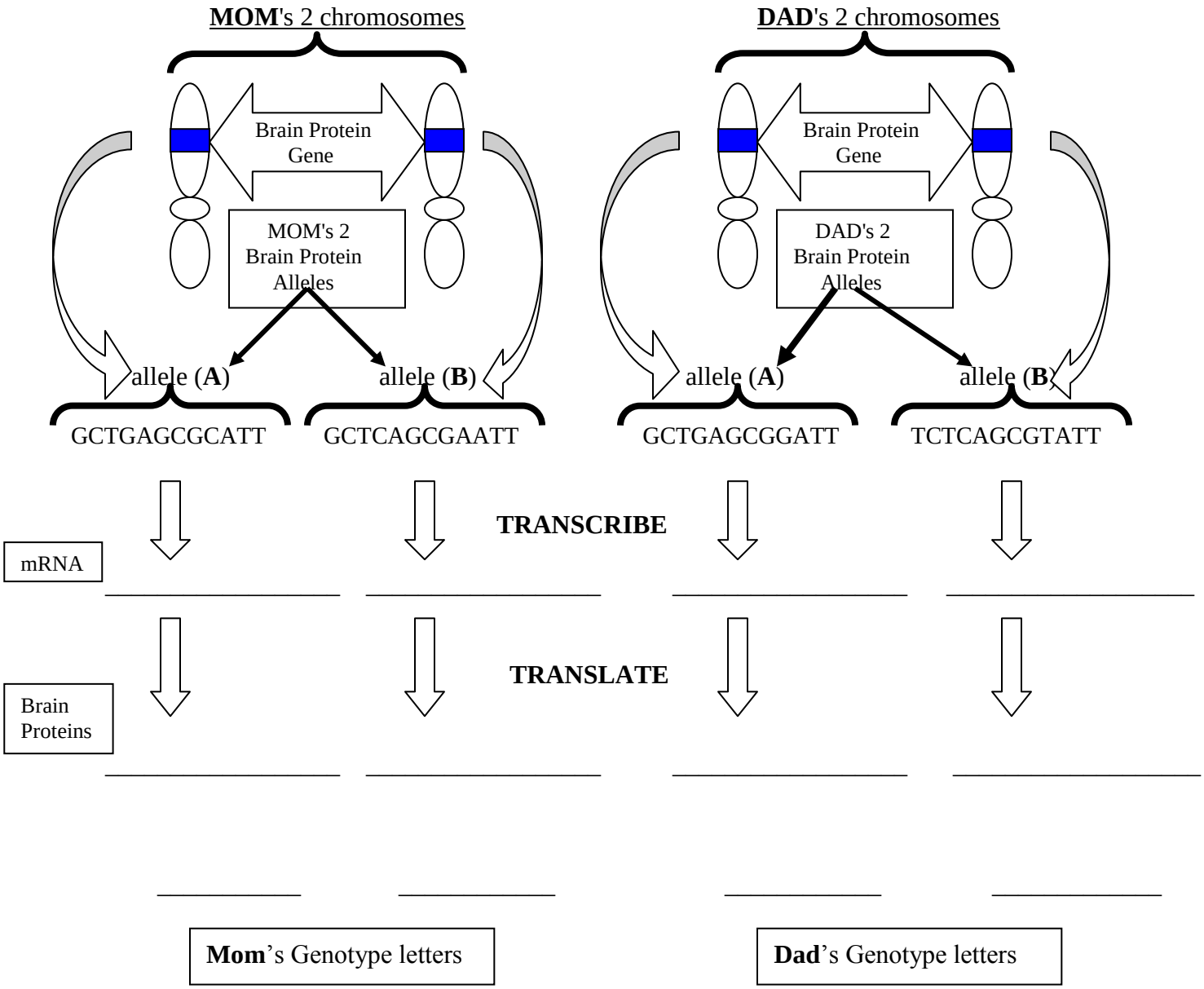
HD: PUZZLE

Huntington's Disease (**HD**) is a genetically inherited disease caused by a **dominant** mutation on human chromosome #4 which usually affects adults over the age of 40. Because this DNA allele mistake is **dominant**, one abnormal protein produced from this mutated allele is enough to interfere with normal brain cell function. These brain cells stop functioning properly which produces a gradual brain deterioration and symptoms of depression, slurred speech, and chorea (uncontrolled body jerks and spasms). Below is a **HD** Puzzle to help you review the skills you have learned during the DNA unit. First you will find a pair of chromosomes for each parent (MOM & DAD) which have gene "mailboxes" with DNA codes for making brain cell proteins.

Skill 1: **Transcribe** each brain protein DNA allele code into mRNA

Skill 2: **Translate** each mRNA into its corresponding brain protein chain

*** **Use the CODON Table on the back** ***



Skill 3: Determine each parent's **genotype** based on the protein chains. Use the Brain Cell Symbol KEY (**on back**) to determine the symbol (**H** or **h**) for normal functioning or broken brain proteins

Codons in mRNA

First base	Second base U	Second base C	Second base A	Second base G	Third base
U	UUU, UUC — Phenylalanine UUA, UUG — Leucine	UCU, UCC, UCA, UCG — Serine	UAU, UAC — Tyrosine UAA, UAG — Stop	UGU, UGC — Cysteine UGA — Stop UGG — Tryptophan	U C A G
C	CUU, CUC, CUA, CUG — Leucine	CCU, CCC, CCA, CCG — Proline	CAU, CAC — Histidine CAA, CAG — Glutamine	CGU, CGC, CGA, CGG — Arginine	U C A G
A	AUU, AUC, AUA — Isoleucine AUG — Start	ACU, ACC, ACA, ACG — Threonine	AAU, AAC — Asparagine AAA, AAG — Lysine	AGU, AGC — Serine AGA, AGG — Arginine	U C A G
G	GUU, GUC, GUA, GUG — Valine	GCU, GCC, GCA, GCG — Alanine	GAU, GAC — Aspartic Acid GAA, GAG — Glutamic Acid	GGU, GGC, GGA, GGG — Glycine	U C A G

Brain Cell Symbol KEY

Symbol	Brain Protein Chain	Brain Protein Function?
H	Arg - Leu - Ala - STOP	broken protein
h	Arg - Val - Ala - STOP	OK … normal

Skill 4: Describe each parent's **phenotype** (normal or have HD disease ?)
HD is caused by a Dominant mutation. What does this mean?

How many mutant alleles must one inherit before showing **HD** ? **1** or **2** ← **(circle)**

parent	**Genotype**	**Phenotype** (normal or have HD disease ?)
MOM:		
DAD:		

Skill 5: **Calculate** the parent's **probability** of having an HD child **using a Punnett Square**

	Mom's Egg Varieties	
Dad's Sperm varieties		

What is the chance the parents will have a child with HD disease? _____