

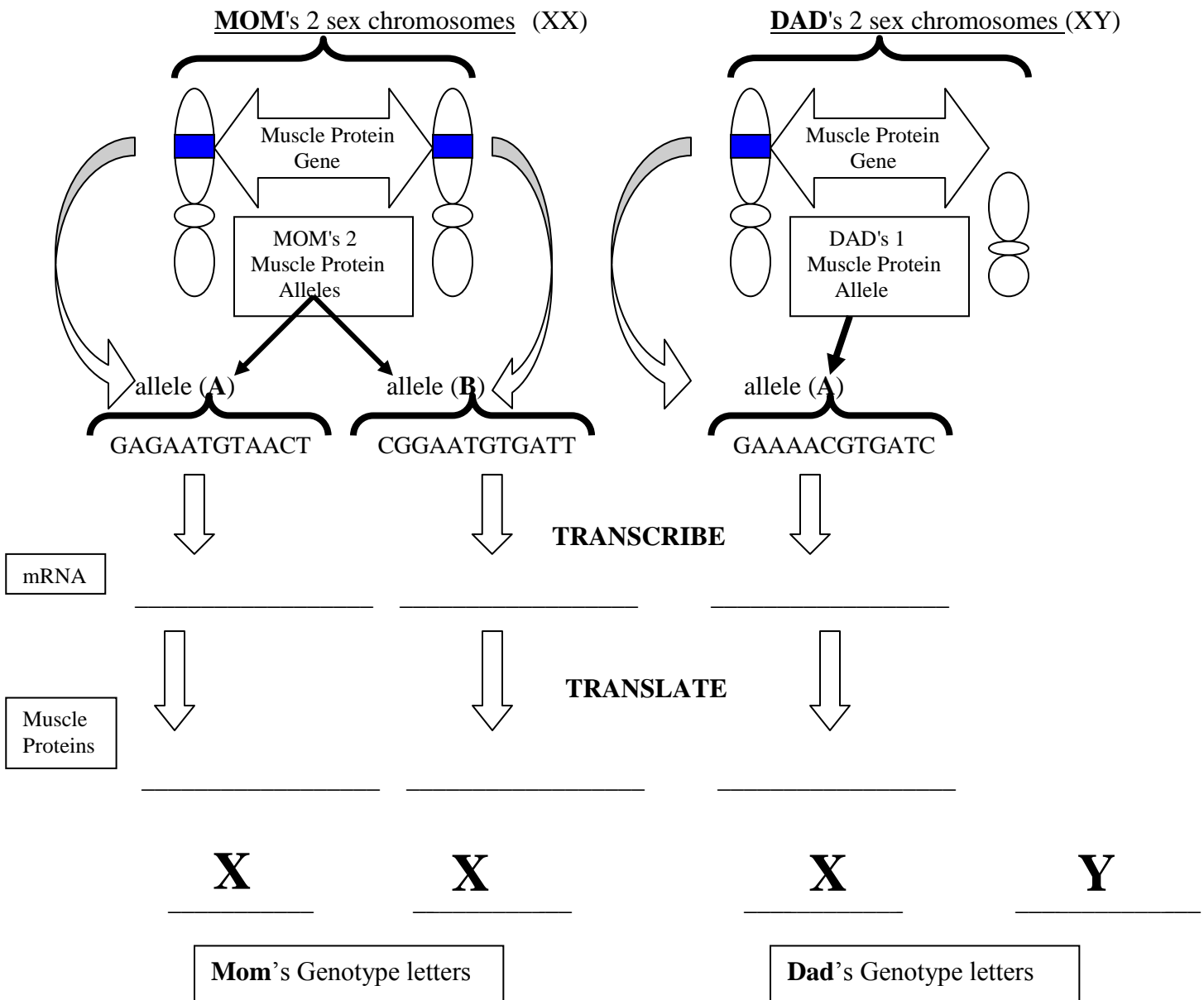
MD: PUZZLE

Muscular Dystrophy (MD) is a genetically inherited disease caused by a **recessive** mutation located on the X chromosome. That means MD is a sex-linked disease that will affect boys and girls in different ratios. The mutation leads to broken muscle proteins that result in rapid muscle cell death and slow muscle cell growth. This progressive loss of muscle function leads to the need for a wheelchair early in life and later the breakdown of breathing and heart muscle function leads to death by the early 30s. Below is a MD Puzzle to practice the 5 skills you have developed during the Genetics unit. First you will find a pair of **sex chromosomes** for each parent (MOM & DAD) which have gene "mailboxes" with DNA codes for making muscle proteins.

Skill 1: Transcribe each muscle cell protein DNA allele code into mRNA

Skill 2: Translate each mRNA into its corresponding muscle cell protein chain

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



Skill 3: Determine each parent's **genotype** based on the protein chains. Use the Muscle Protein Symbol KEY (on back) to determine the symbol (**M** or **m**) for normal functioning or broken muscle proteins

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

Muscle Protein Symbol KEY

Symbol	Protein Chain	Function?
M	Leu - Leu - His - STOP	OK ... normal protein
m	Ala - Leu - His - STOP	broken muscle protein

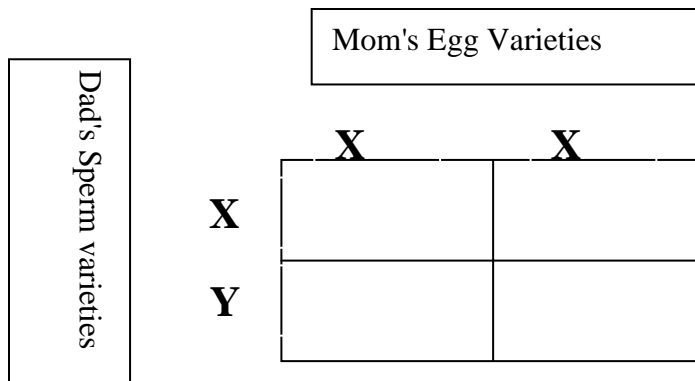
Skill 4 Describe each parent's **phenotype** (normal or have MD disease ?)

MD is caused by a recessive mutation. What does this mean?

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

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

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



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