

a) The cell is in metaphase. It most resembles that of an animal cell because there is no evidence of a cell wall, and because it has centrioles, which are not found in plant cells.

b) The two strands carry the same genetic information, which is important because the cell needs this information to function.

c) Homozygous for short = tt Heterozygous = Tt

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|----------|----------|----------|
| | T | t |
| t | Tt | tt |
| t | Tt | tt |

The probability that a seed from this cross will produce a tall plant is 50%.

d)

| | | |
|----------|----------------------|----------|
| | X^c | X |
| X | XX ^c | XX |
| Y | X ^c Y | XY |

Genotype Ratios: 1:1:1:1
Four genotypes are possible.

Phenotype Ratios: 2:1:1

All females have normal vision; half the males will have normal vision and half will be color-blind.

e) We can be fairly certain that mothers #1 and #6 are carriers. The sons of #3 did not inherit the trait because it is carried on the X chromosome, which sons receive from their mother.

f) The karyotype shows the disorder Turner's Syndrome, 45, X. These individuals are biologically female, but are unable to reproduce. They are usually short, may have slight heart defects, and their reproductive organs do not fully develop.

g) AAC codes for the amino acid asparagine. A mRNA codon for asparagine does not mean that asparagine will appear in the final protein product because proteins are often modified after translation.

h)

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| 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: | T A C A T C T T G G C G A C G A C T |
| mRNA sequence? | A U G U (A) G A A C C G C U G C U G A |
| Amino acid sequence? | methionine-(stop) |
| Will there likely be effects? | Yes What kind of mutation is this? substitution |

i) The diagram illustrates the process of cloning. The nucleus was removed from the donor egg cell to ensure the DNA was only from the individual that is being cloned. (Also, a cell would not function with one and half times the required amount of DNA!) Person B and the baby are clones.

j) Suspect #2 has the same DNA fingerprint as the evidence found at the crime scene and therefore can be connected to the crime.