

GENETICS: Practice Problems:

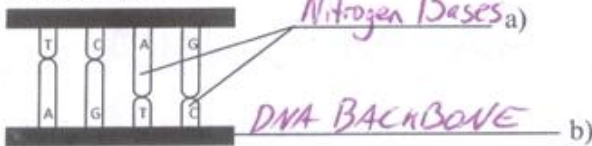
name: SOLUTIONS

1) In your own words, define the following:

- a) Character trait: _____
- b) Chromosomes: _____
- c) Heredity: _____
- d) Gene: _____
- e) Pure-Breed: _____
- f) Cross-Breed: _____
- g) Genome: _____

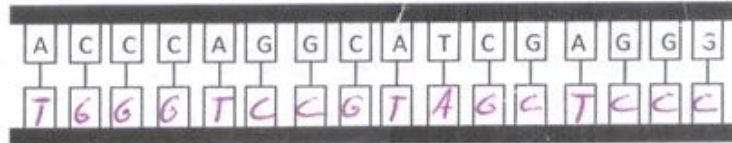
See Class Notes

2) Identify the blanks:



c) Humans have 46 chromosomes

3) Complete the following sequence:



- 4) a) Where are chromosomes found? nucleus
- b) Guanine will pair with Cytosine

5) True or False:

- a) Nitrogen bases form the inside structure of a DNA strand (T) or F
- b) Genes are found on DNA. (T) or F
- c) Thymine can pair up with Adenine. (T) or F
- d) Cytosine can pair up with Cytosine. T or (F)
- e) Proteins are made up of folded DNA strands. T or (F)
- f) Nucleotides have a double helix shape. T or (F)
- g) DNA and RNA are the same. T or (F)
- h) Every chromosome contains one or more genes. (T) or F
- i) In a karyotype, chromosomes are found in pairs (T) or F
- j) Paired chromosomes are called Homologous chromosomes. (T) or F
- k) Amino Acids chains are produced by ribosomes. (T) or F

- 6) Match each description in column A with one corresponding term in column B

A	B
Constituent of a chromosome	Gene
Copies certain sequences code	Chromosome
Half of a DNA strand	DNA
Specific sequence and location on DNA	Nucleotide
Genetic structure visible under a microscope	RNA messenger

- 7) You observe the Karyotype of 2 animals. One of these animals has a karyotype of 10 pairs of chromosomes. The other animal only has 8 pairs of chromosomes. What can be concluded about the 2 animals: not same species

- 8) Our bodies contain thousands of genes.

- a) What type of information is found on our genes:

info for character traits & info for protein synthesis

- b) At the DNA level, what differs from one gene to another?

sequence of Nitrogen Bases (A, C, T, G's)

- 9) In many TV crime series criminals are identified because of hair or blood traces they leave behind. Explain why blood or hair can be used to identify an individual.

Blood and hair contain DNA. DNA is unique to an individual (Genetic fingerprint)

10)

- a) Define 'Protein': large molecules that play vital role in functioning of organism.

- b) Proteins are made from: Folded Amino Acid chains (be precise)

- c) Other than by their function, how do proteins differ from one and other? _____

sequence of amino acids, number of amino acids in chain

- d) Give 3 different functions that proteins have. Structural protein,

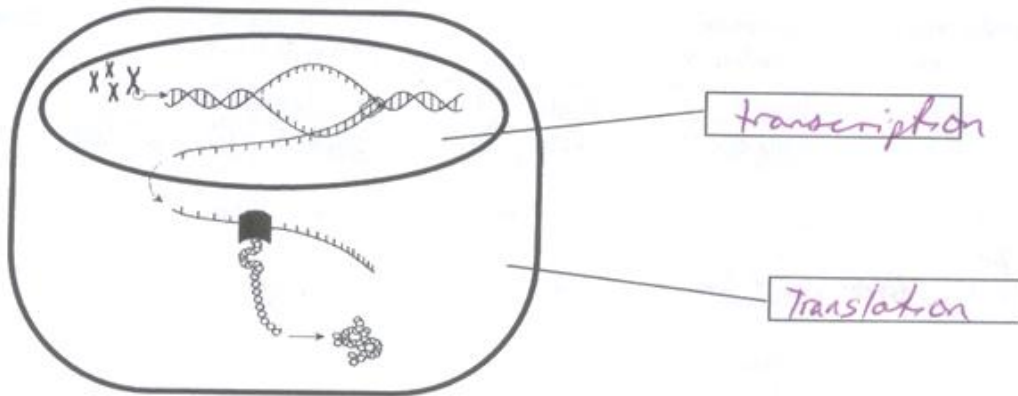
signaling proteins, transport proteins, -----

- e) Are the same amino acids use in the formation of Fish proteins as in Human proteins? Explain.

Yes only 20 Amino Acids exist in nature

- f) Inside what structures are amino acid chains formed? Ribosomes

11)



- a) Place the following processes in the appropriate blank spaces: Translation, Transcription
- b) With the aid of the diagram, describe the process of protein synthesis in terms of what occurs during transcription and translation.

- DNA uncoils & unzips

- RNA messenger attaches to unzipped DNA and copies the sequence

- RNA messenger leaves Nucleus and attaches to Ribosome in the cytoplasm.

- Ribosome reads RNA and produces an Amino acid chain.

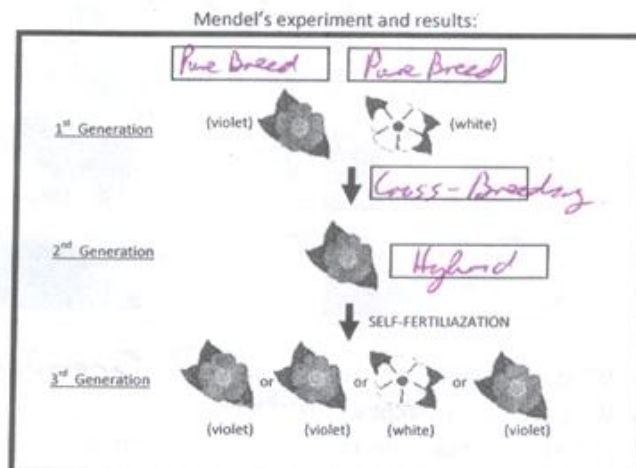
- Amino Acid folds up \rightarrow Protein.

- 12) Place the following terms in the appropriate boxes.

Cross-Breeding

Pure Breed

Hybrid



13) Mendel repeated his famous pea-flower experiment many times. He attained thousands of flowers by the 3rd generation. Which of the following are the correct phenotypes he witnessed? Circle correct

- a) 104 white plants & 911 violet plants **b) 224 white plants & 755 violet plants**
c) 502 white plants & 497 violet plants d) 0 white plants & 1000 violet plants

14) You mate 2 small dogs and witness that their offspring is a large dog. Where the parents pure-breed for this character. Explain.

No, must have had a recessive gene.

15) You cross a pure-breed plant with a long stem and a pure-breed plant with a short stem. What name is given to the offspring? Hybrid

16) Which of the following traits can be hereditary?

- a) Smoker **b) Shape of nose** **c) Ear size** **d) eye color** **f) certain diseases** g) length of nails

17) In your own words, define the following:

a) Allele: _____

b) Homozygote: _____

c) Heterozygote: _____

d) Dominant allele: _____

e) Recessive allele: _____

f) Genotype: _____

g) Phenotype: _____

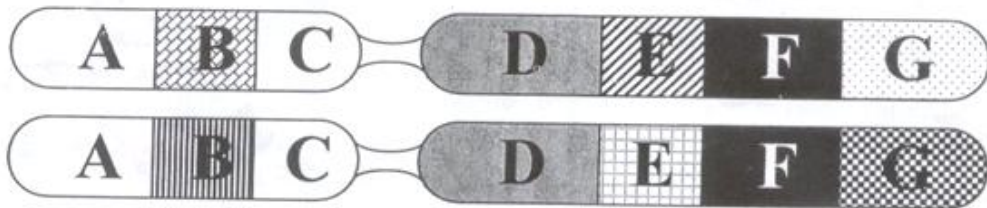
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18) The following genotype codes a particular trait: Gg

G represents: Dominant

g represents: recessive

19) Examine the following illustrations, the different segments represents different genes:



a) What is illustrated above: paired chromosomes

b) What are the different forms of a gene called? alleles

c) For which genes is the organism a Heterozygote? B, E, G.

20) True or False: (think !)

- a) Dominant alleles always express themselves when part of the genotype. T or F
- b) To correctly construct a punnet square we must only know the phenotype of the parents. T or F
- c) It is possible to pass to our offspring alleles that are not visible in our phenotype. T or F
- d) The cross between two pure-breed parents will give us a homozygote. T or F - not always

21) Explain how it is possible that child gets brown hair if both parents have black hair?

Both parents had recessive brown hair allele, Both parents passed this on.

22) A certain vegetable has an allele for yellow color, as well as an allele for orange color. If the vegetable is orange then:

- a) Is the vegetable homozygote or heterozygote for color? Heterozygote.
- b) Which allele is dominant? orange
- c) Which allele is recessive? yellow.
- d) Give the genotype for this vegetable. Oo

23) Is it possible for 2 individuals to exhibit the same Phenotype yet have different Genotypes? Explain

Yes, doesn't matter if you have 2 ^{of the same} dominant genes, or only 1 dominant gene, That trait will express itself. Ex: Ee or EE
same phenotype
different genotype

24) For tigers, fur color can take on 2 colors: Reddish and White. The dominant allele for fur color is Reddish, the recessive allele is White. Fill in the table below:



<u>Phenotype:</u>	Reddish	<u>reddish</u>	<u>White</u>
<u>Genotype:</u>	<u>Homo</u>	Heterozygote	<u>Homo</u>
	RR	<u>Rr</u>	<u>rr</u>

25) Your friend David wants to breed chickens. He prefers Brown chickens over white chickens. David unfortunately doesn't know too much about genetics. He figures that if he simply mates a Brown chicken with a Brown rooster he will get the desired outcome. David's chicken and rooster are both Brown and both have genotype Bb. Brown color is dominant, white color is recessive. Using a punnet square show David why he might sometimes get a white chicken!



his chicken and rooster both have a recessive white gene that will exhibit itself in a white chicken 25% of the time

	B	b
B	BB Brown	Bb Brown
b	Bb Brown	bb White

26) On a far away planet 2 aliens both have Square eyes and Purple hair.

On this planet: Square eyes are Dominant (S) & Round eyes are Recessive (s)
Purple hair is Dominant (P) & Green hair is Recessive (p)

Assuming the laws of genetics are similar for the aliens, If both parents have Genotypes: **SsPp**

Using a Punnet Square, determine the probability of these 2 aliens having a baby alien that has Round eyes and Green Hair? → **sspp**

	Alien 1	Alien 2
Phenotype:	Square eyes, Purple Hair	Square eyes, Purple Hair
Genotype:	SsPp	SsPp
Gametes possible:	SP Sp sP sp	SP Sp sP sp

	SP	Sp	sP	sp
SP	SSPP	SSPp	SsPP	SsPp
Sp	SSPp	SSpp	SsPp	Sspp
sP	SsPP	SsPp	ssPP	ssPp
sp	SsPp	Sspp	ssPp	sspp

$$\frac{1}{16} \text{ times} = \underline{\underline{6.25\%}}$$