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Biology 10 Review

Matching

Letter	Term	Description
O	1) Genotype	a) When humans selectively breed an organism for a useful trait
H	2) Trait	b) A molecule made of a string of amino acids that perform various roles in a cell
C	3) Chromosome	c) Wound-up, X-shaped DNA
L	4) Allele	d) A section of DNA that codes for a protein
N	5) Natural selection	e) The change of a population overtime, including new species
K	6) Phenotype	f) Anything that changes the DNA base pair order
E	7) Evolution	g) When multiple species evolve from one ancestor species
M	8) Codon	h) A genetically coded characteristic
G	9) Adaptive Radiation	i) An organelle that translates proteins
D	10) Gene	j) The main unit of DNA consisting of a nitrogen base, a phosphate and a sugar
I	11) Ribosome	k) The visible/testable trait caused by genes
A	12) Artificial selection	l) A version of a particular type of gene
J	13) Nucleotide	m) The 3 base pair code that is read by a ribosome
B	14) Protein	n) When a trait that is more fit for survival is favoured and passed on in nature
P	15) Mutation	o) The types of alleles an organism possesses
F	16) Mutagen	p) Any change to the DNA base pair sequence

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Multiple Choice: Circle the best answer. **1 mark** each.

1) A neutral mutation is a mutation...

- a) that does not affect the survival chances of an organism
b) that happens a neutral number of times
c) that cannot be seen in the organism
d) that causes a neutral facial expression

2) What is the complementary RNA strand for the DNA strand: GGAAGCCTAGTAA?

- a) GGAAGCCTAGTAA
b) CCUUCGGAUCAUU
c) CCTTCGGATCATT
d) GGAAGCCUAGUAA

3) Which of the following is an example of a genotype?

- a) A red-scaled fish
b) A person that has 2 A blood type alleles
c) A person showing a particular trait
d) Both B and C

4) DNA is in the shape of

- a) a circle
b) the infinity symbol
c) a triple helix
d) a double helix

5) If DNA replications/makes a copy of itself (still DNA)

- a) The new DNA is an exact copy of both strands
b) The new DNA has 2 strands with a new base pair order
c) The DNA turns into a 2 stranded piece of RNA
d) New, 2 stranded DNA is created with the same base pair order using the Uracil base

6) The person(s) who popularized evolution and natural selection is:

- a) Gregor Mendel
b) James Watson and Francis Crick
c) Charles Darwin
d) Rosalind Franklin

7) Which of the following could cause a frameshift mutation?

- a) Substitution mutation
b) Deletion mutation
c) Point mutation
d) None of the above

8) All humans have two alleles because

- a) Having more than 2 alleles is lethal
b) Each parent gives 1 allele to the child each
c) having more than 2 alleles unbalances the chromosomes
d) 1 allele comes from the parents, 1 chromosome is made by the child

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9) How many alleles are there for our four main blood types (not including positive or negative)?

- a) 1
- c) 3**
- b) 2
- d) 4

10) If a child is AB type, and their father is B type, their mother could be

- a) B or O type
- b) A or AB type**
- c) O type
- d) Any of the blood types

11) Which statement is not one of the five points of natural selection?

- a) Populations have variants
- b) More offspring are produced than survive
- c) Those that survive have favourable traits
- d) Natural selection increases genetic diversity**

12) The codon wheel or table:

- a) only decodes animal DNA
- c) decodes the DNA of all life**
- b) only decodes plants
- d) only decodes animals and bacteria

13) What is genetic engineering?

- a) When humans change DNA to serve a changed or new purpose**
- b) When humans create machines that are built using genetics
- c) When DNA is built from scratch using chemistry
- d) When DNA changes through natural selection

14) GMOs (Genetically Modified Organism)

- a) An organism that has had its DNA modified**
- b) An organism that has had its temporary RNA modified
- c) An organism evolved through natural selection
- d) An organism where the DNA can never be changed

15) A disadvantage of genetic engineering is

- a) Damaged DNA can be restored to its original sequence
- b) Side effects can occur seemingly at random by activating unwanted chemical pathways**
- c) Genes can be enhanced to aid an organism's survival or role in the ecosystem
- d) Answers A and C

16) Which of the following is **not** a difference between DNA and RNA?

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- a) Different number of strands
c) Guanine vs. Uracil

- b) Longterm vs temporary lifespan
d) Deoxyribose vs. ribose

17) How can new alleles and genes arise over time?

- a) Natural Selection
c) Evolution

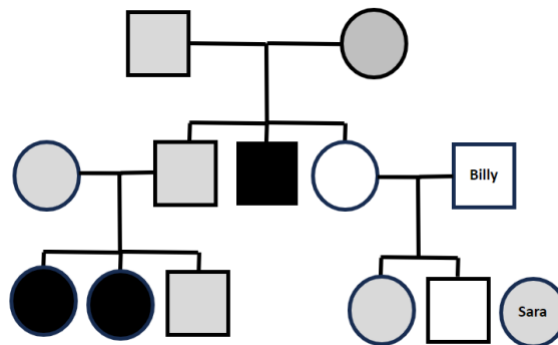
- b) Genetic counseling
d) Mutations

18) What part of a nucleotide forms the rungs (middle part) of the DNA ladder?

- a) phosphate
c) nitrogen base

- b) sugar (deoxyribose)
d) ethanol

Use the following picture for questions 19-22



19) The trait shown is

- a) Dominant
c) Recessive

- b) Sex-linked
d) A gene related to blood type

20) Why does the black square not have anything below it?

- a) The person did not have kids
c) The person started a new family

- b) The person died before having kids
d) Could be answer A or B

21) If the Alleles were noted by the letters G and g, Billy's genotype is (ignore box colour):

- a) GG
c) Gg

- b) gg
d) Could be any Genotype

22) Sara is likely

- a) A cousin
c) A deceased family member

- b) An adopted child
d) The family cat

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Short Answer Section:

1) Describe Translation (purpose, where it occurs, what is involved, and how it happens).

- Translation takes RNA and creates a protein by reading it 3 bases at a time. Proteins do everything for our cells.
- The ribosome reads three of the RNA bases (codons) at a time in the cytoplasm or Rough Endoplasmic Reticulum.
- Each 3 letter code has 1 amino acid associated with it.

2) Describe Transcription (purpose, where it occurs, what is involved, and how it happens).

- Transcription is when a section of DNA is copied into RNA.
- Transcription occurs in the nucleus using many proteins to copy the DNA. The DNA unwinds its double helix to do so.
- When copying, the complement of one of the strands is taken, creating single stranded RNA that uses Uracil instead of Thymine.
- The RNA will leave the nucleus and find a ribosome for translation

3) Describe at least 3 pieces of proof for the theory of evolution and explain why they support the theory.

- **Fossil record** – each fossil can be arranged to show gradual change of a species into another species over a long period of time.
- **DNA** can be used to compare the sequence of bases between different species. **Phylogenetic trees** can be created from this showing an evolutionary path.
- **Geologically separated species** have evolved from one ancestor species in different ways, shaped by the environment. This can include adapted radiation.
- **Homologous structures** – structures in organisms that are similar in form and appearance, each suggesting either convergent evolution or the presence of a common ancestor
- **Vestigial structures** – structures found in a species that no longer serve a purpose, such as the appendix

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4) A DNA sequence is changed from AACCTCTAGGCA to AACCCCTAGGCA.
Explain how this could affect the trait the gene controls.

- This appears to be a point mutation, changing one letter, T, to another, C.
- This won't likely break the gene like a frameshift, but if the amino acid sequence is changed, it could lead to changes in the protein that affect what trait the organism has.
- If the mutation is a **silent mutation**, nothing will happen as the amino acid sequence and protein will not change.

5) An apple has a gene that controls how juicy it is. The J allele causes it to be very juicy, while the j allele means it is not very juicy.

This is an example of:

- a) Complete dominance
- c) Codominance
- e) Multiple alleles

- b) Incomplete dominance
- d) Sex-linked

If we cross a heterozygous apple for this gene with a homozygous recessive apple, what are the genotypic and phenotypic ratios for the resulting seeds?

		Parent 1	
		J	j
Parent 2	j	J j	j j
	j	J j	j j

Genotype: 1 Jj : 1 jj (this is the reduced ratio)

Phenotype: 1 juicy apple : 1 not very juicy apple

Percentages or fractions are also fine.

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6) A gene controlling high blood pressure is found to affect males more than it does females. High blood pressure is caused by the recessive allele, while healthy blood pressure is caused by the dominant allele.

This is an example of:

- a) Complete dominance
- b) Incomplete dominance
- c) Codominance
- d) Sex-linked
- e) Multiple alleles

If a high blood pressure male is crossed with a homozygous dominant female who has a healthy blood pressure, what are the chances a child will be born with high blood pressure? Also, what are the chances of being a carrier?

		Parent 1			
		X^H		X^H	
Parent 2	X^h	X^H X^h	X^H X^h		
	Y	X^H Y	X^H Y		

None of the children can have high blood pressure from the cross (0%)

Each female Will be a carrier, so 1 carrier to 1 non-carrier (50%)

7) A dominant blue coloured flower is crossed with a recessive red coloured flower and produces a Purple coloured flower.

This is an example of:

- a) Complete dominance
- b) Incomplete dominance
- c) Codominance
- d) Sex-linked
- e) Multiple alleles

If we cross a purple flower with another purple coloured flower, and the cross creates 80 seeds, how many seeds of each flower colour are likely to be created?

		Parent 1			
		B		b	
Parent 2	B	B B	B b		
	b	B b	b b		

25% BB : 50% Bb : 25% bb

So:

- 20 Blue flower seeds
- 40 Purple flower seeds
- 20 red flower seeds

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8) Ignoring positives and negatives, there are 4 basic blood types: A, B, AB, and O.

This is an example of:

a) Complete dominance

b) Incomplete dominance

c) Codominance

d) Sex-linked

e) Multiple alleles

Someone who is blood type A needs blood for an operation. You want to donate to their cause, but you do not know your blood type. You know that your mother is blood type heterozygous A, and your father is blood type O. Can you donate blood to your friend? Confirm using a punnett square.

		Parent 1		
		I^A	i	
	i	I^A i	i i	
Parent 2				
	i	I^A i	i i	

Yes, you are either A type or O type, both of which do not have B type antigens that would cause blood clots in someone who has B antibodies, like someone with blood type A.

If you are O, you can also donate to anybody, because there are no antigens on the outside of O type blood cells.