Name

1	A	B	C	D	16	A	B	C	D
2	A	B	C	D	17	A	B	C	D
3	A	B	C	D	18	A	B	C	D
4	A	B	C	D	19	A	B	C	D
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7	A	B	C	D	22	A	B	C	D
8	A	B	C	D	23	A	B	C	D
9	A	B	C	D	24	A	B	C	D
10	A	B	C	D	25	A	B	C	D
11	A	B	C	D	26	A	B	C	D
12	A	B	C	D	27	A	B	C	D
13	A	B	C	D	28	A	B	C	D
14	A	B	C	D	29	A	B	C	D
15	A	B	C	D	30	A	B	C	D

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Light (7130)

TOTAL /50 Name:_____

Genetics Unit Test

Multiple Choice (24 marks)

1. Which of the following conditions **must** be present for a recessive trait to be expressed?
   a. one recessive allele
   b. one dominant allele
   c. two recessive alleles
   d. two dominant alleles

2. A purebred purple-flowering pea plant is crossed with a purebred white-flowering pea plant. The resulting plants all have purple flowers. If two of these offspring are crossed, what is the probable appearance of their offspring?
   a. 100% white
   b. 25% white and 75% purple
   c. 75% white and 25% purple
   d. 100% purple

3. A heterozygous tall plant is crossed with a homozygous short plant. If the tall gene is dominant, which of the following describes the offspring?
   a. all tall
   b. all short
   c. all purebred
   d. 50% tall, 50% short

Use the following representation of a Punnett Square to answer the question below

	P	Q
R	S	T
U	V	W

4. Which of the following represent the position of the parent alleles?
   A P, Q, S, T
   B P, Q, R, U
   C R, S, U, V
   D S, T, V, W

5. Which of the following shows a homozygous–heterozygous cross?
   A Bb x Bb
   B bb x bb
   C bb x Bb
   D BB x BB

6. A homozygous tall plant (TT) is crossed with a homozygous short plant (tt). If the tall gene is dominant, which of the following describes the offspring?

   A all tall
   B all short
   C all purebred
   D half tall, half short

Match each description on the left with the correct term on the right. Each term may be used as often as necessary. Record your answers on the answer sheet provided.	
Description	**Term**
7. hereditary unit of information passed on from parent to offspring 8. genetic makeup of an organism 9. description of a trait that might be present, but hidden in a generation 10. one of the possible versions of a gene	A. gene B. allele C. recessive D. genotype

11. Which of the following is true of a dominant allele?

I	It will mask the recessive allele.
II	It is more likely to be passed onto the next generation than the recessive allele.
III	It will express the same phenotype when it appears in a homozygous or heterozygous condition.

   A I and II only
   B I and III only
   C II and III only
   D I, II and III

12. A red flower is crossed with a white flower and the resulting generation have pink petals. This is an example of
   A Incomplete dominance
   B Codominance
   C Recessive traits
   D Mutation

13. If one of your parents is blood type A and the other is type B, which of the following blood types would you most likely to be? (Hint: you may need to draw four punnett squares).

A Type A
B Type B
C Type AB
D Type O

14. Which of the following is normally true regarding the ABO blood typing system?

A People who have the A antigen normally would not produce the anti-A antibody.
B People who are type AB normally produce both anti-A and anti-B antibodies.
C The only ABO type blood that normally does not have either A or B antigens is AB.
D Type O blood is the most commonly found blood type in humans.

15. A random change in the frequency of a gene is called

A genetic equilibrium
B genetic drift
C genetic isolation
D gene pools

16. Which of the following describes factors that increase genetic variation?

I	gene flow
II	genetic drift
III	mutation
IV	non-random mating

A I, II and III only
B I and IV only
C I and III only
D II and III only

17. A woman who is heterozygous for colour blindness (X^CX^c) and a man with colour blindness (X^cY) are considering having children. What is the probability of having a child who is **both** male and colour-blind?

A 100%
B 75%
C 25%
D 0%

18. Which does **not** describe the DNA molecule?

A Adenine will always pair with deoxyribose
B Guanine pairs with cytosine
C The sugar in each nucleotide is deoxyribose
D It is a double helix

19. A strand of DNA is found to contain 20% Adenine. What percentage of the strand would be Cytosine?

A 20%
B 30%
C 40%
D 60%

20. Which of the following statements is **not** true?

A DNA is found in the nucleus.
B RNA is single stranded.
C Translation occurs at a ribosome in the cytoplasm.
D transfer RNA unwind the DNA template.

21. In the DNA sequence GACTGACTGACT, a mutation occurred and the piece of DNA then contained the letters GACTTGACTGACT. What type of mutation is this an example of?

A deletion
B insertion
C substitution
D translocation

22. What is a gene composed of?

A A chromosome
B A protein
C A base pair
D A small segment of DNA

Use the following Codon chart for questions to the right

Codons Found in Messenger RNA

Second Base

First Base	U	C	A	G	*Third Base*
U	Phe	Ser	Tyr	Cys	U
	Phe	Ser	Tyr	Cys	C
	Leu	Ser	Stop	Stop	A
	Leu	Ser	Stop	Trp	G
C	Leu	Pro	His	Arg	U
	Leu	Pro	His	Arg	C
	Leu	Pro	Gln	Arg	A
	Leu	Pro	Gln	Arg	G
A	Ile	Thr	Asn	Ser	U
	Ile	Thr	Asn	Ser	C
	Ile	Thr	Lys	Arg	A
	Met	Thr	Lys	Arg	G
G	Val	Ala	Asp	Gly	U
	Val	Ala	Asp	Gly	C
	Val	Ala	Glu	Gly	A
	Val	Ala	Glu	Gly	G

23. The mRNA codon AAU will be translated to make the amino acid

A **Phe** (Phenylalanine)
B **Ile** (Isoleucine)
C **STOP**
D **Asn** (Asparagine)

24. The DNA sequence GGT will be transcribed, then translated to make the amino acid

A **Gly** (Glycine)
B **Pro** (Proline)
C **Val** (Valine)
D **His** (Histidine)

25. Which of the following are known to cause genetic mutation?

I	X-rays
II	Ultraviolet light
III	Smoking tobacco products

A I, II, and III
B I and II
C I and III
D II and III

26. CRISPR gene-editing technology allows for DNA in any organism to be edited at any specific gene. This technology was developed from _____.

A Chinese rice farmers
B Parasitic wasps' attack mechanism
C Cellular respiration pathways
D A bacteria's viral defense mechanism

Written Response (24 marks)

Name_____

1. Name and define the three factors that are required for evolution to occur **(3 marks)**

2. **(2 marks)**

   a. Which blood type is the universal donor? Why is it accepted by everyone?

   b. Which blood type is the universal acceptor? Why can people with this blood type accept blood from anyone?

3. Describe two differences between the **structure** of DNA and RNA **(2 marks)**

4. In North American culture, Pitbulls, Rottweilers, Dobermans, and Boxers are known to be aggressive dogs. Is this a result of the environment they were raised in, or is it directly the result of artificial selection?
   In point form, outline why you believe it is one or the other.
   (3 marks for either side, awarded by the quality of your points)

5. Which are generally more harmful to the organism, deletions or insertions? Why? **(2 marks)**

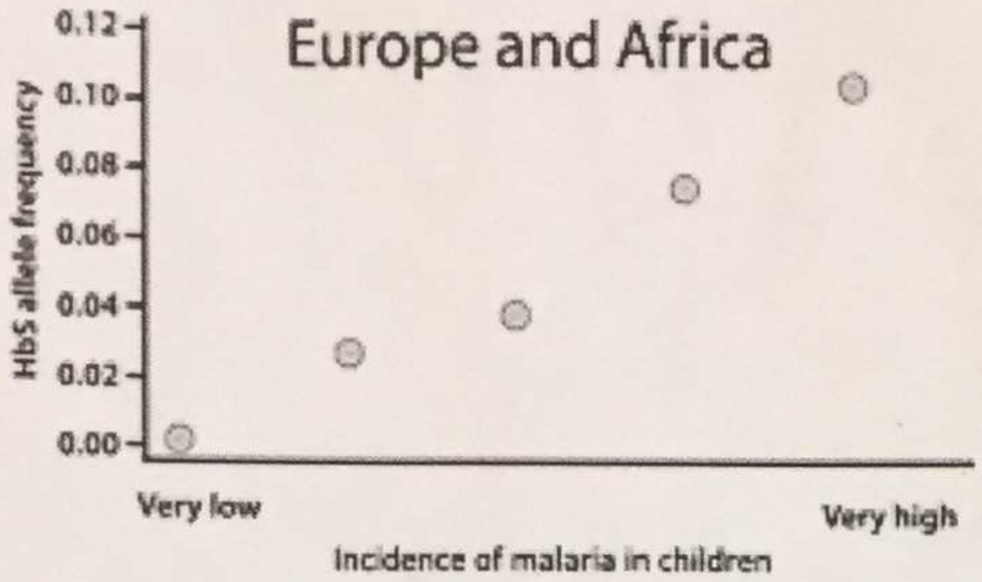
6. What does it mean when "mutations are random, but natural selection is not"? Provide an example that illustrates the process of natural selection to bring clarity to your explanation. **(3 marks)**

7. In your opinion, should CRISPR gene-editing technology be used? **(2 marks)**
If yes, give and **explain** one reason why you think it's worthwhile and one condition you would set before it could be approved.
If no, give and **explain** two reasons why you think think it is too dangerous to use.

BONUS - how can we compare this situation to past historical events?

8. Name one thing that is **good** about genetically modified foods, one thing that is **bad**, and one thing that is **the same** between normal foods and GM foods. **(3 marks)**

9. Sickle cell anemia is a genetic disease where the affected person has two copies of the HbS allele, making their red blood cells not as efficient and likely to cause problems in the body.
Why do we see a high HbS allele frequency in a population that has malaria? **(3 marks)**



How do these findings support the theory of evolution by natural selection? **(1 marks)**

Extra -1

error
#5
written.

Name

KEY

ZipGrade.com

1	A	B	●	D	16	A	B	●	D
2	A	●	C	D	17	A	B	●	D
3	A	B	●	●	18	●	B	C	D
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Light (7130)

TOTAL /50 Name:_____

Genetics Unit Test

Multiple Choice (24 marks)

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   a. 100% white
   b. 25% white and 75% purple
   c. 75% white and 25% purple
   d. 100% purple

PP + pp → Pp × Pp offspring

	P	p
P	PP	Pp
p	Pp	pp

3. A heterozygous tall plant is crossed with a homozygous short plant. If the tall gene is dominant, which of the following describes the offspring?
   a. all tall
   b. all short
   c. all purebred
   d. 50% tall, 50% short

Tt × tt

	t	t
T	Tt	Tt
t	tt	tt

50% tall

Use the following representation of a Punnett Square to answer the question below

P	Q	
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4. Which of the following represent the position of the parent alleles?
   A P, Q, S, T
   B P, Q, R, U
   C R, S, U, V
   D S, T, V, W

5. Which of the following shows a homozygous–heterozygous cross?

C

A Bb x Bb
B bb x bb
C bb x Bb
D BB x BB

same alleles different alleles

6. A homozygous tall plant (TT) is crossed with a homozygous short plant (tt). If the tall gene is dominant, which of the following describes the offspring?

A

A all tall
B all short
C all purebred
D half tall, half short

	t	t
T	Tt	Tt
T	Tt	Tt

100% tall

Match each description on the left with the correct term on the right. Each term may be used as often as necessary. Record your answers on the answer sheet provided.

Description	Term
7. hereditary unit of information passed on from parent to offspring	A. gene
8. genetic makeup of an organism	B. allele
9. description of a trait that might be present, but hidden in a generation	C. recessive
10. one of the possible versions of a gene	D. genotype

A
D
C
B

11. Which of the following is true of a dominant allele?

I	It will mask the recessive allele. ✓
II	It is more likely to be passed onto the next generation than the recessive allele. ✗
III	It will express the same phenotype when it appears in a homozygous or heterozygous condition. ✓

equal likelihood of being passed on.
- random assortment

B

A I and II only
B I and III only
C II and III only
D I, II and III

12. A red flower is crossed with a white flower and the resulting generation have pink petals. This is an example of

A

A Incomplete dominance
B Codominance
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D Mutation

13. If one of your parents is blood type A and the other is type B, which of the following blood types would you most likely to be? (Hint: you may need to draw four punnett squares).

C

A Type A
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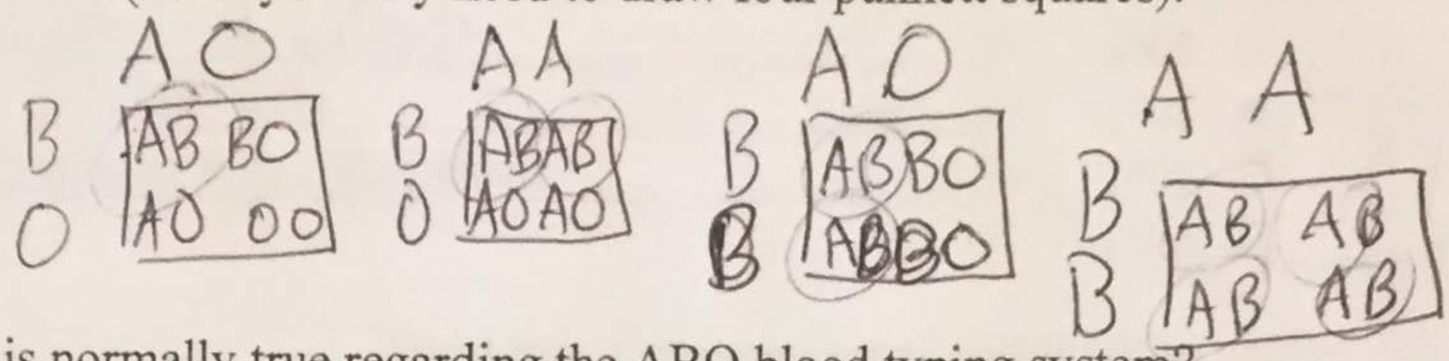
(C) Type AB
D Type O



9/16
AB

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A

(A) People who have the A antigen normally would not produce the anti-A antibody.
B People who are type AB normally produce both anti-A and anti-B antibodies.
C The only ABO type blood that normally does not have either A or B antigens is AB.
D Type O blood is the most commonly found blood type in humans.

least

15. A random change in the frequency of a gene is called

B

A genetic equilibrium
(B) genetic drift
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16. Which of the following describes factors that increase genetic variation?

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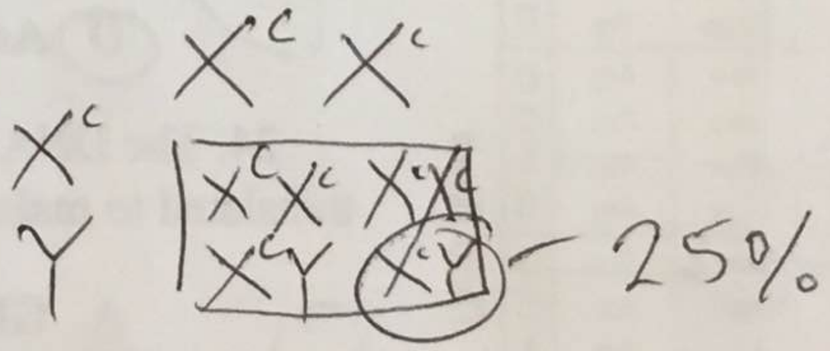

18. Which does **not** describe the DNA molecule?

A

(A) Adenine will always pair with deoxyribose ✗
B Guanine pairs with cytosine ✓
C The sugar in each nucleotide is deoxyribose ✓
D It is a double helix ✓

19. A strand of DNA is found to contain 20% Adenine. What percentage of the strand would be Cytosine?

A 20%
B 30%
C 40%
D 60%

B

20% A 20% T } have to add to 100%
30% C 30% G

20. Which of the following statements is **not** true?

A DNA is found in the nucleus. ✓
B RNA is single stranded. ✓
C Translation occurs at a ribosome in the cytoplasm.
D transfer RNA unwind the DNA template.

D

oops we didn't learn this :)

21. In the DNA sequence GACTGACTGACT, a mutation occurred and the piece of DNA then contained the letters GACTTGACTGACT. What type of mutation is this an example of?

A deletion
B insertion
C substitution
D translocation

B

T ↑ extra.

22. What is a gene composed of?

A A chromosome
B A protein
C A base pair
D A small segment of DNA

D

Use the following Codon chart for questions to the right

Codons Found in Messenger RNA

Second Base

First Base	U	C	A	G	Third Base
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	Leu	Pro	His	Arg	C
	Leu	Pro	Gln	Arg	A
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23. The mRNA codon AAU will be translated to make the amino acid

A **Phe** (Phenylalanine)
B **Ile** (Isoleucine)
C **STOP**
D **Asn** (Asparagine)

D

24. The DNA sequence GGT will be transcribed, then translated to make the amino acid

A **Gly** (Glycine)
B **Pro** (Proline)
C **Val** (Valine)
D **His** (Histidine)

B

DNA GGT
RNA CCA

25. Which of the following are known to cause genetic mutation?

I	X-rays
II	Ultraviolet light
III	Smoking tobacco products

ionizing radiation

carcinogen.

A

A I, II, and III
B I and II
C I and III
D II and III

26. CRISPR gene-editing technology allows for DNA in any organism to be edited at any specific gene. This technology was developed from _____.

D

A Chinese rice farmers
B Parasitic wasps' attack mechanism
C Cellular respiration pathways
D A bacteria's viral defense mechanism

Written Response (24 marks)

Name_____

1. Name and define the three factors that are required for evolution to occur **(3 marks)**

Variation - organisms of the same species have differences

Selection - these differences can give a reproductive advantage over others depending on env.

2. Heritability - differences can be passed on to offspring **(2 marks)**

   a. Which blood type is the universal donor? Why is it accepted by everyone?

Type O - no antigens

   b. Which blood type is the universal acceptor? Why can people with this blood type accept blood from anyone?

Type AB - they have all the antigens.

3. Describe two differences between the **structure** of DNA and RNA **(2 marks)**

DNA	RNA
- Double stranded	- Single stranded
- deoxyribose sugar	- ribose sugar
- A/T pairing	- A/U pairing

4. In North American culture, Pitbulls, Rottweilers, Dobermans, and Boxers are known to be aggressive dogs. Is this a result of the environment they were raised in, or is it directly the result of artificial selection?
   In point form, outline why you believe it is one or the other.
   (3 marks for either side, awarded by the quality of your points)

Things to consider:

- Breeding foxes to be domesticated <> passive / aggressive
  → behaviour is changed by genes here.
- Some dogs are bred for size/ strength.
- Aggressive owners change environment?
- Think about the robot dogs with no tails.
  → influenced behaviour of others.

5. Which are generally more harmful to the organism, deletions or ~~insertions~~ substitutions? Why? **(2 marks)**

6. What does it mean when "mutations are random, but natural selection is not"? Provide an example that illustrates the process of natural selection to bring clarity to your explanation. **(3 marks)**

Rock Pocket Mouse

- mc1r gene was mutated by chance.
- changed fur colour of mouse from light to dark
- mice now had a reproductive advantage b/c predators cannot see them as well.

7. In your opinion, should CRISPR gene-editing technology be used? **(2 marks)**
If yes, give and **explain** one reason why you think it's worthwhile and one condition you would set before it could be approved.
If no, give and **explain** two reasons why you think think it is too dangerous to use.

BONUS - how can we compare this situation to past historical events?

Eugenics in Canada?

8. Name one thing that is **good** about genetically modified foods, one thing that is **bad**, and one thing that is **the same** between normal foods and GM foods. **(3 marks)**

Good

- better yield
- reduce herbicide use
- better nutrients

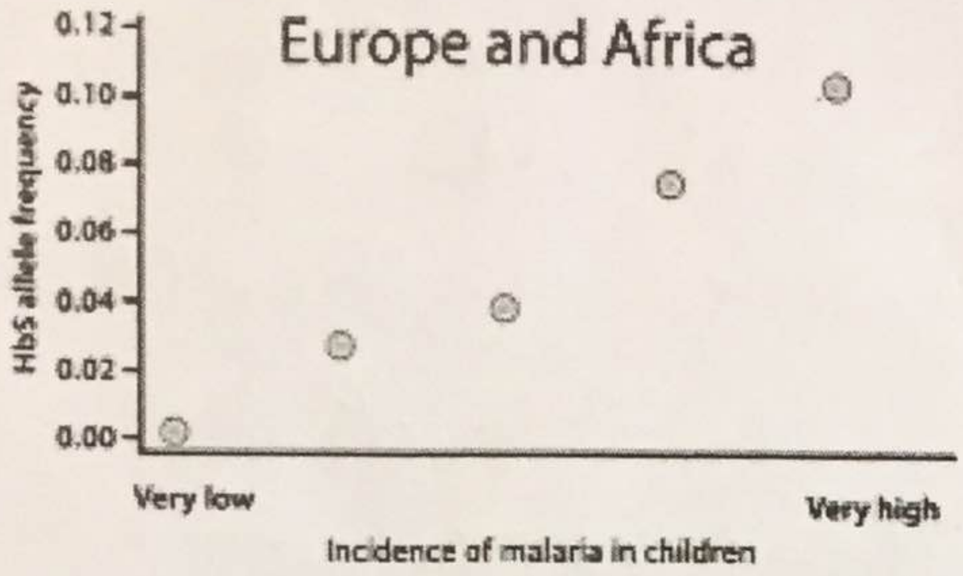
Same

- Taste
- nutrition (most of the time)
- safety

Bad

- companies have monopoly
- environmental ecological affects not yet understood

9. Sickle cell anemia is a genetic disease where the affected person has two copies of the HbS allele, making their red blood cells not as efficient and likely to cause problems in the body.
Why do we see a high HbS allele frequency in a population that has malaria? **(3 marks)**



It is more difficult for the malaria parasite to reproduce in "sickle cell" blood.
- gives protection, even in the heterozygote.

How do these findings support the theory of evolution by natural selection? **(1 marks)**

A variation (sickle cell) gives a reproductive advantage in the specific environment of ~~malaria~~ places with malaria.