Science 10

Name: KEY.

Genetics Review Assignment

1. Describe the shape of a DNA molecule. Use the following terms in your answer: sugar molecules, phosphates, double helix, nitrogen bases.

DNA is shaped like a twisted ladder (i.e., double Helix). The sides are made of repeating phosphate groups and pentose sugar (deoxyribose). Rungs are nitrogenous base pairs.

2. What does DNA stand for? Deoxyribonucleic Acid

3. DNA Replication:

   a. Write the steps of DNA replication.

   1) Unzip DNA with Helicase
   2) DNA polymerase copies DNA strands in 5' → 3' direction with complimentary base pairs

   b. Why is this an important process?

   - So after cell division each cell contains DNA.

4. Add the pairs for the following DNA chain:

G C

C G

T A

T A

C G

G C

A T

G C

[redacted]

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5. Which scientists discovered the structure of DNA?

   Watson + Crick

6. Explain the relationship between DNA, genes and chromosomes.

   genes are small sections of DNA that code for a particular protein, while a chromosome is the condensed form of DNA that has been wrapped up with Histones prior to cell division.

7. Mendel discovered that in pea plants the green pea pod is dominant over the yellow pea pod.

   Using *G* to represent the allele for green pods, and *g* to represent the allele for yellow pods, write the **genotypes** for:

   i a homozygous plant with yellow pods: gg

   ii a heterozygous plant with green pods: Gg

8. John has genotype NN. His **genotype** would best be described as:

   A homozygous recessive

   B homozygous dominant

   C heterozygous recessive

   D heterozygous dominant

9. For each of the genotypes (AA, Aa or aa) below determine what the **phenotype** would be.

   Purple flowers are dominant to white flowers.

   PP Purple Pp Purple pp white

   Hairy knuckles are dominant to non-hairy knuckles in humans.

   HH Hairy Hh Hairy hh non-hairy

   No-cleft chin is dominant. Cleft chin is recessive.

   CC Cleft Cc Cleft cc cleft

[redacted]

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Genetics Review Assignment

Name: _____

10. For each of the following write whether it is homozygous dominant, heterozygous or homozygous recessive.

a) AA Hom Dom
b) Ff He
c) Aa He
d) gg Hom rec
e) GG Hom Dom
f) Pp He
g) Ii He
h) tt Hom rec
i) TT Hom Dom
j) Tt Het
k) aa Hom rec.

11. If mom and dad both have blue eyes, what is the probability of their child having brown eyes? (B = Brown eyes, b = blue eyes)

a) 100% **b) 75%** **c) 50%** **d) 25%** **e) 0%**

	b	b
b	bb	bb
b	bb	bb

12. If mom is homozygous dominant and dad is homozygous recessive, what is the probability of their child having brown eyes? (B = Brown eyes, b = blue eyes)

a) 100% **b) 75%** **c) 50%** **d) 25%** **e) 0%**

	b	b
B	Bb	Bb
B	Bb	Bb

Mom

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Genetics Review Assignment Name: _____

13. If mom is heterozygous and dad has blue eyes, what is the probability of their child having brown eyes? (B = Brown eyes, b = blue eyes)

a) 100% **b) 75%** **c) 50%** **d) 25%** **e) 0%**

	b	b
B	Bb	Bb
b	bb	bb

Mom

14. If mom is homozygous dominant and dad heterozygous, what is the probability of their child having brown eyes? (B = Brown eyes, b = blue eyes)

a) 100% **b) 75%** **c) 50%** **d) 25%** **e) 0%**

	B	b
B	BB	Bb
B	Bb	Bb

mom

15. If mom and dad are both heterozygous, what is the probability of their child having brown eyes? (B = Brown eyes, b = blue eyes)

a) 100% **b) 75%** **c) 50%** **d) 25%** **e) 0%**

	B	b
B	BB	Bb
b	Bb	bb

16. Widow's Peaks are dominant. Look at the phenotypes of Beyonce and Jay Z. If these two had children, could they have children with a widow's peak? Why or why not? Use a Punnett Square to explain your answer.

	w	w
w		
w		

No widow's peak b/c only combinations are recessive alleles.

Name: _____ Date: XEL

Life Science Period: _____

Genetics

punnett square practice

1. Let's say that in seals, the gene for the length of the whiskers has two alleles. The dominant allele (W) codes long whiskers and the recessive allele (w) codes for short whiskers.

   a. What is the probability of producing offspring that have short whiskers from a cross of two long-whiskered seals, one that is *homozygous dominant* and one that is *heterozygous*? Show your work on the punnett square.

	W	W
W	WW	WW
w	Ww	Ww

100 % long whiskers

0 % short whiskers

   b. If one parent seal is a *heterozygous* long-whisker and the other is *short-whiskered*, what is the probability that the offspring will have short whiskers?

	W	w
w	Ww	ww
w	Ww	ww

50 % long whiskers

50 % short whiskers

2. In purple people eaters, one horn (H) is dominant and no horns (h) is recessive. Complete the punnett square to show the cross of *two hybrid* purple people eaters. Summarize the genotypes and phenotypes of the possible offspring.

	H	h
H	HH	Hh
h	Hh	hh

Possible genotypes of offspring:

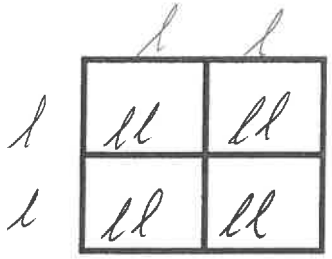
25% HH 50% Hh 25% hh

Possible phenotypes of offspring:

75% one Horn

25% NO horns.

3. In cats, long hair (L) is dominant over short hair (l). Complete the punnett square to show a cross between *two short-haired* cats.

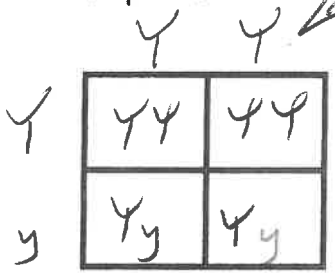


What is the probability that the parents will produce a short-haired kitten?

100 %

4. In Noombats, yellow bellies (Y) are dominant over green bellies (y). Homozygous

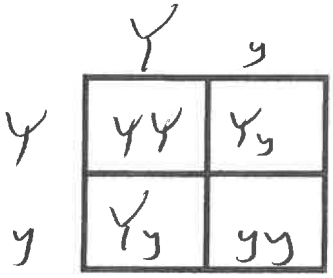
a. Complete the punnett square to show a cross between a *purebred yellow* bellied noombat and a noombat that is a *hybrid* for belly color. What is the probability that the parents will have yellow bellied offspring?



100 % yellow bellied

0 % green bellied

b. Is it possible for two yellow bellied noombats to have a green bellied child? Identify the genotypes of the parents and complete the cross on the punnett square.



a. Genotypes of the parents:

Yy and Yy

b. Can the yellow bellied parents produce a green bellied child?

yes

c. If yes, explain how and identify what the probability would be.

25% due to two recessive alleles combining

Punnett Square Worksheet-Human Characteristics

Directions: Complete the following Punnett Squares. Be sure that you include the ratios of the genotypes (and the words used to describe those alleles) and phenotypes of the characteristics.

1. B= Brown eyes b= blue eyes Mom= Bb Dad= BB
What are the eye color possibilities if they chose to have children?

Genotypes

2/4 → 50% BB
2/4 50% Bb

Mom

DAD

	B	B
B	BB	BB
b	Bb	Bb

Phenotypes

4/4 100% Brown eyes
4:0
Brown:Blue

2. Curly hair is recessive, and straight hair is dominant. A woman with curly hair marries a man who is homozygous dominant for straight hair. Predict the outcomes for their children.

Genotypes

100% Ss

	S	S
s	Ss	Ss
s	Ss	Ss

Phenotypes

100% straight hair
4 : 0
straight : curly

3. Black hair is homozygous dominant. Brown hair is heterozygous. Blonde hair is homozygous recessive. (This is an example of incomplete dominance.) A woman with brown hair marries a man with brown hair. What are the possible outcomes for their kids?

Genotypes

25% BB
50% Bb
25% bb

	B	b
B	BB	Bb
b	Bb	bb

Phenotypes

25% Black hair
50% Brown hair
25% Blonde hair

4. Attached earlobes are dominant over free hanging earlobes. Complete the Punnett Square for the following individuals: Mom=BB and Dad=bb

Genotypes

100% Bb

	b	b
B	Bb	Bb
B	Bb	Bb

Phenotypes

100% Attached earlobes

5. Incomplete dominance problem: T=tall (5'11"-6'2"); Tt=medium height (5'4"-5'10"); t=short (5'3" or smaller)
Mom= 5'5"
Dad= 6'0"
What are the possible height outcomes of their children?

Genotypes

50% TT
50% Tt

	T	T
T	TT	TT
t	Tt	Tt

Mom

Phenotypes

50% TALL
50% Medium

6. Freckles are recessive. No freckles are dominant.
Mom = heterozygous; Dad = homozygous recessive
Possible outcomes for kids?

Genotypes

50% Ff
50% ff

	F	f
f	Ff	ff
f	Ff	ff

DAD

Phenotypes

50% No freckles
50% freckles

KEY.

16. What polymer makes up our characteristics (eye color, hair color, etc)? _____

17. The order of nitrogen bases (A,T,C,G) determines the type of _____ that is assembled.

Protein Synthesis Review Worksheet

1. How are DNA and mRNA alike?
Both contain a sugar, a phosphate group and nitrogenous bases A, C, G

2. How are DNA and mRNA different? Fill in the table below.

DNA		mRNA
Double Helix	**Shape**	Single stranded
A T C G	**Nitrogen bases**	A U C G
Deoxyribose	**Sugars**	Ribose
nucleus	**Location**	nucleus → cytoplasm

Transcription: DNA to mRNA:

1. How many strands of mRNA are transcribed from the two "unzipped" strands of DNA? one

2. If the following were part of a DNA chain, what mRNA bases would pair with it to transcribe the DNA code onto mRNA? G-G-A-T-C-G-C-C-T-T-A-G-A-A-T-C
CCUAGCGGAAUCUUAG

3. If DNA is described as a double helix, how should mRNA be described? Single stranded

4. How are the accuracy of DNA and mRNA codes assured? Repair proteins
skip this one

Translation: mRNA to PROTEIN:

5. Name and describe the three types of RNA's involved in protein synthesis?
mRNA – message rRNA – ribosomes (reads message)
tRNA – transfers amino acids to ribosome

6. What is located at EACH end of a tRNA molecule? Anticodon

7. Where must an mRNA attach before protein production can begin? Ribosome

8. How many bases are needed to specify an mRNA codon? 3

9. If a strand of mRNA contain the sequence, U-A-G-C-U-A-U-C-A-A-A-U, what tRNA anticodons would be needed to translate the sequence? AUCGAUAGUUUA

10. How does mRNA get out of the nucleus? through small pores (nuclear pore complexes)

11. What is the difference between an amino acid and a protein? A protein is a polymer made up of Amino Acid sub-units

12. What type of bond is formed between amino acids? peptide
skip.