Name Key Date March 2017 Period _____

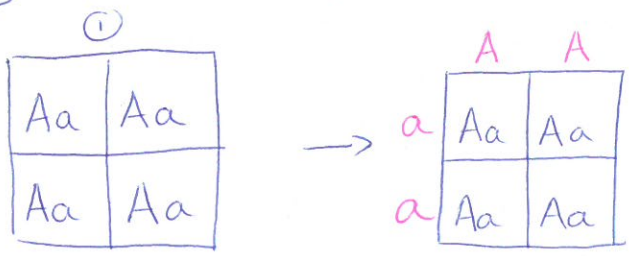
Genetics REVIEW questions

1) If short hair (L) is dominant to long hair (l), animals with LL and Ll have the same

a. parents b. genotypes c. phenotypes d. alleles e. genes

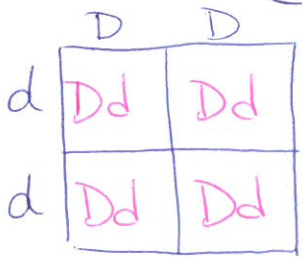
2) If all offspring of a cross have the genotype Aa, the parents of the crosses would most likely be:

a. AA x aa b. Aa x Aa c. Aa x aa d. AA x Aa e. none of these



3) If tall (D) is dominant to dwarf (d) and two homozygous varieties DD and dd are crossed, then what kind of offspring will be produced?

a. all intermediate forms b. all tall c. all dwarf d. ½ tall, ½ dwarf e. ¾ tall, ¼ dwarf



4) For each **genotype** below, indicate whether it is heterozygous or homozygous

AA homozygous Bb Heterozygous Pp Heterozygous

5) For each genotype, determine what **phenotype** would be possible.
Brown eyes are dominant to blue eyes

BB Brown eyes Bb Brown Eyes bb blue eyes

R r
Round seeds are dominant to wrinkled seeds

RR Round seeds Rr Round seeds rr wrinkled seeds

6) A TT (tall) plant is crossed with a tt (short). What percentage of the offspring will be tall? Punnett Square

	T	T
t	Tt	Tt
t	Tt	Tt

100% of the offspring will be tall because they will be Heterozygous individuals.

7) The allele N codes for a normal nose and the allele n codes for a green nose. If two individuals who are both heterozygous at this gene location mate with each other, what combinations of alleles will their offspring have (genotypic ratio)? What will their noses look like (phenotypic ratio)?

N = normal nose
n = green nose

heterozygous = Nn (different alleles)

	N	n
N	NN	Nn
n	Nn	nn

1:3 ratio for NN
2/4 ratio for Nn
1/4 ration for nn

3/4 chance of having normal nose (N).

8) In pea plants, the allele for tall plants (T) is dominant to the allele for short plants (t). You observe that the offspring of a cross include 78 tall plants and 27 short plants. 1) What was the probable allele combination of the two parent plants? 2) How would your answer change if the offspring included 121 tall plants and 118 short plants?

T = tall
t = short

78/99 = tall
27/99 = short

close to 75% tall

	T	t
t	Tt	Tt
t	tt	Tt

1) One heterozygous parent and on parent homozygous for recessive allele

121 & 118 close to 50/50

2)

	t	t
T	Tt	Tt
t	tt	tt

one tt (heterozygous)
one Tt (homozygous)

= T

10) A red-fruited tomato plant (which is dominant), when crossed with a yellow-fruited one, produces progeny about half of which are red-fruited and half which are yellow fruited. What are the genotypes of the parents?

DNA – GENES and CHROMOSOMES

	Structure	Function	Contribution to Diversity
DNA	Double helix	Genetic code	mutations / copy of code / reproduct
GENES	Sections of DNA		
CHROMOSOMES	Long strands DNA		

Karyotypes:

Be able to explain what it is and how to detect mutations or disorders using one.

Read a Karyogram / Kargotype ★Feb 27 Blog Post

Chromosomes:

How do we read them? How do we match the pairs?

How is diversity addressed in the chromosomal structure and function?

★Feb 27th Blog post

- structure → protects DNA
  - provides redundancy (copy)
- Function → stores / organizes
  - cross-over + random division

Meiosis –

- be able to identify stages that create randomness and therefore contribute to diversity (cross-over, division, gametes)
- Differentiate from Mitosis
  - where? Products?

Mutations – Where can Mutations occur in DNA, Genes and Chromosomes

How do mutations contribute to diversity?

DNA - A C G T ... Letter switches, omission, deletion
- copy error

GENES - turned on/off
- wrong start / stop place.
- Protein sythesis errow

Chromosomes - extra chromosome
- missing chromosome (or part of)
- Replication error.
- Environmental affects.

Thinking about Genetics:

You may be given problems that go beyond what we have done in class. Vocab will be used that you must be familiar with:

You must know how the following vocab is used in the topic of genetics:

- Genes
- Chromosomes
- DNA
- Nucleotides
- Alleles
- Genotype
- Phenotype
- Heterozygous
- Homozygous
- Expressed
- Trait
- Dominant / dominance
- Recessive
- Codominant
- In Complete Dominance
- Gametes
- Punnett Square
- Inheritance
- Offspring
- Ratio, percentage or frequency (when talking about the probability of offspring to possess a genotype or phenotype.

* Be able to use vocab when answering questions.

* Be able to understand word problems that use the above vocabulary and concepts

Codominance ~ or Multiple Alleles

Blood types

A = $I^A i$ and $I^A I^A$

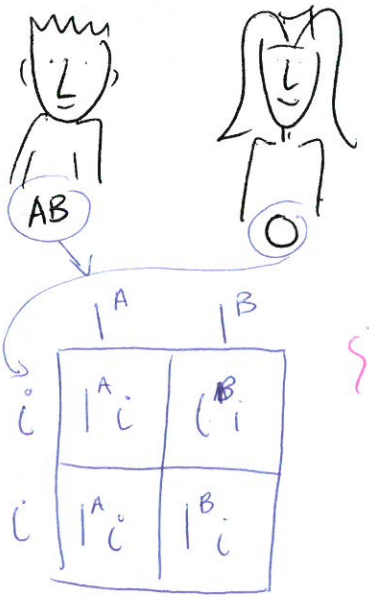
B = $I^B i$ and $I^B I^B$

AB = $I^A I^B$

O = ii

Can these parents have offspring with type B" blood or Type O blood?

Why or why not?



use a Punnett Square in your explaination

Possible blood types = A or B

$I^A i$ = (A)

$I^A i$ = (A)

$I^B i$ = (B)

$I^B i$ = (B)

Answer

These parents have a 50% chance of having a baby with type B blood and 50% chance for Type A.

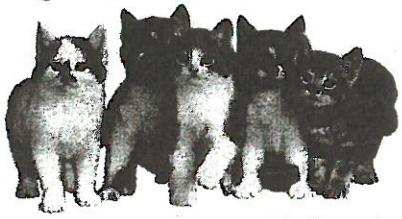
Why

This is because the AB parent only carries the dominant allele for either A or B and the type "O" parent carries recessive alleles that will not be expressed.

Example of Thinking

Sex Linkage

Sex linkage is a special case of linkage occurring when a gene is located on a sex chromosome (usually the X). The result of this is that the character encoded by the gene is usually seen only in one sex (the heterogametic sex) and occurs rarely in the homogametic sex. In humans, recessive sex linked genes are responsible for a number of heritable disorders in males, e.g. haemophilia. Women who have the recessive alleles on their chromosomes are said to be **carriers**. One of the gene loci controlling coat colour in cats is sex-linked. The two alleles, red and non-red (or black), are found only on the X-chromosome.



Allele types

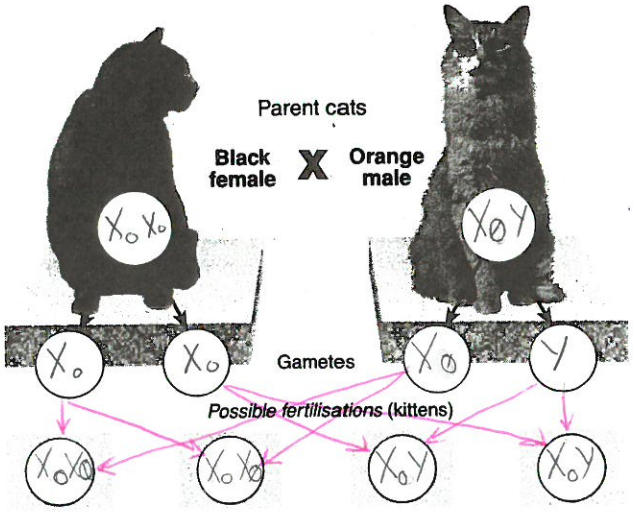
X_o = Non-red (=black)
X_O = Red

Genotypes	Phenotypes
X_oX_o, X_oY	= Black coated female, male
X_OX_O, X_OY	= Orange coated female, male
X_OX_o	= Tortoiseshell (intermingled black and orange in fur) in female cats only

1. An owner of a cat is thinking of mating her black female cat with an orange male cat. Before she does this, she would like to know what possible coat colours could result from such a cross. Use the symbols above to fill in the diagram on the right. Summarise the possible genotypes and phenotypes of the kittens in the tables below.

	Genotypes	Phenotypes
Male kittens	X_oY	Black male
	X_oY	Black male

Female kittens	X_oX_O	Tortoise shell
	X_oX_O	Tortoise Shell



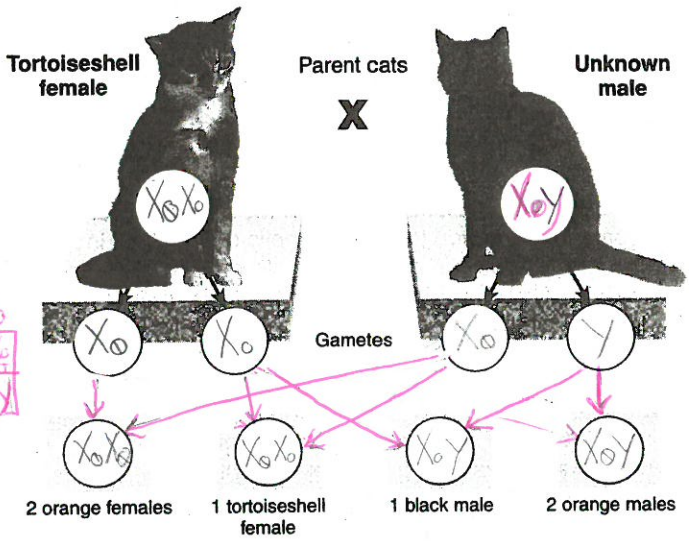
2. A female tortoiseshell cat mated with an unknown male cat in the neighbourhood and has given birth to a litter of six kittens. The owner of this female cat wants to know what the appearance and the genotype of the father was of these kittens. Use the symbols above to fill in the diagram on the right. Also show the possible fertilisations by placing appropriate arrows.

♀	X_o	X_O
X_o	X_oX_o	X_OX_o
Y	X_oY	X_OY

Describe the father cat's:

(a) Genotype: X_OY

(b) Phenotype: Orange Male



3. The owner of another cat, a black female, also wants to know which cat fathered her two tortoiseshell female and two black male kittens. Use the symbols above to fill in the diagram on the right. Show the possible fertilisations by placing appropriate arrows.

	X_o	Y
X_o	X_oX_o	X_oY
X_o	X_oX_o	X_oY

Describe the father cat's:

(a) Genotype: X_OY

(b) Phenotype: Orange coat

(c) Was it the same male cat that fathered both this litter and the one above?
YES / (NO) *(delete one)*