Name **KEY**　　　　　　Date　　　　　　Period　　　　

Worksheet: Monohybrid Crosses
UNIT 3: GENETICS

Directions: *Answer the following genetic cross problems. You can refer to the "Punnett Square Cheat Sheet" attached at the end of this worksheet to help you solve the different types of problems. It is essential that you know the all of the vocabulary inlcuded in the "cheat sheet" as well. Remember when you are doing a genetic cross to follow the steps below to complete!*

STEP 1: Determine what kind of problem you are trying to solve.
STEP 2: Determine letters you will use to specify traits.
STEP 3: Determine parent's genotypes.
STEP 4: Make your punnett square and make gametes
STEP 5: Complete cross and determine possible offspring.
STEP 6: Determine genotypic and phenotypic ratios.

Single-Factor Crosses (Mono-hybrid)

1. In certain breeds of dogs, deafness is due to a recessive allele (d) of a particular gene, and normal hearing is due to its dominant allele (D). What percentage of the offspring of a normal heterozygous (Dd) dog and a deaf dog (dd) would be expected to have normal hearing? A homozygous deaf dog and a homozygous normal?
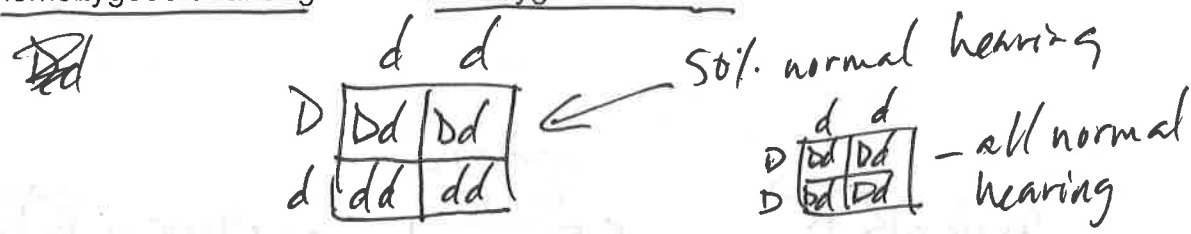
2. In man, normal pigmentation is due to a dominant allele (C), and albinism to it's recessive allele (c). A normal man marries an albino woman. Their first child is albino. What are the genotypes of these three people? If there are more children, what would they probably be like?
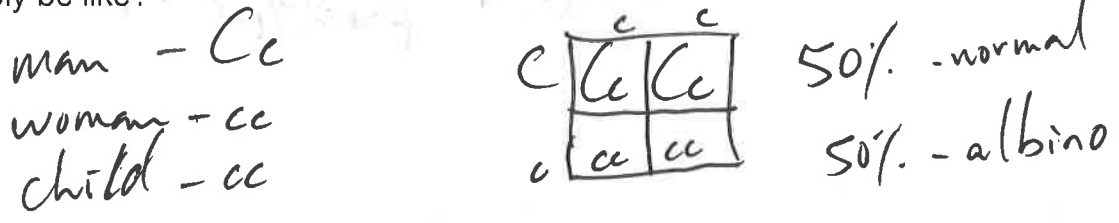
3. In minks, brown is dominant over silver-blue color. What offspring would you predict if you crossed a homozygous brown mink with a silver-blue mink?
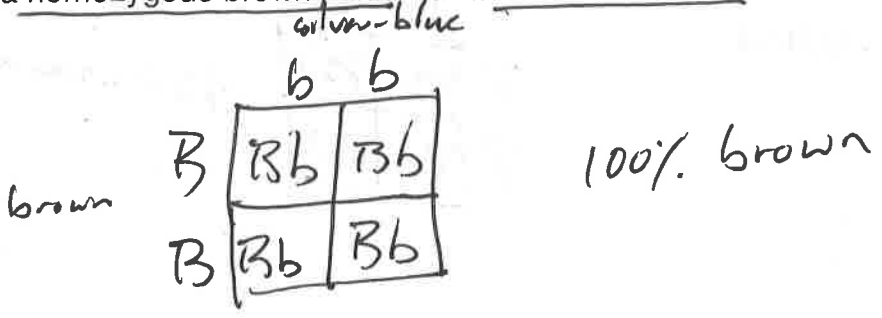
4. What would the genotypic and phenotypic ratios of two F$_2$ generation mink from the above problem be if they were crossed?

$Bb \times Bb$

	B	b
B	BB	Bb
b	Bb	bb

genotype - BB, Bb, bb
1 : 2 : 1

phenotype - brown   3
          silverblue 1

5. In snapdragons, red is not completely dominant over white flowers. What color flowers would you expect when you cross a red flower with a white flower? What would be the genotypic and phenotypic ratios of the offspring be?

red - $R^r R^r$
white - $R^w R^w$

	R^w	R^w
R^r	$R^r R^w$	$R^r R^w$
R^r	$R^r R^w$	$R^r R^w$

- 100% $R^r R^w$ = pink

6. What would you expect from a cross between two pink flowers from above? Give genotypic and phenotypic ratios.

Pink - $R^r R^w$

	R^r	R^w
R^r	$R^r R^r$	$R^r R^w$
R^w	$R^r R^w$	$R^w R^w$

genotype - $R^r R^r$: $R^r R^w$: $R^w R^w$
1 : 2 : 1

phenotype red : pink : white

7. In cattle red hair color and white hair color are co-dominant. A cross between a white and a red cow produces a roan colored cow. Cross a red-haired and roan colored cow. What are the genotypic and phenotypic ratios of offspring?

red - RR
white - WW

	W	W
R	RW	RW
R	RW	RW

- RW = roan

	R	W
R	RR	RW
R	RR	RW

50% RR
50% RW

50% - red   50% - roan

8. In humans, acondroplasia "dwarfism" (D) is dominant over normal (d). A homozygous dominant (DD) person dies before the age of one. A heterozygous (Dd) person is dwarfed. A homozygous recessive individual is normal. A <u>heterozygous dwarf man marries a dwarf heterozygous woman.</u> Give the genotypic and phenotypic ratios of the offspring

	D	d
D	DD	Dd
d	Dd	dd

genotype – DD : Dd : dd   1 : 2 : 1

phenotype – 3 dwarf,
          1 normal

9. In humans, free earlobes (F) is dominant over attached earlobes (f). If one parent is <u>homozygous dominant for free earlobes,</u> while the other has <u>attached earlobes</u> can they produce any children with attached earlobes? Show punnett square to answer question.

	f	f
F	Ff	Ff
F	Ff	Ff

0% chance of attached
earlobes

10. In humans widow's peak (W) is dominant over straight hairline (w). A <u>heterozygous man</u> for this trait marries a <u>woman who is also heterozygous.</u> Give the genotypic and phenotypic ratios of the offspring

	W	w
W	WW	Ww
w	Ww	ww

1 : 2 : 1 – genotype
WW : Ww : ww

widows peak 3 – phenotype
straight 1

11. In pea plants, yellow seeds (Y) are dominant and green seeds (y) are recessive. A pea plant with yellow seeds is crossed with a pea plant with green seeds. The resulting offspring <u>have about equal numbers of yellow and green seeded plants.</u> What are the genotypes of the parents?

yellow – YY
green – yy

	y	y
Y	Yy	Yy
Y	Yy	Yy

– all yellow

yellow – Yy
green – yy

|	y	y
Y	Yy	Yy	50%
y	yy	yy	50%

12. In pea plants, yellow seeds (Y) are dominant and green seeds (y) are recessive. In another cross, a yellow seeded plant was crossed with another yellow seeded plant and it produced offspring of which about 25% were green seeded plants. What are the genotypes of both parents?

yellow -YY
yellow -YY

	Y	Y
Y	YY	YY
Y	YY	YY

-all yellow

NO

yellow - Yy
Yellow - Yy

|	Y	y
Y	YY	Yy
y	Yy	yy

25% green

YES
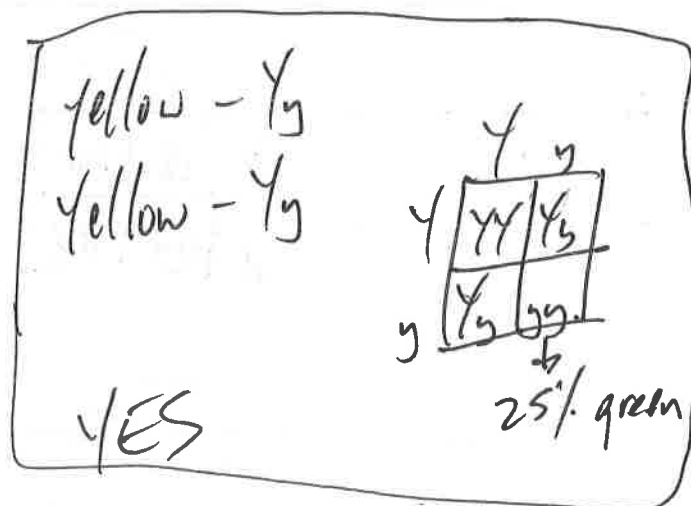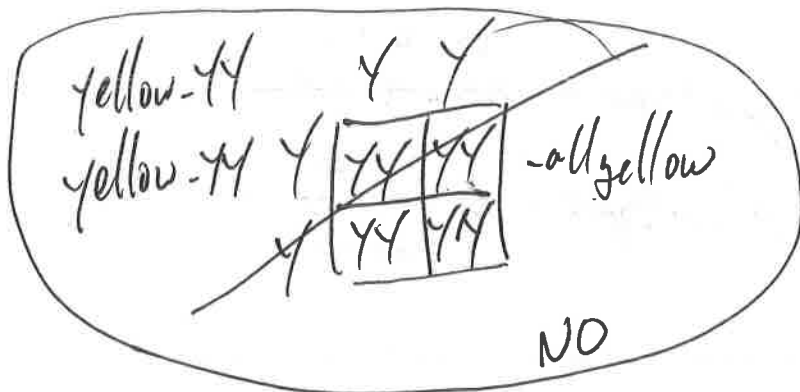
13. In guinea pigs, short hair, (S), is dominant to long hair, (s). What are the genotypic and phenotypic ratios of a cross between a heterozygous short haired guinea pig with a long haired guinea pig.

	S	s
S	Ss	Ss
s	ss	ss
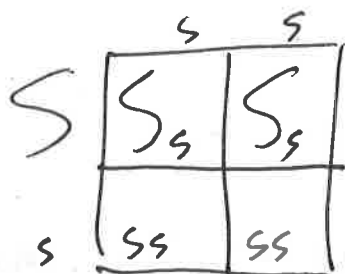
2 : 2 or 1:1
genotype - Ss : ss

phenotype - 50% short   or   !:
          50% long   1

14. Hornless (H) in cattle is dominant over horned (h). A homozygous hornless bull is mated with a homozygous horned cow. What will be the genotype and phenotype of the first generation?

	h	h
H	Hh	Hh
H	Hh	Hh
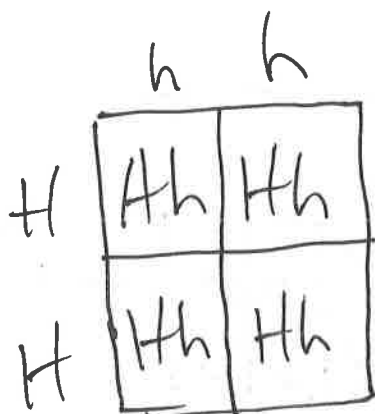
genotype - 100% Hh

phenotype - 100% hornless