Name: _____

**Unit 6 Genetics Study Guide:**
**Use this study guide to prepare for your Genetics Test**

## Meiosis

1. What is it?
   cell division
2. What happens during it?
   cells divide into 4
3. What does it make? And why?
   4 genetically different sex cells with half the # of chromosomes. 23+23=46
4. What is independent assortment? Give an example.
   when traits sort separately: brown hair/blue eyes + blond/brown eyes = blond/blue
5. What is crossing over?
   when chromosomes exchange material (ensures genetic variation)

## Punnett Squares:

### Monohybrid Complete Dominance:

1. In humans, the allele for albinism is recessive to the allele for normal skin pigmentation. Cross two heterozygote parents.

| | A | a |
|---|---|---|
| A | AA | Aa |
| a | Aa | aa |

   a. What is the chance that a child of theirs will have normal skin pigmentation? A 3/4 75%
   b. What is the chance that a child of theirs will be albino? aa 1/4 25%
   c. If the child is normal, what is the chance that it will be a carrier (heterozygous) for the albino allele? 2/4 50%

2. In purple people eaters, one-horn is dominant and no-horn is recessive. Show the cross of a purple people eater that is heterozygous for horns with a purple people eater that does not have horns. Identify the genotypes and phenotypes of their offspring.

| | H | h |
|---|---|---|
| h | Hh | hh |
| h | Hh | hh |

1 : 1
Hh hh
Horns no horns

3. In humans, the brown eye allele is dominant to the blue eye allele. If a homozygous dominant brown eyed male crosses with a homozygous recessive female, what will be the genotypes and phenotypes of their offspring?

| | B | B |
|---|---|---|
| b | Bb | Bb |
| b | Bb | Bb |

= 100% Bb Brown eyes

**DiHybrid Complete Dominance:** L l B b

In robins, singing lovely is dominant to singing badly. Having a large beak is also dominant to a small beak. A heterozygous singing robin that has a small beak is crossed with a heterozygous singing robin that is also heterozygous for beak size. What is the chance of having a small beak/good singing bird? = L bb ?

LlBb X LlBb

| | L | l |
|---|---|---|
| L | LL | Ll |
| l | Ll | ll |

x

| | B | b |
|---|---|---|
| b | Bb | bb |
| b | Bb | bb |

$\frac{3}{4} \times \frac{2}{4} = \frac{6}{16} = \frac{3}{8}$

**Incomplete Dominance:**

4. When breeding horses, white horses (WW) are bred with chestnut (BB) and they produce palomino horses (BW). Identify the genotypes and phenotypes of the possible offspring when a palomino horse is crossed with another palomino horse.

BW x BW

| | B | W |
|---|---|---|
| B | BB | BW |
| W | BW | WW |

1 : 2 : 1

BB BW WW

Chestnut palomino white

**Co-Dominance /Multiple Alleles:**

5. A ~~man with~~ type AB blood marries a woman with type B blood. Her mother has type O blood. List the expected phenotypes of their children.

AB x Bi

| | A | B |
|---|---|---|
| B | AB | BB |
| i | Ai | Bi |

phenotypes = AB, B, A (BB & Bi)

6. A father of a child has type AB blood. The mother has type A. Which blood type(s) can their children NOT have?

| | A | ? |
|---|---|---|
| A | AA | A? |
| B | AB | B? |

≠ O/ii

**Probability Practice:**

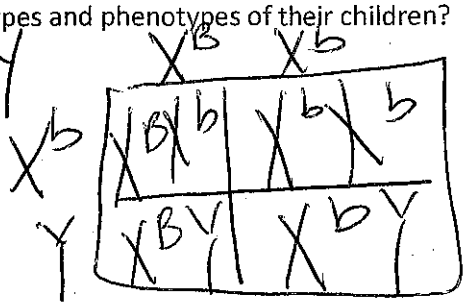
7. What is the probability of each of the following sets of parents producing the given genotypes in their offspring?

| Parent Genotypes | Offspring Genotypes | Probability |
|---|---|---|
| **AaBb x AABB**<br>A a / B b<br>A: AA Aa / A: AA Aa<br>B: Bb Bb / B: Bb Bb | AABB<br>$\frac{2}{4} \times \frac{2}{4}$ | $\frac{4}{16} = \frac{1}{4}$ 25% |
| **AaBb x AaBb**<br>A a / B b<br>A: AA Aa / a: Aa aa<br>B: Bb Bb / b: Bb bb | AaBb<br>$\frac{2}{4} \times \frac{2}{4}$ | $\frac{4}{16} = \frac{1}{4}$ |
| **Aa x aa**<br>A a<br>a: Aa aa / a: Aa aa | Aa | $\frac{2}{4} = 1/2$ |

**Sex-Linked:**

8. Colorblindness is an X-linked disorder. If a female is a carrier for colorblindness crosses with a male that is colorblind, what are the possible genotypes and phenotypes of their children?

$X^BX^b \times X^bY$



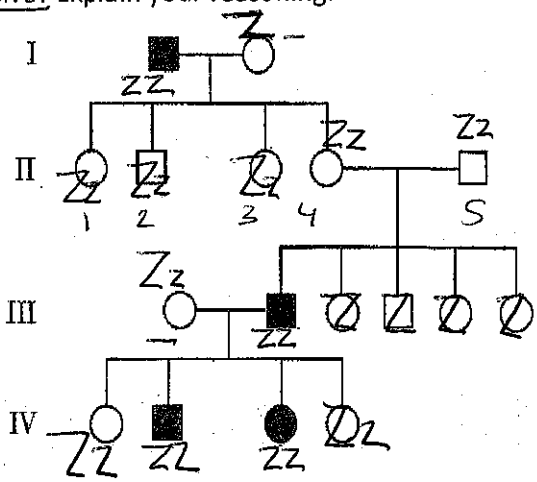

1 carrier female
1 cb female
1 normal boy
1 cb boy

**Pedigrees:**

The following pedigree shows the relationship for 4 generations of people. The trait being followed is a genetic disorder that leads to the inability to pay attention in science class (the zzz gene).

9. Is the inheritance pattern for the zzz gene dominant or recessive? Explain your reasoning.

recessive: expressing has 2 normal parents




10. Use the capital letter "Z" for the dominant allele and lower case "z" for the recessive allele, determine what is the genotype for individual II-4, II-5 and III-1? Justify your answer.

Zz, either b/c one parent was zz(recessive) or they had a recessive baby

11. How can you tell if the trait in a pedigree is sex linked?

only boys / skips a generation / no father to son

**Karyotypes:**

1. What is a karyotype?

picture of chromosomes

2. How many autosomes do humans have?

22 pairs = 44

3. How many sex chromosomes do humans have? What are they for a male? What are they for a female?

1 pair = 2 XY XX

4. How many total chromosomes do humans have?

46

5. How can you tell if someone has a disorder or not with a karyotype?

more or less than 46

6. What disorder is caused by trisomy or an extra 21?

Down Syndrome

7. What disorder is caused by XXY?

male → Klinefelters