

**Incomplete and Co-dominance Practice Problems**

**Name:**  
**Date:**  
**Period:**

1. In snapdragon flowers, the one allele codes for red flowers (r) and another allele codes for white flowers (w). When a red flowered plant is crossed with a white flowered plant, the result is a plant with pink flowers.

a. Does the snapdragon exhibit complete dominance, co-dominance, or incomplete dominance?

**INCOMPLETE DOMINANCE**

b. What are the genotypes of each of the parent plants?

rr x ww

c. Use a Punnett square to show the cross of the plants described above.

	rr	
w	rw	rw
w	rw	rw

d. What is/are the possible genotype(s) of the offspring?

rw

e. What is/are the possible phenotype(s) of the offspring?

**Only pink**

2. In Andalusian birds, black individuals (b) and white individuals (w) are homozygous.

a. A homozygous black bird is crossed with a homozygous white bird. The offspring are all grey. Show the cross, as well as the genotypes and phenotypes of the parents and offspring.

	b b		parents	black	x	white
w	bw	bw	offspring	bw (grey)		
w	bw	bw				

b. What would be the result of a cross between a black individual and a grey individual?

	b b		1/2 black (bb)
b	bb	bb	1/2 grey (bw)
w	bw	bw	

c. If two grey individuals are crossed, what would be the ratios for both phenotype and genotype of the offspring?

	b w		1/4 black (bb)
b	bb	bw	3/4 or 1/2 grey (bw)
w	bw	ww	

3. In Shorthorn cattle, when a red bull (RR) is crossed with a white cow (WW) all of the offspring are roan (RW). In the roan coat color, each hair exhibits both red and white portions. Roan is a result of co-dominance.

a. Show the genotype and phenotype percentages in the offspring of mating a roan bull and a roan cow.

	R W		1/4 red (RR)
R	RR	RW	3/4 or 1/2 Roan (RW)
W	RW	WW	

- b. Is it possible for a white cow to have red parents? Support your answer using a Punnett square.

	W
W	WW

No, a white cow must have a parent with at least one white allele

4. In some cats, the gene for tail length shows incomplete dominance. Cats with long tails are homozygous. Cats with no tails are homozygous. Cats that are heterozygous for tail length possess short tails.

- a. What would be the expected genotypes and phenotypes in the offspring of a cross between two short tails cats?

no tail - n  
long tail - l

n	l
n	nl
l	ln

1/4 no tail (nn)  
3/4 or 1/2 short (nl)  
1/4 long (ll)

- b. If a litter contains two cats without tails and 3 cats with short tails, what types of tails would the parents have?

l	n
n	nl
n	nn

ln - short  
nn - no tail

5. In carnations, a cross between red flowers and white flowers produced all pink flowers. What are the likely results of crossing a pink flower and a red flower? Use a Punnett square to support your answer.

	r	w
r	rr	rw
r	rr	rw

1/2 Red (rr)  
1/2 pink (rw)

6. Thalassaemia, which is common in Mediterranean populations, and sickle-cell anemia, which is common in black populations (but is relatively rare in other people), are defects in human hemoglobin. Both conditions occur in two forms, severe and mild. Severely affected individuals are homozygous; mildly affected persons are heterozygous. People free of these diseases are homozygous for the normal allele. Normal A Sickle Trait S

- a. Both parents in a particular family are mildly affected with sickle-cell anemia (heterozygous). What is the probability that their child will have sickle cell anemia? Have a mild form of the disease? Be normal (unaffected) by the disease?

	A	S
A	AA	AS
S	AS	SS

1/4 Normal (AA)  
2/4 or 1/2 mild (AS)  
1/4 sickle cell (SS)

- b. A man with severe thalassaemia marries a woman with a mild form. What types of children and in what proportion may they expect to have?

Normal N

thalassaemia T

	N	T
T	NT	TT
T	NT	TT

1/2 mild (NT)  
1/2 severe (TT)