

AP Biology Genetics Problem Set.
Answer Key

1. $\frac{\text{Blue}}{AaBb} \times \frac{\text{Scarlet}}{aa\text{bb}}$

Blue must be dihybrid; it is the only way to get the double recessive Scarlet.

$A-B-$	$aaB-$	
$A-bb$	$aabb$	
Blue	Purple	Scarlet

$\frac{\text{Purple}}{aaBb} \times \frac{\text{purple}}{Aa\text{bb}}$

②

	Ab	ab
aB	$AaBb$ ③	$aaBb$ ④
ab	$Aabb$ ⑥	$aabb$ ⑤

$\frac{\text{Purple}}{aaBb}$ or $\frac{\text{Scarlett}}{Aabb}$

③

	aB	ab
ab	$aaBb$ ④	$aabb$ ⑤

③

	Ab	ab
ab	$Aabb$ ⑥	$aabb$ ⑤

$\frac{\text{Blue}}{AaBb} \times \frac{\text{Purple}}{aaBb}$ or $\frac{\text{Purple}}{Aabb}$

Blue must be dihybrid to get Scarlet.

④

	aB	ab
AB	$AaBB$ ⑥	$AaBb$ ⑤
Ab	$AaBb$ ⑥	$Aabb$ ⑦
ab	$aaBB$ ④	$aaBb$ ⑦
ab	$aaBb$ ⑦	$aabb$ ⑤

	Ab	ab
AB	$AABb$ ④	$AaBb$ ⑤
Ab	$AAbb$ ⑥	$Aabb$ ⑦
ab	$AaBb$ ⑤	$aaBb$ ⑦
ab	$Aabb$ ⑦	$aabb$ ⑤

2. Note that you have three phenotypes: hairless, normal and dead. This means one of the genotypes is lethal.

H = hairless
 h = normal

	H	h
Dead H	HH (circled)	Hh (circled)
h	Hh (circled)	hh (circled)

hairless (pointing to HH and Hh)
Normal (pointing to hh)

This can be tested by performing a test cross of a Hairless (Hh) with a normal (hh). You'd expect 50% Hairless and 50% normal.

3. $\begin{array}{c} \text{♂} \\ \text{I}^A \text{I}^B \\ \times \\ \text{♀} \\ \text{I}^A i \end{array}$

	I^A	i	
I^A	$I^A I^A$	$I^A i$	50% chance Type A
I^B	$I^A I^B$	$I^B i$	25% chance Type B
			25% chance Type AB

4. This appears to be a very rare Y linked mutation.

5. In order to have both taster and nontaster offspring the parents must be heterozygous; thus the tasting trait must be dominant.

6. a. $Cc Ss \times Cc Ss$ Traditional 9:3:3:1 dihybrid cross.

b. $Cc Ss \times Cc ss$

	Cs	Cs	cs	cs
Cs	$CCsS$	$CCsS$	$CcSs$	$CcSs$
cs	$CcsS$	$CcsS$	$ccSs$	$ccSs$

c. $cc Ss \times cc Ss$

	cS	cS
cS	$ccSS$	$ccSs$
cs	$ccSs$	$ccss$

d. $CC Ss \times CC Ss$ The C loci is irrelevant.
Or one can be $Cc Ss$

7. Charlie is supposed to be homozygous dominant for black and white (AA). He is studied out to supposedly homozygous heifers. Therefore, all calves should be AA. But when you mate two of these progeny offspring, you sometimes get 25% red and white. This means that some one is heterozygous, but you don't have enough information to know if it is Charlie or one of his heifers.