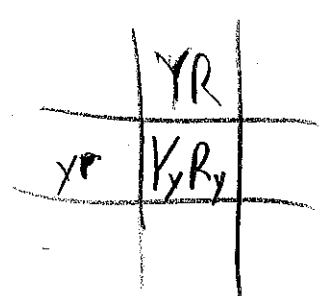
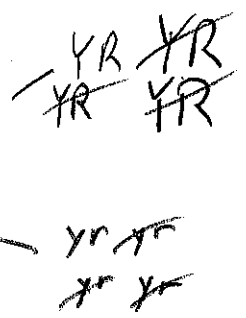


CLASSICAL GENETICS PRACTICE

1. In pea plants, yellow seed colour is dominant to green seed colour and round seeds are dominant to wrinkled seeds. If a homozygous yellow-round seed is crossed with a homozygous green-wrinkled seed, what percentage of the F1 generation will be yellow and wrinkled?

Y = yellow
y = green
R = round
r = wrinkled

homozygous yellow round = YYRR
homozygous green wrinkled = yyrr



100% yellow and wrinkled

Use the following information to answer the next question.

2. The coat colour of Labrador retrievers is determined by two alleles. The black allele, *B*, is dominant to the brown allele, *b*. A second pair of alleles, *E* and *e*, affects the expression of the coat colour: the homozygous recessive condition, *ee*, prevents the expression of black or brown and produces a pup with a yellow coat.

Genotype	Phenotype
<i>B_ E_</i>	Black
<i>bb E_</i>	Brown
<i>_ _ ee</i>	Yellow

B = black.
b = brown
e = recessive (*ee*)
(prevents expression)
E = lets color express

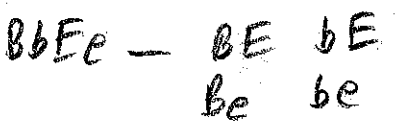
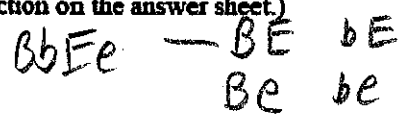
If two Labrador retrievers with the genotype *BbEe* were to be crossed, what phenotypic ratio would be expected in their offspring?

ee = no color expression
yellow

Ratio: 9 : 3 : 4
Phenotype: Black Brown Yellow



(Record all three digits of your answer in the numerical-response section on the answer sheet.)



	<i>BE</i>	<i>Be</i>	<i>bE</i>	<i>be</i>
<i>BE</i>	<i>BBEE</i>	<i>BBEe</i>	<i>BbEE</i>	<i>BbEe</i>
<i>Be</i>	<i>BBEe</i>	<i>BBee</i>	<i>BbEe</i>	<i>Bbee</i>
<i>bE</i>	<i>BbEE</i>	<i>BbEe</i>	<i>bbEE</i>	<i>bbEe</i>
<i>be</i>	<i>BbEe</i>	<i>Bbee</i>	<i>bbEe</i>	<i>bbee</i>

Black = 9
Brown = 3
yellow = 4

3.

In tomato plants, purple stems (P) are dominant to green stems (p), and red tomatoes (T) are dominant to yellow tomatoes (t). The two genes are located on separate chromosomes.

A purple-stemmed, red-tomato plant is crossed with a purple-stemmed, yellow-tomato plant. They produce:

Ratio
-
-
-
-
-
-
-
-
-
-

- 28 purple-stemmed, red-tomato plants
- 31 purple-stemmed, yellow-tomato plants
- 11 green-stemmed, red-tomato plants
- 9 green-stemmed, yellow-tomato plants

Option A

Cross options
A, B, C, D and
see which give
you a 3,3,1,1

Option B

yellow must be
a "tt" so in
answers there is only
1 option

The genetic composition of the parents is

P = purple T = red
 p = green t = yellow

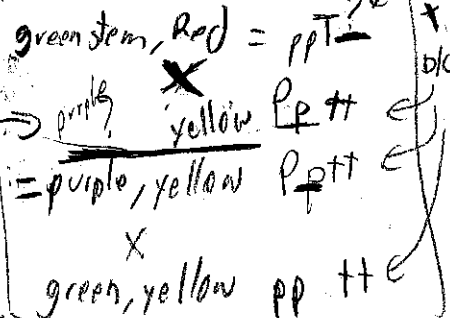
Parents
purple stem red = $P_T_?$
purple stem yellow = P_tt

- A. $PpTt$ and $PPTT$
- B. $PPTt$ and $PpTT$
- C. $PpTt$ and $PpTt$
- D. $PpTt$ and $Pppt$**

4. One of the green-stemmed, red-tomato plants was crossed with another tomato plant. One of the offspring was a purple-stemmed, yellow-tomato plant. If this offspring were crossed with a green-stemmed, yellow-tomato plant, then the possible phenotype or phenotypes of the offspring would be

- A. green-stemmed, yellow-tomato plants
- B. green-stemmed, yellow-tomato plants and purple-stemmed, yellow-tomato plants**
- C. green-stemmed, yellow-tomato plants; purple-stemmed, yellow-tomato plants; and purple-stemmed, red-tomato plants
- D. green-stemmed, yellow-tomato plants; purple-stemmed, yellow-tomato plants; purple-stemmed, red-tomato plants; and green-stemmed, red-tomato plants

not all
offspring were
purple so NOT
PP



what we do know

Since an offspring from first set of parents had purple, this means 2nd parent had purple in it.

5. Mouse colour is determined by the interaction two different genes that assort independently. The presence of a dominant allele from each gene results in a black colouration. If the mice have at least one dominant grey allele but are missing a dominant black allele they will be grey. Any mouse homozygous recessive for the grey gene will be white in colour.

Black = B
brown = b
 BB = black
 G = grey
 Gg = grey

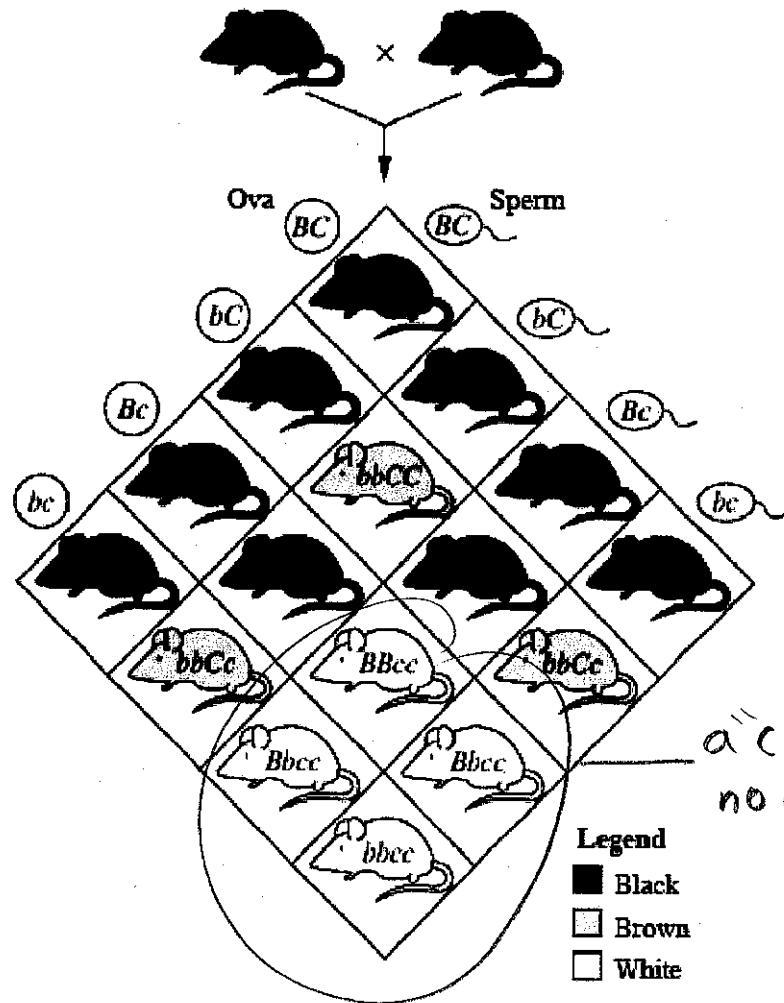
gg = white \rightarrow homozygous recessive

What is the expected phenotypic ratio that results from a cross between two black mice heterozygous for both genes?

Phenotypic Ratio: _____ : _____ : _____
Coat Colour: Black Brown White

mouse 1 $BbGg$ mouse 2 $BbGg$

Punnett Square for a Dihybrid Cross to Investigate Coat Colour in Mice



a "cc" means no colour shown (white)

Legend
 ■ Black
 □ Brown
 □ White

Coat colour in mice is controlled by the interaction of two genes. Three phenotypes result: black coat, brown coat, and white coat.

—from Campbell, 1993

6. What is the expected phenotypic ratio resulting from a cross between a $bbCc$ female mouse and $BbCc$ male mouse?

Phenotypic Ratio: $\frac{3}{8}$: $\frac{3}{8}$: $\frac{2}{8}$
 Coat Colour: Black : Brown : White

white - $\frac{2}{8}$
 Brown - $\frac{3}{8}$
 Black - $\frac{3}{8}$

← If has
 - "cc" = white
 - Bb or BB = Black
 - bb and Cc or CC = Brown

	bC	bc
Bc	BbCC	BbCc
Bc	BbCc	Bbcc
bC	bbCC	bbCc
bc	bbCc	bbcc