

# Exam 4 (mostly practice problems)

What is Mendel's model organism and why.

*Pisum sativum*

- self fertilizing
- easy to grow
- characteristics that are easy to see
- True breeding

What is the ratio for a monohybrid cross and a dihybrid cross?

3:1

9:3:3:1

Complete a dihybrid Punnett square and show the genotype and phenotypes for the cross between Heterozygous plants for yellow and round seeds. (GgWw)

	GW	Gw	gW	gw	
GW	GGWW	GGWw	GgWW	GgWw	1 GGWW
Gw	GGWw	GGww	GgWw	Ggww	2 GGWw
gW	GgWW	GgWw	ggWW	ggWw	2 GgWW
gw	GgWw	Ggww	ggWw	ggww	4 GgWw
					1 GGww
					2 Ggww
					1 ggWW
					2 ggWw
					1 ggww

9 yellow, round

3 yellow, wrinkled

3 green, round

1 green, wrinkled

1 ggWW

2 ggWw

1 ggww



Answer the following questions using this information:

A scientist completed an experiment and concluded that 269 of her plants were tall and yellow, 50 were tall and green, 52 were dwarf and yellow, and 31 were dwarf and green.

What is your Null hypothesis?

$H_0$ : This will fit Mendel's 9:3:3:1 Ratio.

What is your alternative hypothesis?

$H_a$ : This will NOT fit Mendel's 9:3:3:1 ratio.

What is the formula for Chi square?

$$\chi^2 = \sum \frac{(O - E)^2}{E}$$

Calculate the expected values for each plant.

$$269 + 50 + 52 + 31 = 402$$

$$402 \times 9/16 = 226.13$$

$$402 \times 3/16 = 75.38$$

$$402 \times 1/16 = 25.13$$

Calculate the chi value for this problem.

$$\frac{(269 - 226.13)^2}{226.13} = 8.13$$

$$\frac{(50 - 75.38)^2}{75.38} = 8.55$$

$$\frac{(52 - 75.38)^2}{75.38} = 7.25$$

$$\frac{(31 - 25.13)^2}{25.13} = 1.37$$

$$8.13 + 8.55 + 7.25 + 1.37 = \chi^2 = 25.3$$



Using the probability table, find the P value.

$$\chi^2 = 25.3$$

$$P = 0.01$$

Using this value, what can you conclude about this problem?

$P < 0.05$  so we reject the null hypothesis

What are the three types of mutations?

Loss of function: decrease wild type

gain of function: Increase wild type

Neutral: NO change

If I cross two pink snapdragons, what will be resulting offspring look like? What is this ratio and what is this called?

Red X White = Pink X Pink

	$R^1$	$R^2$
$R^1$	$R^1R^1$	$R^1R^2$
$R^2$	$R^2R^1$	$R^2R^2$

$$1 = R^1R^1$$

1 Red

$$2 = R^1R^2$$

2 Pink

$$1 = R^2R^2$$

1 White

Incomplete dominance



Describe codominance.

Both traits show

If two people with the blood types of  $I^A I^B$  and  $ii$  have kids, what could their blood types be?

$I^A$	$I^B$	
$i$	$I^A i$	$I^B i$
$i$	$I^A i$	$I^B i$

2 type B  
2 type A

Complete a Punnett square with two agouti mice with the following genes:  $AAy \times AAy$

$A$	$A^y$	
$A$	$AA$	$AA^y$
$A^y$	$AA^y$	$A^y A^y$

1 brown  
2 mice yellow