Heritability (continued)

Incomplete Dominance, Codominance

* So far we've looked at a monohybrid cross (cross dealing with just one trait). All of these crosses have dealt with completed dominance, where one trait totally masked another.

Incomplete Dominance

Occurs when 2 different alleles control a characteristic but neither is dominant, and both are **partly** expressed in the phenotypes.

Example

* In Japanese flowers, pink flower colour is an incomplete dominant trait. Red flowers crossed with white flowers will produce pink flowers.

Example

* This means that there is THREE phenotypes for flowers
  * Red (RR)
  * Pink (RW)
  * White (WW)

Example

* Find the genotypic and phenotypic ratio of a cross between:
  * A Red flower crossed with a Red flower

Example

* Red flower (RR) x Red flower (RR)

Example

* Red flower (RR) x Red flower (RR)

	R	R
R		
R		

Example

* Red flower (RR) x Red flower (RR)

	R	R
R	RR	RR
R	RR	RR

Example

* Red flower (RR) x Red flower (RR)

Genotype of offspring:
-All offspring will be RR

Phenotype of offspring
-All offspring will be red

	R	R
R	RR	RR
R	RR	RR

Example

* Find the genotypic and phenotypic ratio of a cross between:
  * A Red flower crossed with a Pink flower

Example

* Red flower (RR) x Pink flower (RW)

Example

* Red flower (RR) x Pink flower (RW)

	R	W
R		
R		

Example

	R	W
R	RR	RW
R	RR	RW

Example

Genotype of offspring:
-All offspring will be RR or RW

Phenotype of offspring
-50% red, 50% pink

	R	W
R	RR	RW
R	RR	RW

Example

* Pink flower (RW) x Pink flower (RW)

Example

* Pink flower (RW) x Pink flower (RW)

	R	W
R		
W		

Example

	R	W
R	RR	RW
W	RW	WW

Example

Genotype of offspring:
-25% RR, 25% WW,
50% RW

Phenotype of offspring
-25% red, 50% pink,
25% white

	R	W
R	RR	RW
W	RW	WW

Co-dominance

* Occurs when 2 different alleles control a characteristic but neither is dominant, and both are fully expressed in the phenotypes.

Example

In some chickens, feather colour is co-dominant. Chickens can be black (BB), white (WW), or have both black and white feathers

Example

* Grey chicken (BW) x Grey chicken (BW)

Example

* Grey chicken (BW) x Grey chicken (BW)

	B	W
B		
R		

Example

	B	W
B	BB	BW
W	BW	WW

Example

Genotype of offspring:
-25% BB, 25% WW, 50% BW

Phenotype of offspring
-25% black, 25% white, 50% black and white

	B	W
B	BB	BW
W	BW	WW

Spongebob Squarepants Genetics

Question 4

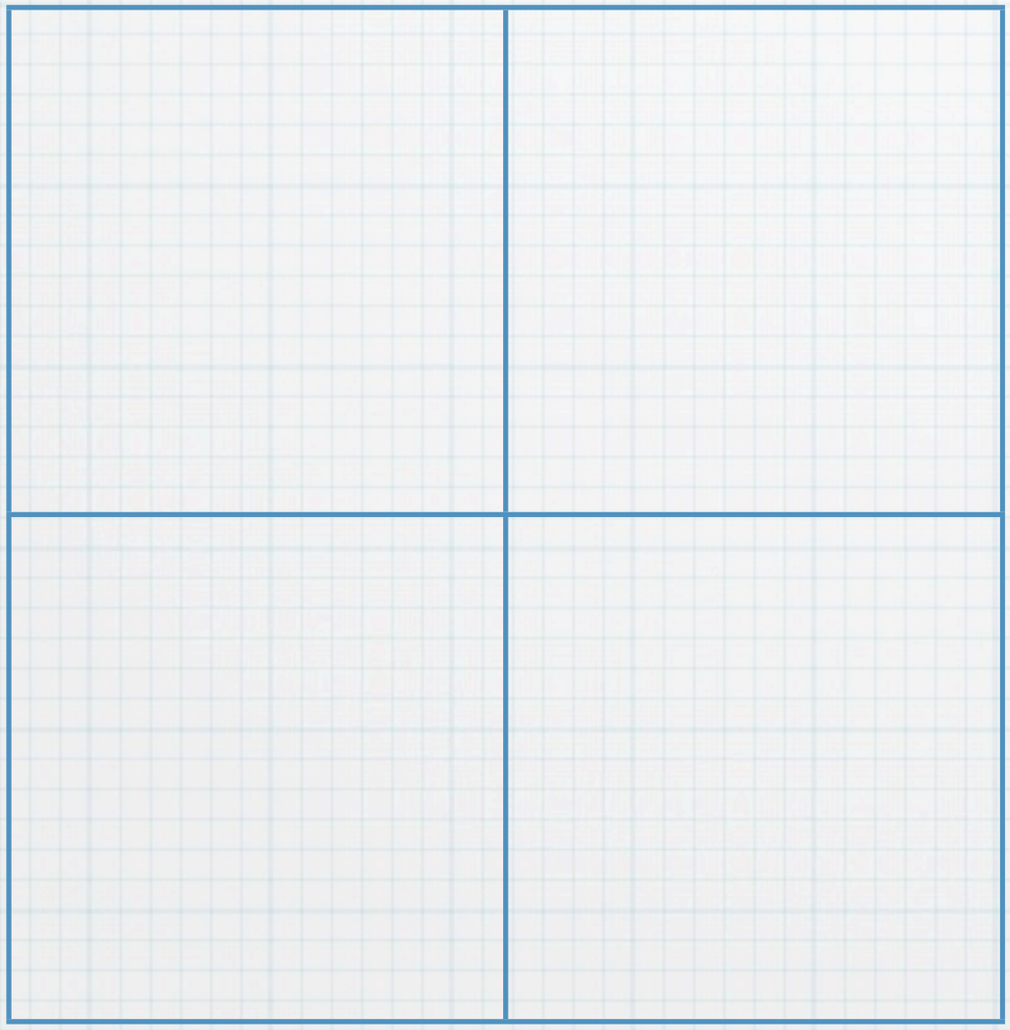
* 4. SpongeBob SquarePants recently met SpongeSusie Roundpants at a dance. SpongeBob is heterozygous for his square shape, but SpongeSusie is round. Create a Punnett square to show the possibilities that would result if SpongeBob and SpongeSusie had children. Square shape (S) is dominant to round (s)

Spongebob: Ss
Suzie: ss

S s

S

S



Spongebob: Ss
Suzie: ss

	S	s
s	Ss	ss
s	Ss	ss

Spongebob: Ss
Suzie: ss

	S	s
s	Ss	ss
s	Ss	ss

Genotypes of children: Ss, ss

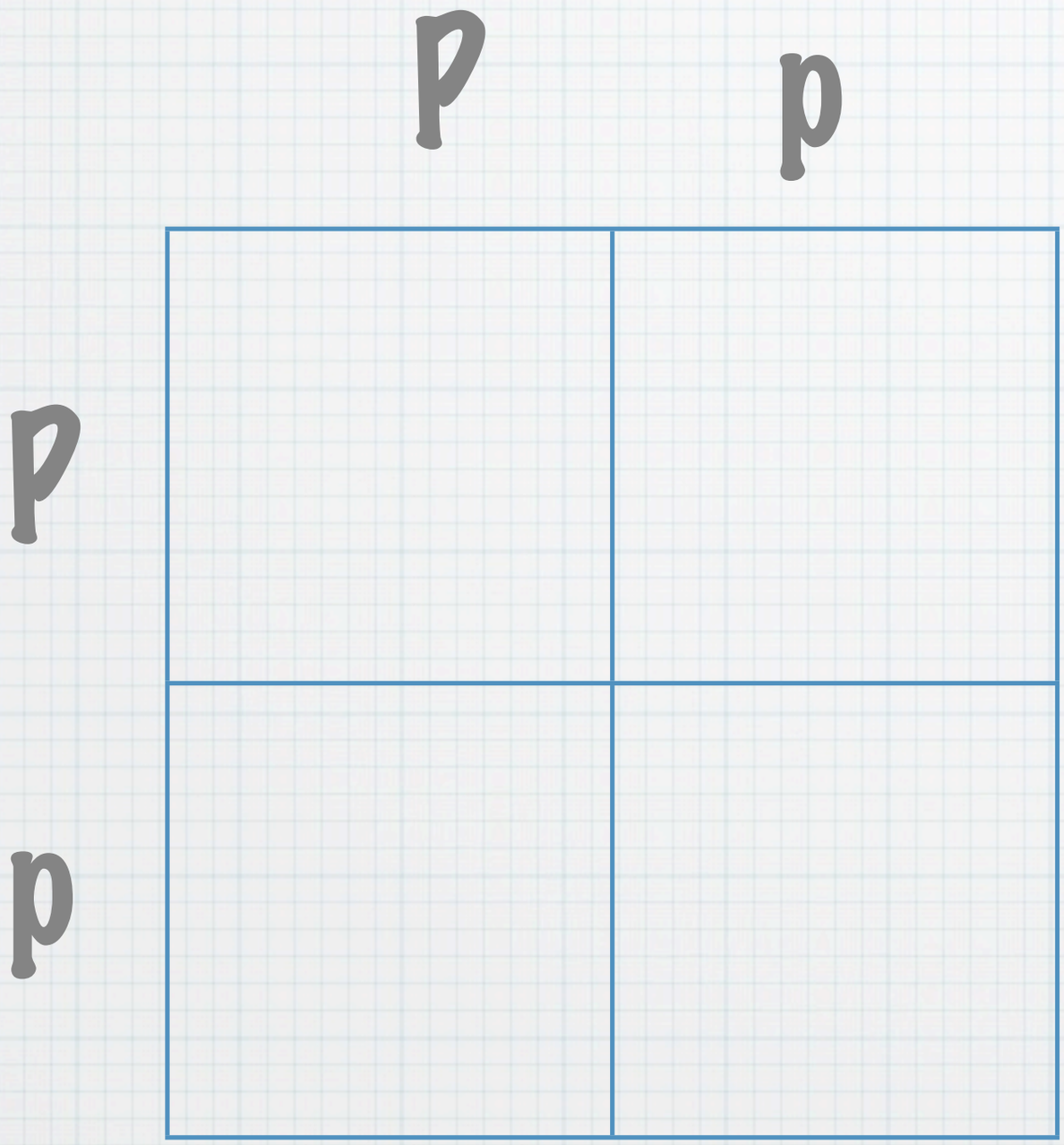
Phenotypes of children:
Square, round

50% chance of being round,
50% chance of being square

Question 5

* 5. Patrick met Patti at the dance. Both of them are heterozygous for their pink body color, which is dominant over a yellow body color. Create a Punnett square to show the possibilities that would result if Patrick and Patti had children. Pink (P) is dominant to yellow (p).

Patrick: Pp
Patti: Pp



Patrick: Pp
Patti: Pp

	P	p
p	PP	Pp
p	Pp	pp

Patrick: Pp
Patti: Pp

	P	p
P	PP	Pp
p	Pp	pp

Genotypes of children: PP, Pp, pp

Phenotypes of children: Pink, yellow

75% chance of being pink,
25% chance of being yellow

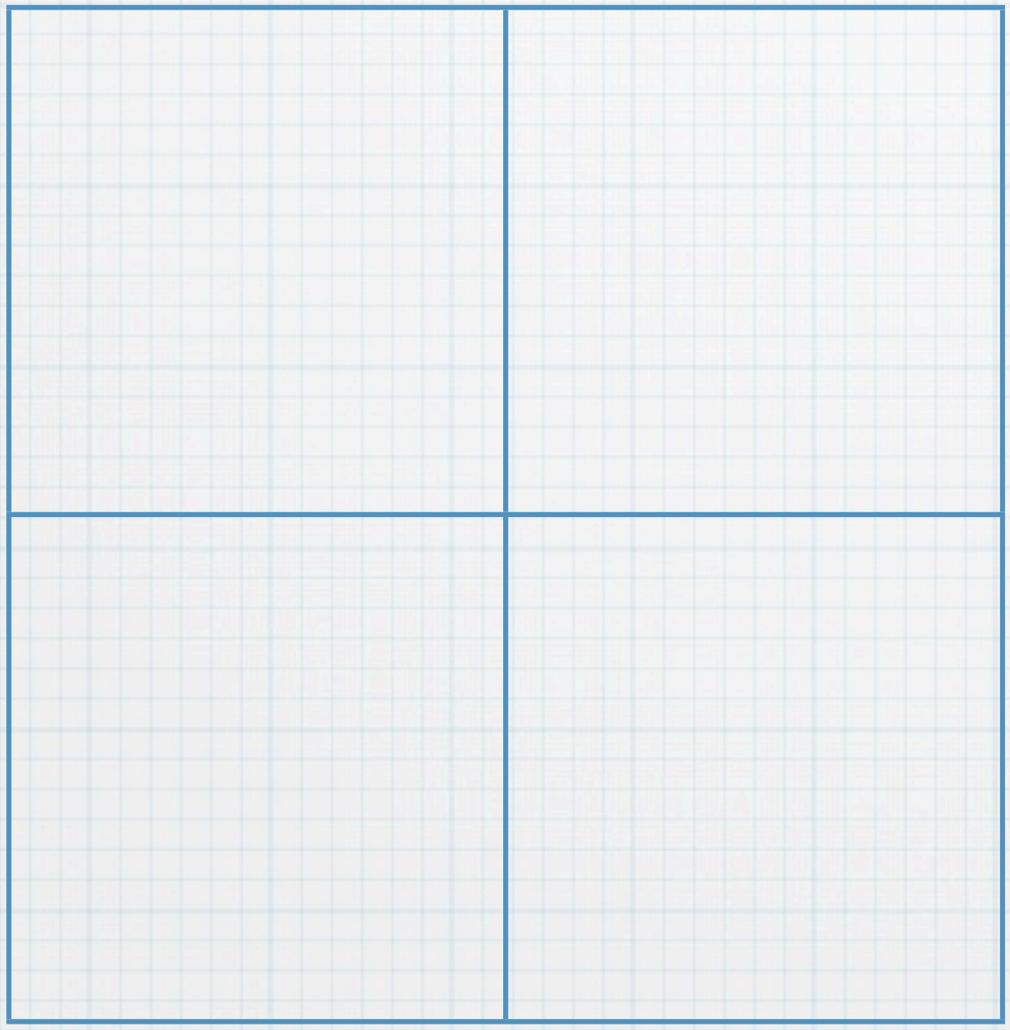
Question 6

* Everyone in Squidward's family has light blue skin, which is the dominant trait for body color in his hometown of Squid Valley. His family brags that they are a "purebred" line. He recently married a nice girl who has light green skin, which is a recessive trait. Create a Punnett square to show the possibilities that would result if Squidward and his new bride had children. Use B to represent the dominant gene and b to represent the recessive gene.

Squidward: BB
Lady friend: bb

B B

b



b

Squidward: BB
Lady friend: bb

	B	B
b	Bb	Bb
b	Bb	Bb

Squidward: BB
Lady friend: bb

	B	B
b	Bb	Bb
b	Bb	Bb

Genotypes of children: Bb

Phenotypes of children: Blue skin

100% chance of being blue

Question 7

* 7. Assume that one of Squidward's sons, who is heterozygous for the light blue body color, married a girl that was also heterozygous. Create a Punnett square to show the possibilities that would result if they had children.

Squidward's son: Bb
Lady friend: Bb

	B	b
B		
b		

Squidward's son: Bb
Lady friend: Bb

	B	b
B	BB	Bb
b	Bb	bb

Genotypes of children: BB, Bb, bb

Phenotypes of children: Blue skin, green skin

75% chance of being blue, 25% being green

Question 8

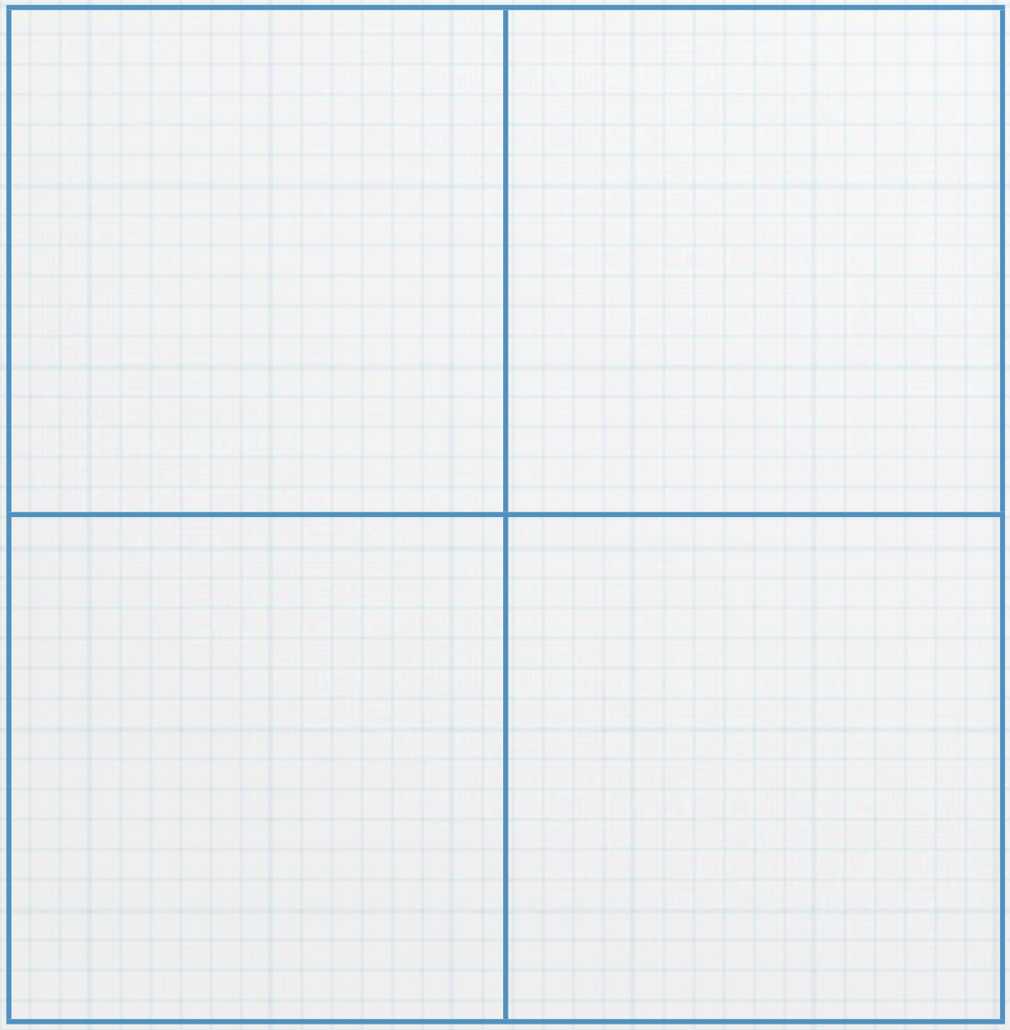
* Mr. Krabbs and his wife recently had a Lil' Krabby, but it has not been a happy occasion for them. Mrs. Krabbs has been upset since she first saw her new baby who had short eyeballs. She claims that the hospital goofed and mixed up her baby with someone else's baby. Mr. Krabbs is homozygous for his tall eyeballs, while his wife is heterozygous for her tall eyeballs. Some members of her family have short eyes, which is the recessive trait. Create a Punnett square using T for the dominant gene and t for the recessive one.

Mr. Krabs: TT
Mr. Krabs' wife: Tt

T T

T

t



Mr. Krabs: TT
Mr. Krabs' wife: Tt

	T	T
T	TT	TT
t	Tt	Tt

Genotypes of children: TT, Tt

Phenotypes of children: Tall eyeballs