Simple Genetics Practice Problems

Name KEY

1. For each genotype, indicate whether it is heterozygous (HE) or homozygous (HO)

AA HO	Ee HE	Ii HE	Mm HE
Bb HE	ff HO	Jj HE	nn HO
Cc HE	GG HO	kk HO	OO HO
Dd HE	HH HO	Ll HE	Pp HE

2. For each of the genotypes below, determine the phenotype.

Purple flowers are dominant to white flowers

PP purple
Pp purple
pp white

Brown eyes are dominant to blue eyes

BB brown
Bb brown
bb blue

Round seeds are dominant to wrinkled

RR Round
Rr Round
rr wrinkled

Bobtails are recessive (long tails dominant)

TT long
Tt long
tt bobtails

3. For each phenotype, list the genotypes. (Remember to use the letter of the dominant trait)

Straight hair is dominant to curly.

SS straight
Ss straight
ss curly

Pointed heads are dominant to round heads.

PP pointed
Pp pointed
pp round

4. Set up the square for each of the crosses listed below. The trait being studied is round seeds (dominant) and wrinkled seeds (recessive)

Rr x rr

	R	r
r	Rr	rr
r	Rr	rr

What percentage of the offspring will be round?
50%.

Rr x Rr

	R	r
R	RR	Rr
r	Rr	rr

What percentage of the offspring will be round?

~~75%~~

RR x Rr

	R	R
R	RR	RR
r	Rr	Rr

What percentage of the offspring will be round?

~~100%~~

Practice with Crosses. Show all work!

5. A TT (tall) plant is crossed with a tt (short plant). What percentage of the offspring will be tall? ~~100%~~

	T	T
t	Tt	Tt
t	Tt	Tt

6. A Tt plant is crossed with a Tt plant. What percentage of the offspring will be short?

~~25%~~

	T	t
T	TT	Tt
t	Tt	tt

7. A heterozygous round seeded plant (Rr) is crossed with a homozygous round seeded plant (RR). What percentage of the offspring will be homozygous (RR)? ~~50%~~

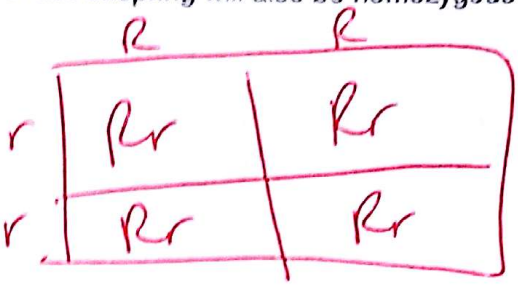
	R	r
R	RR	Rr
R	RR	Rr

RR rr

8. A homozygous round seeded plant is crossed with a homozygous wrinkled seeded plant. What are the genotypes of the parents?

RR x rr

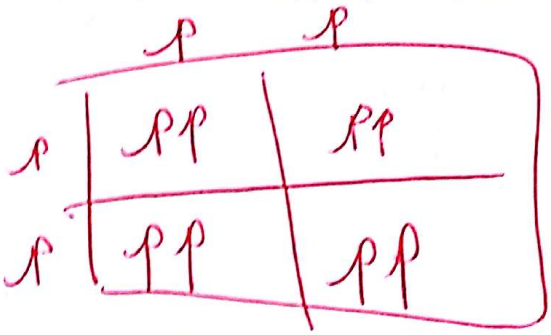
What percentage of the offspring will also be homozygous? 0%



pp

9. In pea plants purple flowers are dominant to white flowers. If two white flowered plants are cross, what percentage of their offspring will be white flowered?

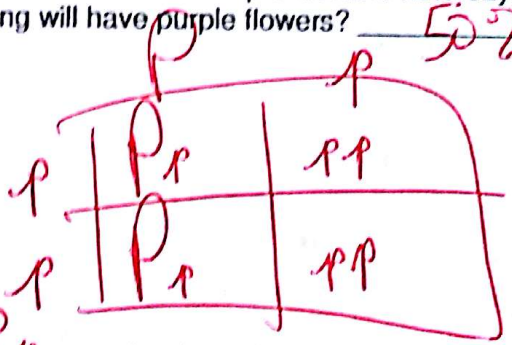
100%



Pp

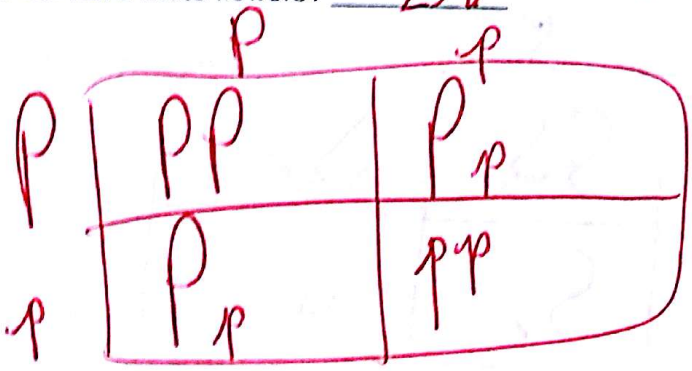
pp

10. A white flowered plant is crossed with a plant that is heterozygous for the trait. What percentage of the offspring will have purple flowers? 50%

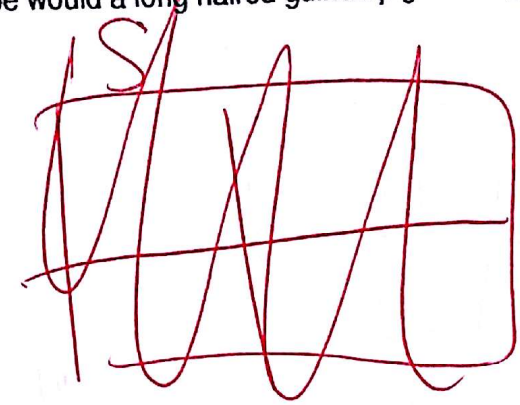


P p

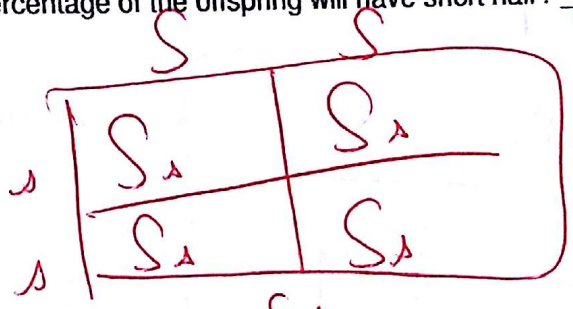
11. Two plants, both heterozygous for the gene that controls flower color are crossed.
What percentage of their offspring will have purple flowers? 75%
What percentage will have white flowers? 25%



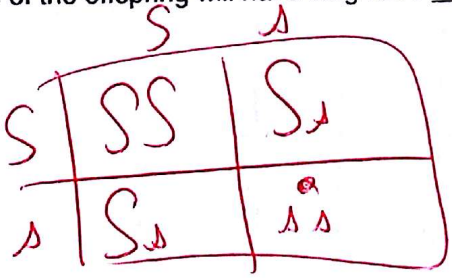
12. In guinea pigs, the allele for short hair is dominant. What genotype would a heterozygous short haired guinea pig have? Ss
What genotype would a purebreeding short haired guinea pig have? SS
What genotype would a long haired guinea pig have? ss



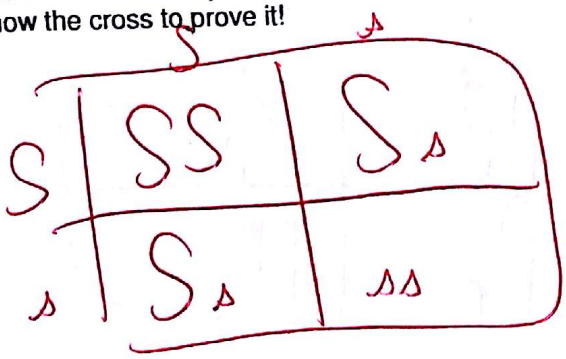
13. Show the cross for a pure breeding short haired guinea pig and a long haired guinea pig. What percentage of the offspring will have short hair? 100%



14. Show the cross for two heterozygous guinea pigs. What percentage of the offspring will have short hair? 75%
What percentage of the offspring will have long hair? 25%



15. Two short haired guinea pigs are mated several times. Out of 100 offspring, 25 of them have long hair. What are the probable genotypes of the parents? Ss x Ss Show the cross to prove it!



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Mendel's Pea Plants

Gregor Mendel experimented with pea plants in a garden. He would take the male part of the flower called the anther which produces pollen and the female part of the flower called the carpel which has an ovary containing ovules. Mendel had several stocks of true-breeding pea plants. The true-breeding (homozygous) pea plants were allowed to self-pollinate and produce offspring identical to the parent pea plants. The true-breeding pea plants let Mendel control his experiment when he cross pollinated a green seed pea plant with a yellow seed pea plant. He cross pollinated the pea plants by taking pollen from the green seed stock, and fertilize the flowers of the yellow seed stock. He fertilized the flowers by brushing the pollen from the flower of yellow pea plants and wiping the pollen on the carpel of green seed pea plants. This process is known as cross-pollination where the seeds came from two different plants. Mendel studied seven different pea plant traits, plant height, the position of the flowers, pea pod shape, pea pod color, seed shape, seed color, and flower color.

1) Why was it important for Mendel to use true-breeding pea plants? (hint: scientific method) So only variable is changed at a time

2) What is a cross-pollination of pea plants? 2 different plants contribute sperm & egg

Mendel crossed the pea plants with contrasting traits, like tall plants and short plants, and studied their offspring. The original pair of plants is called the P (parental) generation. The offspring is called the F_1 (first finial) generation. Offspring from parents of different or contrasting traits are called hybrids. When Mendel crossed the two P generation plants, all the F_1 generations had characteristics from the P generation. Of all the F1 generation plants, only one of the characteristics was expressed and the other characteristic seemed to be lost. Mendel learned two things from these crosses: inheritance of traits (genes) is passed from one generation to the next and the principle of dominance. Alleles are usually genetic code for a gene found in a certain location on a chromosome.

3) Explain how Mendel used the F1 generation to conclude that genes are inherited. The F1 generation had characteristics of the P generation

4) Why did only one of the parent's characteristic for a trait was expressed and the other seemed to be lost. The expressed characteristic was dominant The lost characteristic was recessive

Scientists today study heredity by using Punnett squares. Alleles may be represented as two letters because the plant or animal has two sets of genes, one from their father and one from their mother. When the two letters are the same, either both capitol T T or both lower case t t , they are called homozygous. When the two letters are opposite, they are called heterozygous. Since Mendel use true-bred pea plants, the purple flowers alleles are T T. The white flower alleles are t t. Fill in the Punnett square below of the trait flower color for two true-breading pea plants.

	t	t
T	Tt	Tt
T	Tt	Tt

Purple = dominant
White = recessive

5) After looking at the punnett square and using the vocabulary terms above, why were all the offspring in the F_1 generation showing the dominant characteristic?

All of the offspring were heterozygous.

6) Any time you have a capital letter in one or both alleles, the dominant form of the trait is expressed. Only when you have both alleles as lower case letters does the recessive form of the trait expressed. In the Punnett square above, do all of the offspring express the purple or white flowers? Purple

Since the offspring in the F_1 generation only displayed one of the parent's characteristic, Mendel did not know what happened to the other. He decided to cross two of the offspring of the F_1 generation to create a F_2 generation. Analogy: P = parents, F_1 = kids, F_2 = grandkids of pea plants. Mendel noticed something very different in the F_2 generation. Please fill in the two punnett squares below of three generations, from the true-bred P generation to F_2 generation. The plants from the F1 generation were allowed to self-pollinate.

Use the offspring in the F1 generation to self-pollinate to create the parents of the F2 generation.

	t	t
T	Tt	Tt
T	Tt	Tt

F_1

	T	t
T	TT	Tt
t	Tt	tt

F_2

Purple = dominant
White = recessive

When a homozygous dominant plant is crossed with a homozygous recessive plant, all the offspring are heterozygous and express the dominant characteristic of the trait. But when the plants in the F_1 generation are allowed to self-pollinate, a few of the recessive plants reappear in the F_2 generation. Mendel hypothesized that alleles segregate from each other during formation of gametes (seeds). This means one of each paired chromosomes go into each seed or only one letter from each parent goes into each square (offspring) of a Punnett square. Mendel's hypothesis became the law of segregation.

7) Explain how Punnett squares use the law of segregation. Alleles separate into gametes, which are along the type or side of the punnett square

An organism's physical appearance of the traits are called a phenotype. Mendel studied pea plants traits including seed color. For the trait seed color, its phenotype would be either yellow or green. The genotype is the genes responsible for the phenotype. A diploid organism has two copies of each chromosome and this is why there are two alleles make up the individual's genotype. Now that you have learned how to distinguish between genotype and phenotype, you can determine their ratio or probability. The genotypic ratio is written using numbers that start with homozygous dominant, then heterozygous, then homozygous recessive. An example genotypic ratio looks like 2:2:0.

	T	t
T	TT	Tt
t	Tt	tt

Yellow seed = dominant
Green seed = recessive

8) Use the Punnett square above to answer the questions below?

All possible genotypes? TT, Tt or tt

All possible phenotypes? yellow, green seed

Genotypic ratio? 1:2:1 Phenotypic ratio? 3:1

Pea Plant Crosses

Fill in the following punnett squares and match the punnett square with the probabilities in the following questions. First, determine who was the parents then determine the possible ratios for the offspring. Each punnett square may be used more than once.

Write the letter A, B, C, or D for the Punnett square that would represent the each cross.

(A)

	t	t
T	Tt	Tt
T	Tt	Tt

(B)

	T	t
T	TT	Tt
t	Tt	tt

(C)

	T	T
T	TT	TT
t	Tt	Tt

(D)

	T	t
t	Tt	tt
t	Tt	tt

B 9) Mendel crossed dominant tall plants with tall plants. The results in the F_1 generation were 84 tall plants and 29 recessive short plants.

D 10) Mendel crossed dominant axial flower position plants with recessive terminal flower position plants. The results in the F_1 generation were 15 axial flower plants and 17 terminal flower plants.

A 11) Mendel crossed dominant green pod plants with recessive yellow pod plants. The results in the F_1 generation were 40 green pod plants and 0 yellow pod plants.

C 12) Mendel crossed dominant smooth pod plants with smooth pod plants. The results in the F_1 generation were 51 smooth pod plants and 0 recessive constricted pod plants.

D 13) Mendel crossed dominant purple flower plants with recessive white flower plants. The results in the F_1 generation were 206 purple flower plants and 197 white flower plants.

B 14) Mendel crossed dominant gray seed coat plants with dominant gray seed coat plants. The results in the F_1 generation had a ratio of 3 gray coat plants to every one recessive white seed coat plants.

C 15) Mendel crossed dominant yellow seed plants with dominant yellow seed plants. The results in the F_1 generation were all yellow seed plants and no recessive green seed plants. The results in the F_2 generation were 714 yellow seed plants and 106 green seed plants.

A 16) Mendel crossed dominant round seed plants with recessive wrinkled seed plants. The results in the F_1 generation were all round seed plants and no wrinkled seed plants. The results in the F_2 generation were 318 round seed plants and 121 wrinkled seed plants.

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Pea Plant Punnett Square Worksheet

1) Yellow seeds are dominant over green seeds in pea plants. Fill in the Punnett square and determine the expected genotypic and phenotypic ratios from crossing homozygous recessive and homozygous dominant parents.

yy YY

	Y	Y
y	Yy	Yy
y	Yy	Yy

Genotypes: Yy Genotypic Ratio: 0:4:0

Phenotypes: yellow Phenotypic Ratio: 4:0

2) Green pod color is dominant over yellow pod color in pea plants. Fill in the Punnett square and determine the expected genotypic and phenotypic ratios from crossing homozygous dominant and heterozygous parents.

GG

Gg

	G	G
G	GG	GG
g	Gg	Gg

Genotypes: GG and Gg Genotypic Ratio: 2:2:0

Phenotypes: green Phenotypic Ratio: 4:0

3) Round seeds are dominant over wrinkled seeds in pea plants. Fill in the Punnett square and determine the expected genotypic and phenotypic ratios from crossing homozygous recessive and heterozygous parents.

	r	r
R	Rr	Rr
r	rr	rr

Genotypes: Rr and rr Genotypic Ratio: 0:2:2

Phenotypes: Round + wrinkled Phenotypic Ratio: 2:2

4) Smooth pod shape is dominant over constricted pod shape in pea plants. Fill in the Punnett square and determine the expected genotypic and phenotypic ratios from crossing homozygous recessive and homozygous dominant parents.

	s	s
S	Ss	Ss
S	Ss	Ss

Genotypes: Ss Genotypic Ratio: 0:4:0

Phenotypes: Smooth Phenotypic Ratio: 4:0

5) Tall pea plants are dominant over short pea plants. Fill in the Punnett square and determine the expected genotypic and phenotypic ratios from crossing heterozygous and heterozygous dominant parents.

	T	t
T	TT	Tt
t	Tt	tt

Genotypes: TT, Tt and tt Genotypic Ratio: 1:2:1

Phenotypes: tall and short Phenotypic Ratio: 3:1

6) The axial flower position is dominant over the terminal flower position. Fill in the Punnett square and determine the expected genotypic and phenotypic ratios from crossing heterozygous and homozygous dominant parents.

	A	A
A	AA	AA
a	Aa	Aa

Genotypes: Aa and AA Genotypic Ratio: 2:2:0

Phenotypes: axial Phenotypic Ratio: 4:0

7) Gray seed coat color is dominant over white seed coat color. Fill in the Punnett square and determine the expected genotypic and phenotypic ratios from crossing homozygous dominant and homozygous dominant parents.

	G	G
G	GG	GG
G	GG	GG

Genotypes: GG Genotypic Ratio: 4:0:0

Phenotypes: gray Phenotypic Ratio: 4:0

8) Tall pea plants are dominant over short pea plants. Fill in the Punnett square and determine the expected genotypic and phenotypic ratios from crossing homozygous recessive and homozygous recessive parents.

	t	t
t	tt	tt
t	tt	tt

Genotypes: tt Genotypic Ratio: 0:0:4

Phenotypes: short Phenotypic Ratio: 0:4

Bikini Bottom Genetics Name _____

Scientists at Bikini Bottoms have been investigating the genetic makeup of the organisms in this community. Use the information provided and your knowledge of genetics to answer each question.

1. For each genotype below, indicate whether it is a heterozygous (He) OR homozygous (Ho).

TT Ho Bb He DD Ho Ff He tt Ho dd Ho

Dd He ff Ho Tt He bb Ho BB Ho FF Ho

Which of the genotypes in #1 would be considered purebred? TT, ff, DD, bb, ff, BB, FF, dd

Which of the genotypes in #1 would be hybrids? Dd, Bd, Tt, Ff,

2. Determine the phenotype for each genotype using the information provided about SpongeBob.

Yellow body color is dominant to blue.

YY yellow Yy yellow yy blue

Square shape is dominant to round.

SS Square Ss Square ss round

3. For each phenotype, give the genotypes that are possible for Patrick.

A tall head (T) is dominant to short (t).

Tall = TT or Tt Short = tt

Pink body color (P) is dominant to yellow (p).

Pink body = PP or Pp Yellow body = pp

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. HINT: Read question #2!

	S	s
s	Ss	ss
s	Ss	ss

A. List the possible genotypes and phenotypes for their children.

Ss or ss / Square or round

B. What are the chances of a child with a square shape? 2 out of 4 or 50 %

C. What are the chances of a child with a round shape? 2 out of 4 or 50 %

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. HINT: Read question #3!

	P	p
P	PP	Pp
p	Pp	pp

A. List the possible genotypes and phenotypes for their children.

PP or Pp = Pink / pp = yellow

B. What are the chances of a child with a pink body? 3 out of 4 or 75 %

C. What are the chances of a child with a yellow body? 1 out of 4 or 25 %

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.

	B	B
b	Bb	Bb
b	Bb	Bb

A. List the possible genotypes and phenotypes for their children.

all Bb = blue

B. What are the chances of a child with light blue skin? 100 %

C. What are the chances of a child with light green skin? 0 %

D. Would Squidward's children still be considered purebreds? Explain!

No, they would be hybrids b/c their parents are different

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.

	B	b
B	BB	Bb
b	Bb	bb

A. List the possible genotypes and phenotypes for their children.

BB or Bb = blue, bb = green

B. What are the chances of a child with light blue skin? 75 %

C. What are the chances of a child with light green skin? 25 %

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.

	T	T
T	TT	TT
t	Tt	Tt

A. List the possible genotypes and phenotypes for their children.

TT or Tt = tall

B. Did the hospital make a mistake? Explain your answer.

Yes, they could only have a short-eyed baby if both parents were heterozygous.

Bikini Bottom Genetics 2 Name _____

Use your knowledge of genetics to complete this worksheet.

1. Use the information for SpongeBob's traits to write the phenotype (physical appearance) for each item.

Characteristic	Dominant Gene	Recessive Gene
Body Shape	Squarepants (S)	Roundpants (s)
Body Color	Yellow (Y)	Blue (y)
Eye Shape	Round (R)	Oval (r)
Nose Style	Long (L)	Stubby (l)

(a) LL- long (e) Rr- round

(b) yy- blue (f) ll- stubby

(c) Ss- ~~non~~ Squarepants (g) ss- round pants

(d) RR - round (h) Yy - yellow

2. Use the information in the chart in #1 to write the genotype (or genotypes) for each trait below.

(a) Yellow body - YY or Yy (e) Stubby nose - ll

(b) Roundpants - ss (f) Round eyes - RR or Rr

(c) Oval eyes - rr (g) Squarepants - SS or Ss

(d) Long nose - LL or Ll (h) Blue body - yy

3. Determine the genotypes for each using the information in the chart in #1.

(a) Heterozygous round eyes - Rr (c) Homozygous long nose - LL

(b) Purebred squarepants - SS (d) Hybrid yellow body - Yy

4. One of SpongeBob's cousins, SpongeBillyBob, recently met a cute squarepants gal, SpongeGerdy, at a local dance and fell in love. Use your knowledge of genetics to answer the questions below.

(a) If SpongeGerdy's father is a heterozygous squarepants and her mother is a roundpants, what is her genotype? Complete the Punnett square to show the possible genotypes that would result to help you determine Gerdy's genotype.

What is Gerdy's genotype? Ss

	S	s
s	Ss	ss
s	Ss	ss

(b) SpongeBillyBob is heterozygous for his squarepants shape. What is his genotype? Ss

(c) Complete the Punnett square to show the possibilities that would result if Billy Bob & Gerdy had children.

	S	s
S	SS	Ss
s	Ss	ss

(d) List the possible genotypes and phenotypes for the kids.

SS, and Ss are square, ss are roundpants

(e) What is the probability of kids with squarepants? 75 %

(f) What is the probability of kids with roundpants? 25 %

5. SpongeBob's aunt and uncle, SpongeWilma and SpongeWilbur, have the biggest round eyes in the family. Wilma is believed to be heterozygous for her round eye shape, while Wilbur's family brags that they are a pure line. Complete the Punnett square to show the possibilities that would result if SpongeWilma and SpongeWilbur had children.

(a) Give the genotype for each person. Wilma - Rr Wilbur - RR

(b) Complete the Punnett square to show the possibilities that would result if they had children.

	R	r
R	RR	Rr
R	RR	Rr

(c) List the possible genotypes and phenotypes for the kids.

RR and Rr are round

(d) What is the probability that the kids would have round eyes? 100 %

(e) What is the probability that the kids would be oval eyes? 0 %

6. SpongeBob's mother is so proud of her son and his new wife, SpongeSusie, as they are expecting a little sponge. She knows that they have a 50% chance of having a little roundpants, but is also hoping the new arrival will be blue (a recessive trait) like SpongeSusie and many members of her family. If SpongeBob is heterozygous for his yellow body color, what are the chances that the baby sponge will be blue? Create a Punnett square to help you answer this question.

Yy x yy

	Y	y
y	Yy	yy
y	Yy	yy

50% chance of a blue baby

7. SpongeBob's aunt is famous around town for her itty, bitty stubby nose! She recently met a cute squarepants fellow who also has a stubby nose, which is a recessive trait. Would it be possible for them to have a child with a regular long nose? Why or why not? Create a Punnett square to help you answer this question.

NO! There are no dominant alleles (L) in either parent which makes it impossible to have a child w/ a dominant allele

	l	l
l	ll	ll
l	ll	ll

100% stubby noses.

8. If SpongeBob's aunt described in #7 wanted children with long noses, what type of fellow would she need to marry in order to give her the best chances? Create a Punnett square to help you answer this question. She should marry a man w/ LL (a pure-breeding long nose family). Then 100% of her offspring will be long-nosed

Bikini Bottom Genetics
Incomplete Dominance

Name _____

SpongeBob loves growing flowers for his pal Sandy! Her favorite flowers, Poofkins, are found in red, blue, and purple. Use the information provided and your knowledge of incomplete dominance to complete each section below.

1. Write the correct genotype for each color if R represents a red gene and B represents a blue gene.

Red - RR Blue - BB Purple - RB

2. What would happen if SpongeBob crossed a Poofkin with red (RR) flowers with a Poofkin with blue (BB) flowers. Complete the Punnett square to determine the chances of each flower color.

	R	R
B	RB	RB
B	RB	RB

(a) Give the genotypes and phenotypes for the offspring. RB = purple

(b) How many of the plants would have red flowers? 0 %

(c) How many of the plants would have purple flowers? 100 %

(d) How many of the plants would have blue flowers? 0 %

3. What would happen if SpongeBob crossed two Poofkins with purple (RB) flowers? Complete the Punnett square to show the probability for each flower color.

	R	B
R	RR	RB
B	RB	BB

(a) Give the genotypes and phenotypes for the offspring. RR = red, RB = purple, BB = blue

(b) How many of the plants would have red flowers? 25%

(c) How many of the plants would have purple flowers? 50 %

(d) How many of the plants would have blue flowers? 25 %

4. What would happen if SpongeBob crossed a Poofkin with purple (RB) flowers with a Poofkin with blue (BB) flowers? Complete the Punnett square to show the probability for plants with each flower color.

	R	B
B	RB	BB
B	RB	BB

(a) Give the genotypes and phenotypes for the offspring.
RB = purple, BB = blue

(b) If SpongeBob planted 100 seeds from this cross, how many should he expect to have of each color?

Purple flowers - 50 Blue flowers - 50 Red flowers - 0

Worksheet created by T. Trimpe 2003 http://sciencespot.net/

SpongeBob and his pal Patrick love to go jellyfishing at Jellyfish Fields! The fields are home to a special type of green jellyfish known as Goobers and only really great jellyfishermen are lucky enough to catch some on every trip. Many of the jellyfish are yellow (YY) or blue (BB), but some end up green as a result of incomplete dominance. Use this information to help you complete each section below.

5. What would happen if SpongeBob and Patrick crossed two "goobers" or green jellyfish? Complete the Punnett square to help you determine the probability for each color of jellyfish. YB

	Y	B
Y	YY	YB
B	YB	BB

(a) Give the possible genotypes and phenotypes for the offspring.
YY=yellow, YB=green, BB=blue

(b) What percentage of the offspring would be yellow? 25 %

(c) What percentage would be blue? ~~50~~ 25 %

(d) What percentage would be "goobers" (green)? ~~25~~ 50 %

6. What would happen if they crossed a yellow jellyfish with a goober? Complete the Punnett square to help you determine the probability for each color of jellyfish. YY YB

	Y	Y
Y	YY	YY
B	YB	YB

(a) Give the possible genotypes and phenotypes for the offspring.
YY=yellow, YB=green

(b) What percentage of the offspring would be yellow? 50 %

(c) What percentage would be blue? 0 %

(d) What percentage would be "goobers" (green)? 50 %

7. What would happen if they crossed a blue jellyfish with a yellow jellyfish? Complete the Punnett square to help you answer the questions. BB YY

	Y	Y
B	YB	YB
B	YB	YB

If 100 jellyfish were produced from this cross, how many would you expect for each?

Yellow - 0 Blue - 0 Goobers - 100

8. What would happen if they crossed a blue jellyfish with a goober? Complete the Punnett square to help you answer the questions. BB YB

	B	B
Y	YB	YB
B	BB	BB

If 100 jellyfish were produced from this cross, how many would you expect for each?

Yellow - 0 Blue - 50 Goobers - 50

Monohybrid Crosses

Name _____

OOMPA LOOMPA GENETICS

SHOW WORK HERE!

KEY

GG = gray face

Gg = gray face

gg = orange face

1. OOmpas generally have gray faces, which is caused by a dominant gene. The recessive condition results in an orange face. Develop a "key" to show the possible genotypes and phenotypes for the OOmpah's face colors.

Gg x Gg

2. Two heterozygous OOmpahs are crossed. What proportion of the offspring will have orange faces? 1/4

	G	g
G	GG	Gg
g	Gg	gg

GG

3. A gray faced OOmpah (homozygous) is married to an orange faced Oompah. They have 8 Oompah children.
How many of those children will have gray faces? 100%

gg

4. Otis Oompah has an orange face is is married to Ona OOmpah who has a gray face. Gg They have 60 Oompah children, 30 of those children have orange faces. What is Ona and Otis OOmpah's genotype? gg x Gg Show the cross.

	G	g
g	Gg	gg
g	Gg	gg

GG

5. Odie Oompah has a gray face, in fact everyone in Odie's family has a gray face, and the family likes to brag that they are a "pure" line. Much to his family's horror, he married Ondi Oomah, who *gasp* has an orange face. gg
What will be the phenotypes of their children? ~~Gg~~ gray

What are the genotypes of the children? Gg

6. Ona Oompah (from #4) divorces Otis and marries Otto. Otto has an orange face. gg
What is the probability that Ona and Otto's children will have an orange face? 50%

gg x Gg

Monohybrid Crosses

Incomplete Dominance

7. OOmpahs can have red, blue, or purple hair. The allele that controls this trait is INCOMPLETELY DOMINANT, where purple hair is caused by the heterozygous condition. Show a "key" for the genotypes and phenotypes of hair color.

KEY

BB = blue

RR = red

RB = purple

RB

8. Orville Oompah has purple hair and is married to Opal Oompah who brags that she has the bluest blue hair in the valley. How many of Opal's children will be able to brag about their blue hair also. 50%
How many will take after their father? 50%

BB

	R	B
B	RB	BB
B	RB	BB

Incomplete Dominance

RR

9. One of Opal's children is born with shocking red hair. Is Orville Oompah the father of this child? Maybe
But wait, Opal swears that she has been faithful, she claims the hospital goofed and got her baby mixed with someone else's. Is Opal the mother of the red haired child?
NO

RR BB

10. Olga Oompah has red hair and marries Oliver Oompah who has blue hair. They have 32 children. What is the color of these children's hair? Purple

RB x RB

11. Olivia Oompah is married to Odo Oompah. Both of them have purple hair. They have 100 children. What is the hair color of their children and in what proportion?
Red 25 Blue 25 Purple 50

12. In the land of OOmpah, blue hair is highly valued. Blue haired OOmpahs get special benefits. Oscar Oompah has purple hair but he wants a wife that will give him children with blue hair. RB
What color hair should he look for in a wife? BB
If he can't find this type of Oompah what should be his second choice? RB

13. Ophelia Oompah is not married but she wants to have children. She goes to a fertility clinic where she is fertilized by an anonymous sperm donor. Ophelia has red hair. RR 5 months later, a litter of oompahs is born, of the eight babies in the litter, 4 of them have red hair, and 4 of them have purple hair. What color hair did the babies' father have? RB (Show the cross)

	R	R
R	RR	RR
B	RB	RB

14. Ophelia RR repeats the process a year later. This time she has a litter of 5 oompahs, all of which have purple hair. What was the father's hair color in this case? BB
(Show the cross)

	R	R
B	RB	RB
B	RB	RB

Dihybrid Crosses

GGBB ggRR

15. A homozygous gray faced, blue haired oompah named Ortimer marries an orange faced (homozygous) red haired oompah named Odette. GGBB x ggRR What will Ortimer and Odette's children look like? gray faced and purple haired

	GB	GB	GB	GB
gR	GgBR			
gR	GgBR			
gR	GgBR			
gR				

16. Two oompahs, both heterozygous for both traits are married. Out of 16 children, how many of each type would you expect?

GgBR x GgBR

	GB	GR	gB	gR
GB	GGBB	GGRB	GgBB	GgRB
GR	GGRB	GGRR	GgBR	GgRR
gB	GgBB	GgRB	ggBB	ggBR
gR	GgRB	GgRR	ggBR	ggRR

gray faced, red haired III = 3
gray faced, purple haired IIII I = 6
gray faced, blue haired III = 3
orange faced, red haired I = 1
orange faced, purple haired II = 2
orange faced, blue haired I = 1
16