Punnett Square

Name_____KEY_____ Date_____ Class_____

1. In humans, brown eyes are dominant over blue. A brown-eyed man marries a brown-eyed woman and they have 3 children, two of whom are brown-eyed and one of whom is blue- eyed. Draw the Punnett square that illustrates this marriage.

B= brown   b= blue

	B	b
B	BB	Bb
b	Bb	bb

What are the parent's genotypes? ___BB Bb_____

What are the possible genotypes of the children? _____1BB, 2Bb, 1bb_____

2. Cross a heterozygous long and black mouse with a homozygous recessive short and white mouse. Show the Punnett square and summarize the genotype and phenotype ratio.

L= long l= short B=black b=white

	LB	Lb	lB	lb
lb	LlBb	Llbb	llBb	llbb
lb	LlBb	Llbb	llBb	llbb
lb	LlBb	Llbb	llBb	llbb
lb	LlBb	Llbb	llBb	llbb

Ratio	Genotype	Phenotype
4/16	LlBb	Long, black
4/16	Llbb	Long, white
4/16	llBb	short, black
4/16	llbb	short, white

3. In peas, tall is dominant over short and red flower color is dominant over white. If two heterozygous tall, heterozygous red plants are crossed, what is the probability that the offspring will be tall and white? Show your work!

T= tall t= short R=red r=white

	TR	Tr	tR	tr
TR	TTRR	TTRr	TtRR	TtRr
Tr	TTRr	TTrr	TtRr	Ttrr
tR	TtRR	TtRr	ttRR	ttRr
tr	TtRr	Ttrr	ttRr	ttrr

Ratio	Genotype	Phenotype
1/16	TTRR	tall, red
2/16	TTRr	tall, red
2/16	TtRR	tall, red
1/16	TTrr	tall, white
4/16	TtRr	tall, red
2/16	Ttrr	tall, white
1/16	ttRR	short, red
2/16	ttRr	short, red
1/16	ttrr	short, white

Answer: 3/16 tall white = 19%

4. In Japanese four-o'clocks, predict the phenotype ratio of a cross between the following. Show your work!
   a. A red plant and a white plant.

	R	R
W	RW	RW
W	RW	RW

Ratio	Genotype	Phenotype
4/4	RW	Pink

   b. A white plant and a pink plant.

	W	W
R	RW	RW
W	WW	WW

Ratio	Genotype	Phenotype
2/4	RW	Pink
2/4	WW	White

c. A red plant and a pink plant.

	R	R
R	RR	RR
W	RW	RW

Ratio	Genotype	Phenotype
2/4	RR	Red
2/4	RW	Pink

d. Two pink plants.

	R	W
R	RR	RW
W	RW	WW

Ratio	Genotype	Phenotype
1/4	RR	Red
2/4	RW	Pink
1/4	WW	White

5. A woman homozygous for type A blood marries a man who is heterozygous for type B. What will be the possible genotypes and phenotypes for their children? Show your Work!

	I^A	I^A
I^B	I^{AB}	I^{AB}
I^O	I^{AO}	I^{AO}

Ratio	Genotype	Phenotype
2/4	I^{AB}	AB blood type
2/4	I^{AO}	A blood type

6. What is the probability that a couple whose blood types are AB and O will have a type A child?

	I^A	I^B
I^O	I^{AO}	I^{BO}
I^O	I^{AO}	I^{BO}

Ratio	Genotype	Phenotype
2/4	I^{AO}	A blood type
2/4	I^{BO}	B blood type

ANSWER: 50% for a child with type A

7. In squash, the allele for white fruits is dominant over the allele for yellow. If a white fruited plant is crossed with a yellow-fruited plant, and all of the offspring are white, what are the possible genotypes of the parents and the offspring?

	W	W
w	Ww	Ww
w	Ww	Ww

Ratio	Genotype	Phenotype
4/4	Ww	White

Parents: WW, ww

8. In race horses, black hair and trotting gait are dominant traits. Recessive traits are chestnut hair and pacing gait. The genes for hair color and gait are on two different chromosomes. Use a Punnett square to determine the possible offspring from a cross between two heterozygous black trotters.

B= black b= chestnut T=trotting t=pacing

	BT	Bt	bT	bt
BT	BBTT	BBTt	BbTT	BbTt
Bt	BBTt	BBtt	BbTt	Bbtt
bT	BbTT	BbTt	bbTT	bbTt
bt	BbTt	Bbtt	bbTt	bbt

Ratio	Genotype	Phenotype
1/16	BBTT	black, trotting
2/16	BBTt	black, trotting
2/16	BbTT	black, trotting
1/16	BBtt	black, pacing
4/16	BbTt	black, trotting
2/16	Bbtt	black, pacing
1/16	bbTT	chestnut, trotting
2/16	bbTt	chestnut, trotting
1/16	bbtt	chestnut, pacing

9. In fruit flies, the allele for normal size wings is dominant over the allele for vestigial wings. The allele for normal size eyes is dominant over the allele for small eyes. Use a Punnett square to predict the results of a cross between an individual that is heterozygous for both traits and one that is homozygous recessive for both traits.

V= normal v= vestigial S=normal s=small

	VS	Vs	vS	vs
vs	VvSs	Vvss	vvSs	vvss
vs	VvSs	Vvss	vvSs	vvss
vs	VvSs	Vvss	vvSs	vvss
vs	VvSs	Vvss	vvSs	vvss

Ratio	Genotype	Phenotype
4/16	VvSs	Normal, normal
4/16	Vvss	Normal, small
4/16	vvSs	Vestigial, normal
4/16	vvss	Vestigial, small