

Biology A

Name _____ Per _____

Symbols

Vocabulary terms you need to know: dominant, recessive, phenotype, genotype, homozygous, heterozygous, allele

Introduction: Like any language, the language of genetics consists of symbols and rules for using those symbols. For the purposes of this unit, a symbol for an allele consists of one letter. When a trait shows dominance, the capitalized first letter of the dominant form of the trait becomes its symbol. (In humans, for example, free ear lobes are the dominant form of earlobe shape. Attached ear lobes are recessive. Thus, F stands for free ear lobes.) For the recessive form of the same trait, the symbol remains the same but is not capitalized. (Thus f stands for attached ear lobes.)

The table below shows the forms of the traits Mendel studied in peas:

	stem height	coat color	pod color	seed color	seed shape	flower position
Dominant form	tall	colored	green	yellow	round	axial
Recessive form	short	white	yellow	green	wrinkled	terminal

1. Underline the first letter of each dominant form in the table above. Using the rules described above, complete the following chart of the traits Gregor Mendel studied in pea plants.

	stem height	coat color	pod color	seed color	seed shape	flower position
Dominant allele symbol	<u>T</u>	<u>C</u>	<u>G</u>	<u>Y</u>	<u>R</u>	<u>A</u>
Recessive allele symbol	t	c	g	y	r	a

2. Using the symbols from the table above, write the genotypes that would be present in the following phenotypes if they were all homozygous. Next, indicate whether they are dominant or recessive:

phenotype	genotype	Dom. or Rec.?
tall stemmed plants	<u>TT</u>	dom.
terminal flower position	<u>aa</u>	rec.
white seed coat	<u>cc</u>	rec.
wrinkled seed shape	<u>rr</u>	rec.
yellow pod color	<u>gg</u>	rec.
yellow seed color	<u>YY</u>	Dom.

True-breeding

3. Write the genotype of the following hybrids (also called heterozygotes).

phenotype	genotype
yellow seeded peas	Yy
axial flowers	Aa
green podded peas	Gg
colored seed coats	Cc
round seeds	Rr
tall stemmed seeds	Tt

4. Use Punnett squares to predict the genotypic and phenotypic ratios of the following parental cross.

$Tt \times Tt$

	T	t
T	TT tall	Tt tall
t	Tt tall	tt short

Genotypic ratio:
 $1:2:1$

Phenotypic ratio:
 $3:1$

5. Use Punnett squares to predict the genotypic and phenotypic ratios of the following parental cross.

homozygous wrinkled seeds x heterozygous round seeds

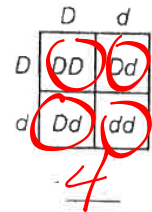
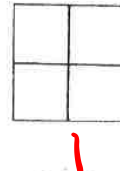
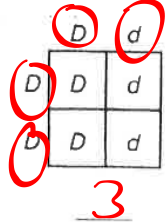
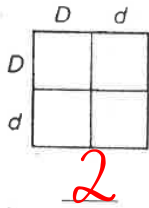
$rr \times Rr$

	R	r
r	Rr round	rr wrinkled
r	Rr round	rr wrinkled

Genotypic ratio:
 $0:2:2$

Phenotypic ratio:
 $2:2$

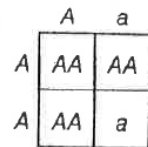
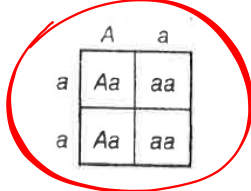
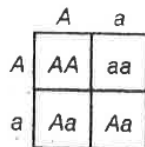
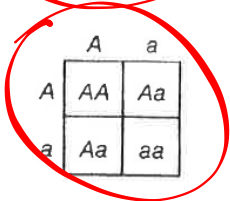
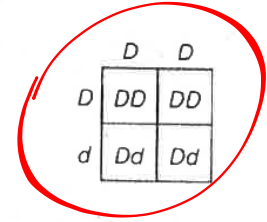
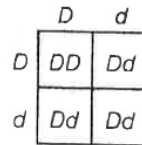
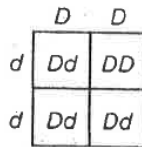
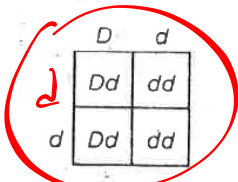
3. Examine the diagrams below. Each is a step in the Punnett square method. Put the steps in order by writing the numbers 1 to 4 below them on the correct blanks.



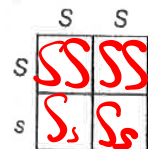
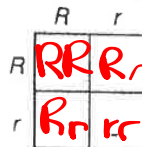
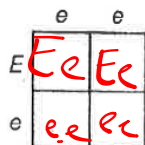
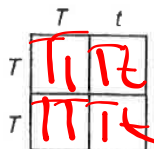
4. What do the letters outside the Punnett square stand for? gametes of parents

What do the letters inside each box stand for? genotypes of offspring

5. Examine the following Punnett squares and circle those that are correct.



6. Complete the following to determine the expected offspring.



EXPECTED AND OBSERVED RESULTS

7. In corn plants, normal height H is dominant to short height h . Complete these four Punnett squares showing different crosses. Then, shade red all the pure dominant offspring. Shade green all the heterozygous offspring. Leave all the pure recessive offspring unshaded.

	H	H
h	Hh	Hh
h	Hh	Hh

	H	h
H	HH	Hh
H	HH	Hh

	H	h
H	HH	Hh
h	Hh	hh

	H	h
h	Hh	hh
h	Hh	hh

8. In flies, long wings L are dominant to short wings l . Complete these four Punnett squares showing different crosses. Then, shade red all the offspring that will have long wings. Leave all the shortwinged offspring unshaded.

	L	L
l	Ll	Ll
l	Ll	Ll

	L	l
L	Ll	Ll
l	Ll	ll

	l	l
l	ll	ll
l	ll	ll

	L	l
l	Ll	ll
l	Ll	ll

9. In guinea pigs, short hair S is dominant to long hair s . Complete the following Punnett square according to the directions given. Then, fill in the blanks beside each Punnett square with the correct numbers.

a. One guinea pig is Ss and one is ss .

	S	s
s	Ss	ss
s	Ss	ss

Offspring expected (number)

2 Short hair

2 Long hair

- b. Both guinea pigs are heterozygous for short hair.

$Ss \times Ss$

	S	s
S	SS	Ss
s	Ss	ss

Offspring expected (number)

3 Short hair

1 Long hair