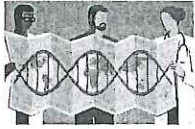


Name: Key!
Date: _____



S30 Unit A: Genetics Practice

Monohybrid Crosses

1. In tomatoes, the allele for red color, R , is dominant to the allele for yellow color, r .

a) What is the genotype of a heterozygous tomato?

Rr

b) What is the genotype of a homozygous red – colour tomato?

RR

c) What is the genotype of a yellow tomato?

rr

d) What is the phenotype of a tomato with two dominant alleles?

$RR \rightarrow$ red

e) What is the phenotype of a tomato with one dominant allele and one recessive allele?

$Rr \rightarrow$ red

2. In a certain flower, the allele for yellow color, Y , is dominant to the allele for orange color, y . Determine the expected probabilities of genotype and phenotype in offspring produced by crosses between:

a) Homozygous yellow and orange flowers (express probabilities as percent)

	Y	Y
y	Yy	Yy
y	Yy	Yy

Genotype \rightarrow 100% Yy

Phenotype \rightarrow 100% yellow.

b) Two heterozygous yellow flowers (express probabilities as ratios)

	Y	y
Y	YY	Yy
y	yY	yy

Genotype \rightarrow $YY = 25\%$, $yy = 25\%$, $Yy = 50\%$
 $1:4$ $1:4$ $1:2$

Phenotype \rightarrow yellow = $3:1$ orange = $1:3$

c) Orange and heterozygous yellow flowers (express probabilities as values from 0 to 1)

	Y	y
y	Yy	yy
y	Yy	yy

Genotype \rightarrow $Yy = 50\%$ $yy = 50\%$
 $= 0.5$ $= 0.5$

Phenotype \rightarrow yellow = 0.5 orange = 0.5

22/02/17

3. A tall plant ^{is} *thought* to have the genotype Tt is crossed with a short plant tt. Explain, using a Punnett square, these possible results:

a) Half of the offspring plants are short

Half of the genotypes are tt.

	t	t
T	Tt	Tt
t	t t	t t

b) All of the offspring plants are tall

Maybe the genotype of the tall plant was actually TT.

	t	t
T	Tt	Tt
T	Tt	Tt

c) Only five offspring plants survive; four are tall and one is short

4. An unspecified character controlled by a single gene is examined in pea plants. Only two phenotypic states exist for this trait. One phenotypic state is completely dominant to the other. A heterozygous plant is self-crossed. What percentage of the offspring plants, exhibiting the dominant phenotype, is homozygous? Express your answer as a whole number.

	R	r
R	RR	Rr
r	Rr	rr

25% are RR.

5. In humans, the disorder galactosemia is inherited as a recessive trait caused by the allele, g. The normal condition is the result of the presence of the dominant allele, G.

a) Using a Punnett square, show the cross between two heterozygous parents.

	G	g
G	GG	Gg
g	Gg	gg

b) A woman who is not affected by galactosemia marries a man who is also unaffected by the disease. They have three children, one of which is affected by the disease. What are the genotypes of the parents?

Gg → heterozygous for both parents.

22/02/17

Sex - Linkage

6. In one form of haemophilia, a recessive X-linked allele, X^h , increases blood clotting time.

a) Explain how haemophiliac offspring can be born to two normal parents.

	X^h	X^H
X^H	$X^H X^h$	$X^H X^H$
Y	$X^h Y$	$X^H Y$

It is possible to produce the genotype $X^h Y$, which would have the disease.

b) Can any of the female offspring from normal parents inherit haemophilia?

No, the females would either be normal ($X^H X^H$) or carriers ($X^H X^h$).

7. Red - green colorblindness is caused by a recessive X-linked allele.

a) If a woman who is a carrier for the red - green colorblindness allele has children with a man who has red - green colorblindness, what is the probability that child will have the red - green colorblindness? (express your answer as a value from 0 to 1)

	X^R	X^r
X^r	$X^R X^r$	$X^r X^r$
Y	$X^R Y$	$X^r Y$

0.5 will have red/green colorblindness.

b) If a woman who is a carrier for the red - green colorblindness allele has children with a man who has red - green colorblindness, what is the probability that a male child will have red - green colorblindness? (express your answer as a value from 0 to 1)

0.5 of boys have r/g color blindness.

c) If a woman who has red - green colorblindness has children with a man who does not have red - green colorblindness, what is the probability that female child will have red - green colorblindness? (express your answer as a value from 0 to 1)

0.5 of girls have r/g color blindness.

Single Trait

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Sex Linked

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