

Genetics Mixed Review Worksheet

For each of the following:

- Identify the genotypes of the parents
- Complete a Punnett Square
- Give the genotypic AND phenotypic results of the cross (percentage OR ratio)

1. In fruit flies, long wings are dominant to short wings. Complete a cross between a short winged male and a heterozygous female. $L = \text{long } l = \text{short}$

$ll \times Ll$

| | | |
|---|----|----|
| | L | l |
| l | Ll | ll |
| l | Ll | ll |

Genotype
50% Ll
50% ll

Phenotype
50% Long
50% short

1:1 ← Ratio → 1:1

2. In certain flowers, blue and yellow flowers are incompletely dominant to each other. Show the cross between a pure blue flower and a pure yellow flower.

$C^B = \text{blue } C^Y = \text{yellow}$

$C^B C^B \times C^Y C^Y$

| | |
|-------|-----------|
| | C^B |
| C^Y | $C^B C^Y$ |
| C^Y | $C^B C^Y$ |

Genotype
100% $C^B C^Y$

Phenotype
100% Green

3. In some species of wildcats, blue stripes and purple spots are codominant. Show the cross between a male with stripes and a female with spots and stripes.

$S^B = \text{blue stripes } S^P = \text{purple spots}$

$S^B S^B \times S^B S^P$

| | | |
|-------|-----------|-----------|
| | S^B | S^P |
| S^B | $S^B S^B$ | $S^B S^P$ |
| S^B | $S^B S^B$ | $S^B S^P$ |

Genotype:
50% $S^B S^B$
50% $S^B S^P$

Phenotype
50% Blue stripes
50% Blue stripes + Purple spots

1:1 ← Ratio → 1:1

4. In humans, blood type is controlled by multiple alleles – A, B & O. Show the cross between a male with Type O blood and a woman with Type AB blood. What blood types will NOT show up in their offspring?

$\sigma^i i \quad \text{♀ } I^A I^B$

| | | |
|---|---------|---------|
| | I^A | I^B |
| i | $I^A i$ | $I^B i$ |
| i | $I^A i$ | $I^B i$ |

Genotype
50% $I^A i$
50% $I^B i$

Phenotype
50% Type A
50% Type B

Blood types NOT produced
Type O
Type AB

1:1 ← Ratio → 1:1

5. In humans, male pattern baldness is an X-linked trait. Show the cross between a male that is not bald and a female that is a carrier. $N = \text{normal } n = \text{bald}$

$X^N Y \times X^N X^n$

| | | |
|-------|-----------|---------|
| | X^N | Y |
| X^N | $X^N X^N$ | $X^N Y$ |
| X^n | $X^N X^n$ | $X^n Y$ |

Genotype:
25% $X^N X^N$
25% $X^N X^n$
25% $X^N Y$
25% $X^n Y$

Phenotype
50% Normal ♀
25% Normal ♂
25% bald male

1:1:1:1

6. In cats, coat color is controlled by a codominant, sex-linked gene. Calico cats have both orange and black splotches on their white coat. Show the cross between an orange spotted male and a calico female.

$O = \text{orange } B = \text{black}$

$X^O Y \times X^O X^B$

| | | |
|-------|-----------|-----------|
| | X^O | X^B |
| X^O | $X^O X^O$ | $X^O X^B$ |
| Y | $X^O Y$ | $X^B Y$ |

Genotype:
25% $X^O X^O$
25% $X^O X^B$
25% $X^O Y$
25% $X^B Y$

Phenotype:
25% Orange ♀
25% Calico ♀
25% Orange ♂
25% Black ♂

1:1:1:1

7. Oompahs Loompahs generally have blue faces which is caused by a dominant gene. The recessive condition results in an orange face. Show the cross between an orange faced male and a heterozygous female.

F = blue face f = orange face

ff x Ff

| | | |
|---|----|----|
| | F | f |
| f | Ff | ff |
| f | Ff | ff |

Genotypes:
50% Ff
50% ff
1:1

Phenotypes
50% Blue } face
50% Orange } face
1:1

8. Oompahs can also have red, blue or purple hair. Purple hair results from the heterozygous condition. Show the cross between an orange-faced, purple-haired male and a heterozygous blue-faced, blue-haired female.

H^R = Red H^B = Blue $H^R H^B$ = purple

♂ ff $H^R H^B$ x Ff $H^B H^B$

| | | |
|---------|--------------|--------------|
| | f H^R | f H^B |
| F H^B | Ff $H^B H^R$ | Ff $H^B H^B$ |
| f H^B | ff $H^B H^R$ | ff $H^B H^B$ |

Genotypes:
25% Ff $H^B H^R$
25% Ff $H^B H^B$
25% ff $H^B H^R$
25% ff $H^B H^B$
1:1:1:1

Phenotypes
25% Blue face Purple hair
25% Blue face Blue hair
25% Orange face Purple hair
25% Orange face Blue hair
1:1:1:1