Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Simple Genetics Practice Problems**

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

|  |  |  |  |
| --- | --- | --- | --- |
| AA \_\_\_\_Bb \_\_\_\_Cc \_\_\_\_Dd \_\_\_\_ | Ee \_\_\_\_ff \_\_\_\_GG \_\_\_\_ HH \_\_\_\_ | Ii \_\_\_\_Jj \_\_\_\_kk \_\_\_\_Ll \_\_\_\_ | Mm \_\_\_\_nn \_\_\_\_OO \_\_\_\_Pp \_\_\_\_ |

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

|  |  |
| --- | --- |
| *Purple flowers are dominant to white flowers*PP \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Pp \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_pp \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | *Brown eyes are dominant to blue eyes*BB \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Bb \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_bb \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| *Round seeds are dominant to wrinkled*RR \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Rr \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_rr \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | *Bobtails are recessive (long tails dominant)*TT \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Tt \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_tt \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

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

|  |  |
| --- | --- |
| *Straight hair is dominant to curly.*\_\_\_\_\_\_\_\_\_\_\_\_ straight\_\_\_\_\_\_\_\_\_\_\_\_ straight\_\_\_\_\_\_\_\_\_\_\_\_ curly | *Pointed heads are dominant to round heads.*\_\_\_\_\_\_\_\_\_\_\_\_ pointed\_\_\_\_\_\_\_\_\_\_\_\_ pointed\_\_\_\_\_\_\_\_\_\_\_\_ 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**



What percentage of the offspring will be round? \_\_\_\_\_\_\_\_\_\_\_

**Rr x R r**



What percentage of the offspring will be round? \_\_\_\_\_\_\_\_\_\_\_

**RR x Rr**



What percentage of the offspring will be round? \_\_\_\_\_\_\_\_\_\_\_

**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? \_\_\_\_\_\_\_\_\_\_\_

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

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)? \_\_\_\_\_\_\_\_\_\_\_\_

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

What percentage of the offspring will also be homozygous? \_\_\_\_\_\_\_\_\_\_\_\_\_\_

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? \_\_\_\_\_\_\_\_\_\_\_\_\_\_

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? \_\_\_\_\_\_\_\_\_\_\_\_\_

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

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

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? \_\_\_\_\_\_\_\_\_\_

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

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? \_\_\_\_\_\_\_\_ x \_\_\_\_\_\_\_\_\_\_\_ Show the cross to prove it!

[**Simple Genetics Practice Problems**](http://www.biologycorner.com/worksheets/genetics_practice.html)**KEY**

This worksheet will take about 20 minutes for most students, I usually give it to them after a short lecture on solving genetics problems. I don't normally take a grade on it, instead just monitor progress of students as they work and then have them volunteer to write the answers #5-15 on the board.

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

|  |  |  |  |
| --- | --- | --- | --- |
| AA \_HO\_\_Bb \_HE\_\_Cc \_HE\_\_\_Dd \_HE\_\_\_ | Ee \_HE\_\_\_ff \_HO\_\_\_GG \_HO\_\_ HH \_HO\_\_ | Ii \_\_HE\_\_Jj \_\_HE\_\_kk \_HO\_\_\_Ll \_HE\_\_\_ | Mm \_HE\_\_\_nn \_HO\_\_OO \_HO\_\_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 |   | What percentage of the offspring will be round? \_\_\_1/2 or 50%\_\_\_ |
| Rr x Rr |   | What percentage of the offspring will be round? \_\_\_75% or 3/4\_ |
| RR x Rr |   | What percentage of the offspring will be round? \_\_all, 100%\_\_\_\_\_ |

**Practice with Crosses.**

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I've only included a couple of squares as samples here, most of these are very straightforward. Given enough practice, students will learn to do most of them without the squares.

5. A TT (tall) plant is crossed with a tt (short plant).
What percentage of the offspring will be tall? \_\_\_\_\_all tall\_\_\_\_\_



6. A Tt plant is crossed with a Tt plant. What percentage
of the offspring will be short? \_\_\_25%\_\_



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)? \_\_\_\_1/2 or 50%\_\_\_\_\_\_

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%\_\_\_\_\_

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? \_\_\_\_\_all white\_\_\_\_\_\_\_

If students are stuck on this one, advise them to make a "key" to help them sort it out.

PP = purple, Pp = purple, pp = white

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? \_\_\_\_\_pp x Pp, 50% purple\_\_\_\_\_

11. Two plants, both heterozygous for the gene that controls
flower color are crossed. What percentage of their offspring
will have purple flowers? Pp x Pp , 75% purple\_\_\_\_\_\_\_\_\_\_\_\_\_\_
What percentage will have white flowers? \_\_\_\_25% white\_\_\_\_\_\_\_

12. In guinea pigs, the allele for short hair is dominant.
What genotype would a heterozygous short haired guinea pig have? \_\_Hh\_\_\_
What genotype would a purebreeding short haired guinea pig have? \_\_hh\_\_\_\_
What genotype would a long haired guinea pig have? \_\_HH\_\_\_\_

Why did I use H instead of S for short hair. Students may discover the hard way that capital and lower case S's are hard to tell apart. This is a good time to talk to them about how to choose their letters. You can choose the letter of the dominant trait, or you can chooe the letter for the trait itself (H is for hair).

13. Show the cross for a pure breeding short haired guinea pig
and a long haired guinea pig. HH x hh
What percentage of the offspring will have short hair? \_\_\_\_all\_\_\_\_

14. Show the cross for two heterozygous guinea pigs. Hh x Hh
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? Hh x Hh Show the cross to prove it! most students just point to the cross right in #14