

Punnett Square Practice Problems

SIMPLE DOMINANT & RECESSIVE TRAITS

Let's say that in seals, the gene for the length of the whiskers has two alleles. The dominant allele (W) codes long whiskers & the recessive allele (w) codes for short whiskers.

- 1) What percentage of offspring would be expected to have short whiskers from the cross of two long-whiskered seals, one parent is homozygous dominant and the other one is heterozygous?
- 2) If one parent seal is pure long-whiskered and the other is short-whiskered, what percent of offspring would have short whiskers?

In purple people eaters, one-horn is dominant and no horn is recessive.

- 3.) Draw a Punnett Square showing the cross of a purple people eater that is hybrid for horns with a purple people eater that does not have horns.
- 4.) Summarize the genotypes & phenotypes of the possible offspring

A green-leafed fuzzywhatsit is crossed with a fuzzywhatsit with yellow-striped leaves. The cross produces 185 green-leafed fuzzywhatsits.

- 5.) What were the genotypes of both parents?
- 6.) Summarize the genotypes & phenotypes of the offspring that would be produced by crossing two of the green-leafed fuzzywhatsits obtained from the initial cross.

Mendel found that crossing wrinkle-seeded plants with pure round-seeded plants produced only round-seeded plants.

- 7.) What genotypic & phenotypic ratios can be expected from a cross of a wrinkle-seeded plant & a plant heterozygous for this trait (seed appearance)?

In dogs, there is a hereditary deafness caused by a recessive gene, "d." A kennel owner has a male dog that she wants to use for breeding purposes if possible. The dog can hear, so the owner knows his genotype is either DD or Dd. If the dog's genotype is Dd, the owner does not wish to use him for breeding so that the deafness gene will not be passed on. A testcross must be done.

- 8.) Draw the Punnett squares to illustrate these two possible crosses. In each case, what percentage/how many of the offspring would be expected to be hearing? Deaf?
- 9.) How could you tell the genotype of this male dog?
- 10.) Also, using Punnett square(s), show how two hearing dogs could produce deaf offspring.

In humans, brown eyes (B) are dominant over blue (b). A brown-eyed man marries a blue-eyed woman and they have three children, two of whom are brown-eyed and one of whom is blue-eyed.

- 11.) Draw the Punnett square that illustrates this marriage.
- 12.) What is the man's genotype?
- 13.) What are the genotypes of the children?

Directions: For each of the following problems 14-18,

1. List the genotypes of the parents.
2. Diagram and complete a Punnett square
3. Give the phenotype percentages of the offspring.

In garden peas, round seed coats (R) is dominant over wrinkled seed coats (r).

- 14.) What will the results be of a cross between a homozygous dominant male and a recessive female?

In peas, yellow color (Y) is dominant to green (y).

- 15.) What will be the results of a cross-pollination of a heterozygous female and a heterozygous male?

In humans, straight toes (S) are dominant over curled toes (s).

- 16.) What would be the result of a cross between a recessive male and a heterozygous female?

In dogs, erect ears (E) are dominant over droopy ears (e).

- 17.) What are the results if two heterozygous dogs have a litter of puppies?

The ability to roll the tongue (R) is determined by a dominant gene while the recessive gene results in the inability to roll the tongue (r). A man and his wife can both roll their tongues and are surprised to find that their son cannot.

- 18.) Explain this by showing the genotypes of all three persons. (Note: You do not need to do a Punnett Square for this problem).

CODOMINANT TRAITS

In humans, wavy hair (CS) results by the co-dominant situation of curly hair (C) and straight hair (S).

19.) What are the possible results if a curly-haired man and wavy-haired woman have children?

In crocus flowers, white (W) and purple (P) colors are co-dominant, and result in a purple and white striped flower when both genes are present.

20.) What are the possible results from the cross-pollination of a striped crocus with a white crocus?

Cattle can be red (RR = all red hairs), white (WW = all white hairs), or roan (RW = red & white hairs together).

21.) Predict the phenotypic ratios of offspring when a homozygous white cow is crossed with a roan bull.

22.) What should the genotypes & phenotypes for parent cattle be if a farmer wanted only cattle with red fur?

A cross between a black cat & a tan cat produces a tabby pattern (black & tan fur together).

23.) What pattern of inheritance does this illustrate?

24.) What percent of kittens would have tan fur if a tabby cat is crossed with a black cat?

INCOMPLETE DOMINANCE

A cross between a blue blahblah bird (*I made this bird up*) & a white blahblah bird produces offspring that are silver. The color of blahblah birds is determined by just two alleles.

25.) What are the genotypes of the parent blahblah birds in the original cross?

26.) What is/are the genotype(s) of the silver offspring?

27.) What would be the phenotypic ratios of offspring produced by two silver blahblah birds?

The color of fruit for plant "X" is determined by two alleles. When two plants with orange fruits are crossed the following phenotypic ratios are present in the offspring: 25% red fruit, 50% orange fruit, 25% yellow fruit.

28.) What are the genotypes of the parent orange-fruited plants?

In cattle, red (r) is incompletely dominant over white (w) hides. Roan is the name of the color that results from incomplete dominance.

29.) What are the possible results if a white male mates with a roan female?

MULTIPLE ALLELE INHERITANCE

30.) Could a man with type B blood and a woman with type AB produce a child with type O blood?

A man with Type A blood marries a woman with type B blood. Their child has type O blood.

31.) What are the genotypes for these individuals?

32.) What other genotypes, and in what frequencies, would you expect to find in offspring produced from this marriage?

A woman with Type O blood and a man who is Type AB have are expecting a child.

33.) What are the possible blood types of the kid?

34.) What are the possible blood types of a child whose parents are both heterozygous for "B" blood type?

35.) Determine the possible genotypes & phenotypes with respect to blood type for a couple who's blood types are homozygous A & heterozygous B.

Jill is blood Type O. She has two older brothers with blood types A & B.

36.) What are the genotypes of her parents with respect to this trait?

A test was done to determine the biological father of a child. The child's blood is Type A and the mother's is B. Dude #1 has a blood type of O, & dude #2 has blood type AB.

37.) Which dude is the biological father?