Monohybrid Questions

1. In peas, yellow pod color is dominant to green pod color. Give the results of the following crosses.
a. Heterozygous yellow x homozygous recessive green
b. homozygous yellow x heterozygous yellow
c. Homozygous yellow x green

2. In humans, dimples in the chin are dominant to no dimples in the chin. Cross a homozygous recessive non-dimpled person with a heterozygous dimpled person. What are the chances of this couple having a child with dimples?

3. In humans, brown hair is dominant to blonde hair. Cross a homozygous dominant brown hair person with a homozygous recessive blonde hair person.

4. In pea plants, round seeds are dominant to wrinkled seeds. Cross a heterozygous round seed plant with a homozygous dominant round seed plant.

5. In humans Blue eye color is recessive to brown.
a) Could two brown eyed parents have a blue eyed child? Show your work.
b) Could two blue eyed parents have a brown eyed child? Show your work.

6. In summer squash, white fruit color is dominant to yellow fruit color.
a) What would the genotype and phenotype be for the F_1 generation if the parental cross was homozygous dominant white and homozygous recessive yellow?
b) What would the genotype and phenotype be for the F_2 generation if you crossed two F_1 individuals from the above problem?

7. Albinism, the total lack of skin pigment, is due to a recessive gene. A man and a woman plan to marry and wish to know the probability of their having any albino children.
a) What could you tell them if both are normally pigmented, but each has one albino parent?
b) What could you tell them if the man is albino, the woman is normal, but her father is an albino?
c) What could you tell them if the man is albino and the girl's family includes no albinos?

8. In humans Blue eye color is recessive to brown. A blue eyed man, both of whose parents were brown eyed, married a brown eyed woman whose father was blue eyed. What are the chances of this couple having a blue eyed child?

9.In certain trees, smooth bark is dominant over wrinkled. Cross two trees that are heterozygous for smooth bark. If there are 100 offspring produced, how many would you expect to have wrinkled bark?

10.In Mountain Boomers, the genes for length of tail exhibit "incomplete" dominance. Cross a homozygous Long-tailed and a homozygous Short-tailed Mountain Boomer.

11.Height in pea plants is determined by the dominant tall gene and the recessive short gene. Cross a homozygous tall pea plant with a dwarf pea plant to determine the probability of producing a tall plant.

12.Height in pea plants is determined by the dominant tall gene and the recessive short gene. Cross 2 heterozygous tall plants. What is the probability of producing a dwarf plant?

13.Hazel is heterozygous for type B blood and Elijah has type O blood. If they have children, what is the probability that they will have;
a) a type A child? b) a type B child? c) a type AB child? d) a type O child

14.The ability to taste the chemical PTC is determined by a single gene in humans with the ability to taste given by the dominant allele T and inability to taste by the recessive allele t. Try some PTC for yourself to determine if you possess the tasting gene. Suppose two heterozygous tasters (Tt) have a large family.
a. Predict the proportion of their children who will be tasters and non-tasters. Use a Punnett square to illustrate how you make these predictions.
b. What is the likelihood that their first child will be a taster? What is the likelihood that their fourth child will be a taster?

15.A rooster with grey feathers is mated with a hen of the same phenotype. Among their offspring 15 chicks are grey, 6 are black and 8 are white.
a. What is the simplest explanation for the inheritance of these colors in chickens?
b. What offspring would you expect from the mating of a grey rooster and a black hen?

16.In a certain plant, blue flower color is dominant to white. You have a blue flowered plant.
a. What do you know about the phenotype and genotype of the plant?
b. Explain how you would figure out the complete genotype of the plant.
c. Show the P_1 Geno for the test cross.

17.Woodrats are medium sized rodents with lots of interesting behaviours. You may know of them as packrats. The trait of bringing home shiny objects is dominant to the trait of carrying home only dull objects. Suppose two heterozygous individuals are crossed. How many of each genotype would be expected if 8 offspring were produced?

18.The common grackle is a species of robin-sized blackbirds that are fairly common (hence the name) over most of the United States. Suppose that long tails were incompletely dominant to short tails in these birds. A female medium-tailed grackle mates with a male grackle who had one parent with a long tail and one parent with a short tail. Show the cross.

19.The ability to curl your tongue up on the sides is dominant to not being able to roll your tongue.
a) What is your phenotype and genotype with respect to this trait?
b) A woman who can roll her tongue marries a man who cannot. Their first child has his father's phenotype. What are the genotypes of the mother, father, and child?

20.In Northeast Kansas there is a creature know as a wildcat. It comes in three colors, blue, red, and purple. This trait is controlled by a gene with incomplete dominance. A heterozygous individual is purple. What would be the genotypes and phenotypes of the offspring if a blue wildcat were crossed with a purple one?

21.With the lubber grasshopper red stripes are co dominant with yellow.
a) What will be the phenotypic and genotypic ratio of a cross of two grasshoppers, both with red and yellow stripes?
b) What genotypes and phenotypes would be produced by crossing a grasshopper with both color stripes and one with yellow stripes?

22.A naturalist visiting an island in the middle of a large lake observes a species of small bird with three distinct types of beaks. Those with short, crushing beaks consume hard shelled nuts, those with long, delicate beaks pick the seeds from pine cones, and those with intermediate beaks, consume both types of seeds though they are not as good at either. Assume that this difference in beak morphology is the result of incomplete dominance. Cross a bird with a short, crushing beak with one with an intermediate beak.

23.In pea plants, spherical seeds are dominant to dented seeds. In a genetic cross of two plants that are heterozygous for the seed shape trait, what fraction of the offspring should have spherical seeds?

24. If yellow is dominant over green, to identify the genotype of yellow-seeded pea plants as either homozygous dominant or heterozygous, you could do a test cross with a plant of genotype _____.

25.A test cross is used to determine if the genotype of a plant with the dominant phenotype is homozygous or heterozygous. If the unknown is homozygous, all of the offspring of the test cross have the _____ phenotype. If any of the offspring show the have the _____ phenotype the unknown is heterozygous.

26.A genetic cross of snapdragons with red flowers with white flowers resulted in offspring that all had pink flowers. When the F1 plants were self-pollinated, the resulting F2-generation plants had a phenotypic ratio of 1 red: 2 pink: 1 white. Show the second cross.

27.Human blood type is determined by co-dominant alleles. A woman with type A blood and a man with type B blood could potentially have offspring with which blood types?

28. Human blood type is determined by co-dominant alleles. What are the possible blood types for a cross between a type AB and type O?

29. Human blood type is determined by co-dominant alleles. What are the possible blood types for a cross between two type AB people?.

30. Human blood type is determined by co-dominant alleles. What are the possible blood types for a cross between a homozygous type A and a heterozygous type B?

31. Human blood type is determined by co-dominant alleles. A boy has type A blood and his sister has homozygous recessive blood. The father has type B blood. What are the blood types and genotypes of the kids and there parents including their mother.

32.A cross between a white-fruited and a yellow-fruited squash plant produces all white plants. If two of the white offspring are crossed together, what will be the appearance of their offspring?

33.In guinea pigs, rough coat is dominant over smooth. If a homozygous rough-coated animal is crossed with a smooth one, what will be the phenotype of the F_1?

34.In four o'clocks, red & white flowers are incompletely dominant and the heterozygote is pink.
A. Cross a red-flowered four-o'clock plant with a white-flowered one.
B. Cross an F1 with an F1.
C. Cross an F1 with its red parent.

35.In Andalusian chickens, the heterozygous condition of the alleles for black feathers and white feathers is grey. What offspring will a grey Andalusian hen have if bred to roosters with the following feather colors:
A. black rooster x grey hen
B. grey rooster x grey hen
C. white rooster x grey hen

36.Both Mrs. Smith and Mrs. Jones had babies the same day in the same hospital. Mrs. Smith took home a baby girl, whom she named Shirley. Mrs. Jones took home a baby girl, whom she named Jane. Mrs. Jones began to suspect, however, that her child had been accidentally switched with the Smith baby in the nursery. Blood tests were made; Mr. Smith was type A, Mrs. Smith was type B, Mr. Jones was type A, Mrs. Jones was type A, Shirley was type O, and Jane was type B. Had a mix-up occurred?

Monohybrid Questions KEY

1a. Genotype 1Yy:1yy Phenotype 1 yellow: 1 green b. Genotype 1YY:1Yy Phenotype all yellow
c. Genotype All Yy Phenotype All yellow
2. Genotype 1Dd:1dd Phenotype 1 dimpled:1 no dimples
3.Genotype all Bb Phenotype all brown
4. Genotype 1RR:1Rr Phenotype all round
5. a) Yes b) No
6. a) Genotype all Ww Phenotype all white b) Genotype 1WW:2Ww:1ww Phenotype 3 white:1 yellow
7. a) They both are heterozygous Nn x Nn, therefore 1/4 or 25% chance of albino offspring
b) 50% chance of albino offspring (Man nn woman Nn)
c) No chance of albino offspring
8. 50% - man bb, his parents Bb and Bb, woman Bb, her father bb
9. 25
10.All have medium length tails.
11. 100% of F_1 will be tall.
12. 1 in 4 or 1/4 or 25% or 0.25
13. a) 0% b) 50 % c) 0% d) 50%
14. a. ¼ TT + ½ Tt = ¾ tasters ¼ tt = ¼ non-tasters
b. 1st child-- ¾ 4th child-- 3/4 (each child is independent)
c. 1/4 for each child; 1/4 x 1/4 x 1/4 = 1/64 that all three will be non-tasters
15. a. incomplete dominance of black over white; heterozygotes are grey
b. the rooster would be C^BC^b and the hen C^BC^B (C^B = black, C^b= white) half the offspring would be C^BC^B (black) and half C^BC^b (grey)
16. a. its blue and can be either BB or Bb b. do a test cross c. P_1 geno: B? x bb
17. 2SS:4Ss:2ss
18. $1T^LT^L$:$2T^LT^S$:$1T^ST^S$ 1 long: 2 medium: 1 short
19. Mother Tt, father tt, child tt
20. $1C^BC^B$:C^BC^R 1 blue: 1 purple
21. a) phenotype: 1 red:2 red and yellow:1 yellowgenotype: 1 S^RS^R:2 S^RS^r:1 S^rS^r
b) 1 S^RS^r:1 S^rS^r 1 red and yellow:1 yellow
22.1 intermediate: 1 short
23.3/4 of the offspring
24. yy
25. dominant, recessive The test cross was invented by Mendel to determine the genotype of plants displaying the dominant phenotype.
26. P_1 geno: F^RF^W x F^RF^W
27. All 4 blood types.
28. 1A:1B
29. 1A:2AB:1B
30. 1A:1AB
31. Dad I^Bi, Mom I^Ai, Son I^Ai, Daughter ii
32. Parents = WW x ww Offspring = Ww (white). The white parent must be homozygous in order to produce all white offspring in this cross (which is a test cross). Now cross the white offspring = Ww x Ww to get = WW, Ww, Ww, ww and their appearance is 3 white : 1 yellow
33.A. Parental = RR x rr F1 = Rr, rough
34. a) R'R' X RR: Gametes = R' and R; Offspring = RR' and pink
b) RR' X RR': Gametes = R, R' and R, R'; Offspring = 1/4 RR (red), 1/2 RR' (pink), and 1/4 R'R' (white)
c) RR' X RR: Gametes = R, R' and R; Offspring = 1/2 RR (red) and 1/2 RR' (pink).d) R'R' X R'R: gametes = R' and R', R; Offspring = 1/2 R'R' (white) and 1/2 RR' (pink)
35. (A) black rooster BB x grey hen BB' offspring = 1/2 BB (black and 1/2 BB' (grey)
(B) grey rooster BB' x grey hen BB' offspring = 1/4 BB (black), 1/2 BB' (grey), and 1/4 B'B' (white)
(C) white rooster B'B' x grey hen BB' Offspring = 1/2 BB' (grey) and 1/2 B'B' (white)
36. The babies were switched.