

Genetics Problems Answer Key

2. 75% red, 25% white Rr 50%, RR 25%, rr 25%
3. (a.) Bb x Bb (b.) 50% black offspring if test cross: Bb x bb (c) Kill white sheep who produce black offspring AND test cross white sheep with black one: kill white who produce black kids
4. 50% black
5. Pp x pp
6. a) Rr x Rr = parents, rr = son b) 25% another non roller
7. Homozygous recessive; test cross
8. Man = Aa, Wife = aa, Child = aa, 50%
9. AA x aa Aa The more children (offspring) created, the greater the likelihood the actual results of the cross will yield expected results (based on probability)
10. (a.) 100% BbHh - brown curly (b.) 100% BbHh - brown curly
(c.) 9/16 brown curly, 3/16 blond curly, 3/16 brown straight, 1/16 blond straight
1BBHH: 2BBHh: 1BBhh: 2BbHH: 4BbHh: 2Bbhh: 1bbHH: 2bbHh: 1bbhh
(d.) 25% BbHh–brown curly; 25% Bbhh– brown straight, 25% bbHh– blonde curly, 25% blonde straight
11. a.) 100% heterozygous b.) 10
12. Heterozygous
13. BBtt x bbTT Black trotter 100%
14. a) 9/16, 3/16, 3/16, 1/16
b) BbTt x BBtt 50% each phenotype: black trotters and black pacers
15. BBHH x bbhh 100% black short, 9/16, 3/16, 3/16, 1/16
16. 100% black short haired, 25% each
17. BBHH x bbhh 100% heterozygous; be creative – requires a few consecutive crosses!
18. $\frac{3}{4} * \frac{1}{2} * 1 * \frac{1}{2} * 1 = 3/16$
19. Incomplete dominance: long tail = AA, short tail = Aa, no tail = aa
20. a.) 50% white, 50% roan, 0% red b.) Yes: Rr * rr → Rr, Roan offspring interbreed
→ only allow red F₂ offspring to mate to create all red herd
21. bull : TtRr cow A: ttrr calf A: ttRr
cow B: ttRr calf B: TtRR
cow C: TtRR calf C: ttRR
22. a.) $\frac{1}{2}$ gray normal, $\frac{1}{2}$ gray stumpy b.) $\frac{3}{4}$ gray normal, 1/4 black stumpy
c.) $\frac{1}{2}$ gray normal, $\frac{1}{2}$ black stumpy d.) 100% gray normal
23. BCAD (or DACB)
24. Yes, genes are linked b/c not a 1:1:1:1 ratio of four genotypes & phenotypes, $111/600 = 18.5$ map units between genes for each trait
25. ACDB (or BDCA)
26. j – d – cl – dp – ft – ed – ho – net
27. 9 striped, 3 black, 4 white
28. 9 purple, 7 white
29. 4 green, 4 yellow, 4 blue, 4 white
30. 1 red, 4 dark, 6 medium, 4 light, 1 white
31. a) 1 type AB, 1 type B, 1 type A, 1 type O
b) yes: both parents can be heterozygote A and B to produce type O child
Type O is NOT possible if man's parents are both AB: man MUST be homozygous: BB

32. a.) black x chocolate
b.) 2 black ($C^B C^g$, $C^B C^C$), 1 chocolate ($C^C C^g$), 1 golden ($C^g C^g$)
33. To determine if trait is sex-linked dominant or sex linked recessive, test cross a 'dominant' male ($X^R Y$) to a female ($X^r X^r$) and compare the phenotypes of male and female offspring. All the female offspring of this cross will show dominant trait. If the disease is dominant, then all daughters will have disease. Secondly, perform a test cross between a 'recessive' male ($X^r Y$) and female ($X^r X^r$) → all offspring (male & female) show recessive trait. If all offspring resulting from second test cross show disease, then disease = sex-linked recessive.
34. 100% sons are colorblind, 0% daughters are colorblind → all daughters are carriers of colorblind allele
35. a) both mom and dad have X^h b) 50% chance brother is hemophiliac
c) no, son receives Y from dad, not X with hemophilia allele
d) son gets X^h from mother, gets Y from dad
36. a.) 2 of each chromosome b.) 20 total chromosomes for 2n organism (10 homologous pairs)
37. 1 blind normal male 1 normal vision / normal (no hemophilia) male
1 blind hemophiliac male 1 normal vision / hemophilia male
38. a.) 25% curly, normal vision child b.) 25% straight, colorblind child c.) 12.5% curly, colorblind girl
39. *this is the same ? as from your meiosis lab. Therefore, I didn't provide you with the answer!*
40. a. & b.) $TTrr \times ttRR =$ all $TtRr$ recessive easier back cross $TtRr \times ttRR$ and select $TTrr \times TtRr$, select tall red back cross with some seeds, cross tall red with tall yellow, those from tall red are homozygous recessive, use these seeds. Use these seeds and do same with $ttRR$.
41. a.) 9 different genotypes b.) 4 possible phenotypes c.) 4: $FFDD$, $FFdd$, $ffDD$, $ffdd$
42. Parents: $bbHH \times Bbhh$
43. $aaFf \times Aaff$
44. $AaFF \times aaff$
45. $RrhhBB \times RrHhbb$
46. $bbSs \times Bbss$
47. $F_1 = 100\%$ red, $F_2 = 9$ red, 1 white, 6 brown
48. SELF-FERTILIZE CHOSE PLANT THAT ALWAYS PRODUCED RED offspring
49. $DDee \times ddEE = P_1$ $F_1 = DdEe$
50. $X^B Y \times X^B X^b$
51. a.) many varieties
b.) cuttings - asexual reproduction of 1 parent creates clones of hybrid
52. $ssX^{B2} Y \times SSX^{B1} X^{B2} =$ a.) short tortoise female, yellow short male, black short female, black short male b.) 25% chance of yellow-haired AND male
53. b