More Practice

Mine

1. The genes for dark eyes (black and brown) usually dominate over genes for blue or gray eyes. A man with black eyes marries a woman with light gray eyes. They have two children, a boy with black eyes, and a girl with blue eyes. What are the genotypes of the man, his wife, the little boy, and the little girl?

   (Dad) Bb x bb (mom)

   (little boy) Bb x bb (little girl)

2. A man and a woman have 24 children. Of the children, 17 have brown eyes and 7 of the children have blue eyes. What are the genotypes of the parents?

   Bb x Bb or Bb x bb

3. Assume that a cross was made between fruit flies of genotype AAbb and those of genotype aaBB. Give the expected phenotypic ratio for the F_2 generation.

	aB
Ab	AaBb 100%

4. In sesame plants, the one-pod condition (P) is dominant to the three-pod condition (p), and normal leaf (L) is dominant to wrinkled leaf (l). These traits are inherited independently. Determine the genotypes for the two parents for all the possible matings producing the following offspring:

   a. 318 one-pod normal, 98 one-pod wrinkled PPLl x PPLl

   b. 323 three-pod normal, 106 three-pod wrinkled ppLl x ppLl

   c. 401 one-pod normal PP x PP or P_p x PP

   d. 150 one-pod normal, 147 one-pod wrinkled, 51 three-pod normal, 48 three-pod wrinkled

      P_pLl x ppLl P_pLl x P_pll

   e. 223 one-pod normal, 72 one-pod wrinkled, 76 three-pod normal, 27 three-pod wrinkled

      P_pLl x P_pLl

5

6. The genotype of F1 individuals in a tetrahybrid cross is AaBbCcDd. Assuming independent assortment of these four genes, what are the probabilities that F2 offspring would have the following genotypes?

a. aabbccdd $\frac{1}{4} \times \frac{1}{4} \times \frac{1}{4} \times \frac{1}{4} = \frac{1}{256}$

b. AaBbCcDd $\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{16}$

c. AABBCCDD $\frac{1}{256}$

d. AaBbccDd $\frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{4} \cdot \frac{1}{2} = \frac{1}{32}$

e. AaBBCCdd $\frac{1}{2} \cdot \frac{1}{4} \cdot \frac{1}{4} \cdot \frac{1}{4} = \frac{1}{128}$

6 7. Assume that blood type is inherited as A and B dominant over O, but A and B incompletely dominate over each other. Genotypes AA and AO are then phenotypically type A, genotypes BB and BO are type B, genotype AB is type AB, and genotype OO is type O blood. A man with type A blood marries a woman with type A blood. They have the first child as blood type O. What are the genotypes of both parents and the child.

$I^A i^O \times I^A i^O$ AO × AO

7 8. A man with type AB blood marries a woman with type O blood, but whose father was type A blood. What genotype would you expect their first child to have? Why?

	O	O
A	AO	AO
B	BO	BO

8. For the following cross, determine what the probability is for each listed:

AaBBDd X AaBbdd

a. the offspring will have ~~at least~~ 1 dominant trait aaBBdd + aaBbdd $\left(\frac{1}{4} \frac{1}{2} \frac{1}{2}\right) + \left(\frac{1}{4} \frac{1}{2} \frac{1}{2}\right) = \frac{2}{16} = \frac{1}{8}$

b. the offspring will have only 2 dominant traits

c. the offspring will have all three dominant traits

Mine

More Practice 2

Monohybrid Cross Questions

1. White coloring in guinea pigs is recessive. What will the offspring be from a cross between a white guinea pig and a heterozygous black guinea pig?

   gg x Gg $\frac{1}{2}$ Black $\frac{1}{2}$ white

2. Free ear lobes are dominant over attached ear lobes. What will the F1 offspring be from a cross between two heterozygous free ear lobed parents?

   Ff x Ff $\frac{3}{4}$ Free $\frac{1}{4}$ Attached
   1:2:1

3. The ability to taste phenythiocarbamide (PTC) is dependent upon a dominant gene, T. The recessive allele, t, is associated with the inability to taste the substance.
   (a) What are the possible genotypes for tasters? TT Tt For non-tasters? tt
   (b) Two parents, both tasters, have a non-taster offspring. What are the genotypes of the two parents? Tt x Tt Explain. they have to be heterozygous in order to produce a tt.
   (c) Two parents, one a taster and the other a non-taster, have a taster offspring. What is the genotype of the offspring? Tt Explain. one gene from each parent - the nontaster gave them t.

hh
4. Hairy tongues in the alien race of Pzkrauks is a recessive trait to the normal hairless tongues. If a male who is heterozygous normal tongued has children with a homozygous normal tongued female, what would be the genotypes and phenotypes of their offspring? What percentage would be hairy tongued? What percentage would be normal tongued?

   Hh x HH

   2:2:0

   4:0 0% hairy
   100% Normal

Co-dominance and Incomplete Dominance questions

1. When shorthorn red (RR) cattle are bred to shorthorn white (rr) cattle, they produce roan (Rr) (red and white hairs interspersed) offspring. What type of inheritance is this? Co-Dominance
   (a) If two roan shorthorns are crossed, what is the probability of red, white and roan colors in their offspring?

   Rr x Rr

   $\frac{1}{4}$ Red $\frac{1}{2}$ Roan $\frac{1}{4}$ White

2. In the petunia, a pure breeding red flower is crossed with a white one to produce pink offspring. What form of inheritance is this? Incomplete
   (a) Show the genotypes of the parents and the F1 generation of a cross between a red and white petunia. P = RR x rr
   F_1 = Rr
   (b) What would be the anticipated offspring if the F1 plant from (a) above were test-crossed to the red parent? Rr x RR $\frac{1}{2}$ red $\frac{1}{2}$ Pink
   (c) What would be the anticipated offspring if the F1 plant from (a) above were test-crossed to the white parent? Rr x rr

   $\frac{1}{2}$ Pink $\frac{1}{2}$ White

3. In andalusian fowl, F^B is the gene for black plumage. F^b is the gene for white plumage. These genes show incomplete dominance. The heterozygous condition results in blue plumage. List the genotypic and phenotypic ratios expected from the crosses: Black : Blue : White

		Genotypic Ratio	Phenotypic ratio
(a) black X blue	$F^BF^B \times F^BF^b \rightarrow$	2:2:0	2:2:0
(b) blue X blue	$F^BF^b \times F^BF^b \rightarrow$	1:2:1	1:2:1
(c) blue X white	$F^bF^b \times F^bF^b$	0:2:2	0:2:2

4. Two carnations (flowers), a red one and a white one, are crossed and the F2 offspring have three different genotypes. If this gene shows incomplete dominance, what is the color of the heterozygous plants?

   Pink

5. In guinea pigs, coat color is determined by at least three alleles. Yellow is homozygous dominant, two other colors are also possible; white and ecru (cream-coloured). Which is the homozygous recessive color? white

Determine the expected genotype and phenotype ratio of the F1 generation which would result from:

(a) a cross between two cream-coloured guinea pigs $Y_y \times Y_y$ 1:2:1 (both ratios)

(b) a yellow-coated and cream-coated animal breeding $YY \times Y_y$ 2:2:0 (" ")

6. On a fox ranch, a mutation arose that gave a "platinum" coat colour that was very popular with fur buyers. The breeders couldn't breed a pure strain of platinum foxes; every time they bred two platinum foxes together, there were some normal foxes in the progeny. For example, in repeated matings of the same platinum foxes, 82 platinums and 38 normal offspring were produced. State a concise genetic hypothesis to account for these results.

Platinum is heterozygous and incomplete dominance

Bb BB bb

7. In dogs, gum coloration is co-dominant, with black exerting dominance over pink. You have a lovely spotted gummed Labrador retriever who has just had 8 pups. Four of the pups have spotted gums like your dog, and 4 have pink gums. What is the likely phenotype of the sneaky neighbor dog?

Bb × ____ → bb (pink)

4 Bb 4 bb

Blood Types and Multiple Alleles

1. In a maternity ward, four babies become accidentally mixed up. The ABO blood types of the four babies are known to be: Baby Jane is O, Baby John is A, Baby Christopher is B, and Baby Robin is AB. The ABO types of the four sets of parents are determined as such: The Andersons are AB and O, the Browns are A and O, the Christiansons are A and AB, and the Dietrichs are O and O. Indicate which baby belongs to each set of parents.

Andersons – ~~John~~ or Christopher

Browns – ~~Jane~~ or John

Christiansons – Robin

Dietrichs – Jane

The probability that a mother with blood type O and a father with genotype I^Bi would have a child with blood type O is 1/2.

	B	i
i	B	ii
i	B	ii

The probability that a father with genotype *ii* and a mother with blood type AB would have a son with blood type B is 1/2.

Dihybrid Cross Questions

1. What would be the expected phenotypic ratio of the F1 offspring if a heterozygous, tall round pea plant pollinated itself? Tall is dominant to short, and round is dominant to wrinkled in pea plants. TtRr x TtRr 9:3:3:1

2. Long legs (*L*) in racing horses is dominant to short legs (*l*). Good muscle tone (*G*) is dominant to weak muscle tone (*g*). Determine the phenotypes of the F1 generation resulting from a cross between a heterozygous long legged, weak muscled horse and a heterozygous long legged, strong horse? Llgg x LlGg →

   (a) Determine the phenotypes of the offspring if the genotypes of the mare was *LLGg* and the stud was *LlGg*. →

3. In poultry, a crested head is produced by a dominant gene (*C*) and plain head is its recessive allele (*c*). Black feather colour (*B*) is dominat to red feathers (*b*). A homozygous black feathered, plain headed bird is mated with a homozygous red feathered, crested headed bird. BBCC x bbcc

   (a) Determine the F1 genotypes and phenotypes. BbCc Black plain
   (b) If the F1 birds were allowed to mate with each other, what phenotypic and genotypic ratios are expected from the F2 generation?

   9:3:3:1

Sex-Linked Questions

1. Red/ green colour blindness in humans is a sex-linked recessive trait. In a large family in which all the daughters have normal visions and all the sons are colourblind, X^cY what are the probable genotypes of the parents?

   mom: X^cX Dad XY

2. If a normal sighted woman whose father was colourblind marries colour blind man, what percentage of their sons will be colour blind? What percentage of their daughters will be colour blind? X^cX x X^cY 50% 50%

3. If a normal woman carrying the sex linked gene for colour blindness marries a normal male, what percentage of their sons will be colour blind? What if she marries a colour blind male? X^cX x XY 50% 50%

4. Baldness is a recessive sex-linked trait. If a normal headed woman whose father is bald, has children with a normal headed man, whose father was bald, what will be the genotypes and phenotypes of their children?

   X^bX x XY

   XX XY
   X^bX X^bY

   normal female ½ normal male
   ½ bald male