Chapter 2 review questions

1. **Vocabulary**

Match the phrases to the terms below. Each term may be used once, more than once, or not at all

Phrases

An alternative form of a gene at a locus

Describes an allele that needs 2 copies to be present to produce its phenotype

An example of a disorder caused by a dominant allele

Describes an allele that produces a particular phenotype even when only one copy is present

The genetic constitution of an individual, or the combination of alleles at a particular locus

An example of a disorder caused by a recessive allele

Cell division during which crossing-over occurs

Type of cell division that occurs in ovaries and testes, producing gametes.

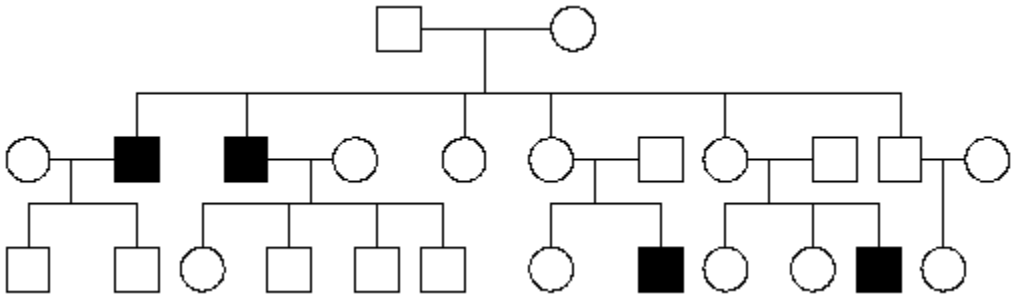
A basic unit of inheritance, found on a chromosome

Said to be present for genes close together on a chromosome

Terms

Allele	Amino acid	Chromatid	Chromosome
Dominant	Gamete	Gene	Genotype
Huntington disease		Linkage	Locus
Meiosis	Pedigree	Phenotype	Phenylalanine
Phenylketonuria		Protein	Recessive
Recombination			

2.



What mode of inheritance does this pedigree show?

Give 2 reasons for your answer

3. Two highly inbred strains of mice (homozygous at all loci) have the following phenotypes:

STRAIN A resistant to the treatments toyotamycin (tym-r) and datsunin (dat-r) but sensitive to hondamycin (hdc-s)

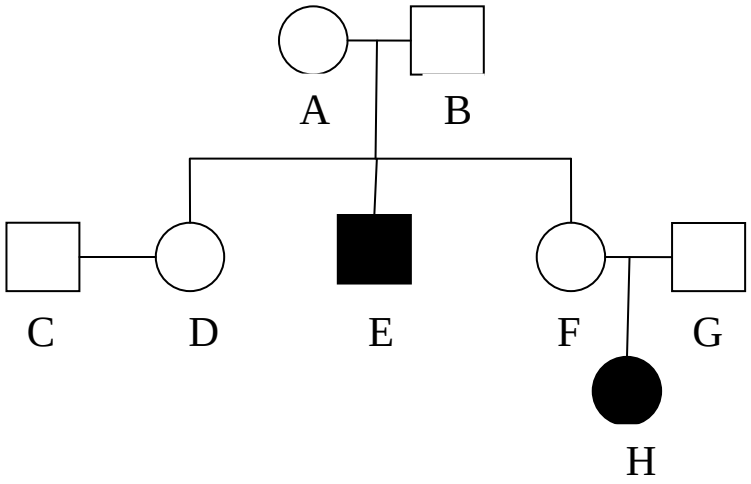
STRAIN B sensitive to toyotamycin (tym-s) and datsunin (dat-s) but resistant to hondamycin (hdc-r)

Resistance or sensitivity is known to be controlled by 3 unlinked genes.

From the results of the following crosses, decide whether the alleles controlling reaction to these treatments are autosomal, sex-linked or cytoplasmic (inherited from the mother only)

Strain A female x Strain B male	Strain B female x Strain A male
↓	↓
females are tym-r dat-r hdc-r	females are tym-s dat-r hdc-r
males are tym-r dat-r hdc-s	males are tym-s dat-r hdc-r

4. Consider the following pedigree for PKU, an autosomal recessive disorder



Assume that there are no newly arising mutations.
Use the symbol K for the normal allele and k for the PKU allele

i. Write down the genotypes of individuals A, B, E , F, G and H
ii. If the probability of being an unaffected carrier is .02 (ie 1 in 50) , what is the probability that two carriers would mate by chance?
iii. If D is a carrier and C is homozygous normal, what is the probability that a child of theirs will have PKU?
iv. If D is a carrier and C is also a carrier and they go on to have 2 children, what is the probability that both children will be unaffected?

ANSWERS

1. allele, recessive, Huntington disease, dominant, genotype, phenylketonuria, meiosis, meiosis, gene, linkage

2. X linked recessive since only males affected and affected males have no affected children whilst affected males have unaffected parents.

3. tym is cytoplasmic

dat resistance is autosomal dominant

hdc resistance is X linked dominant

4. i. A=Kk B=Kk E=kk F=Kk G=Kk H=kk
ii. Probability = 0.02 x 0.02 = 0.0004 (ie 4 in 10,000)
iii. Probability = 0 (not possible)
iv. Probability of unaffected child = 0.75, so probability of 2 unaffected children is 0.75 x 0.75 = 0.5625 (ie. just over 56%)