Practice problems

Here are some practice problems.

In addition use the web, your textbook, and MS biology to work an array of practice problems.

This set of problems is just a example of SOME OF THE the sorts of problems you may be asked to address.

Problem: You decide against your better judgment to host a dinner party. Including you and your partner a total of five couples will attend. You have a dining table with five chairs on the left side and five chairs on the right side so that you can seat everyone. You do not assign seating except that you stipulate that the members of each couple must be seated on different sides of the table. Question: How many different ways can the 5 couples be seated at the table following the above "rules" ?

The gene that governs the sense of humor in humans has two alleles (H, h) with the the ability to find life humorous at times being determined by the presence of the dominant allele, "H". How many humor alleles are present in the DNA of each human somatic cell?

a = 16 b = 8 c = 4 d = 2 e = 1

How many humor alleles are present in the DNA of each human prereproductive cell after Meiosis I is complete but before Meiosis II begins?

a = 16 b = 8 c = 4 d = 2 e = 1

How many humor alleles are present in a mature human reproductive cell (gamete) after both Meiosis I and II have been completed? a = 16 b = 8 c = 4 d = 2 e = 1

Given two alternative alleles of the H gene, how many different genotypes are present in human populations at this locus? a = 1 b = 2 c = 3 d = 6 e = 9

Let Y and R designate alleles for each of two genes.

Assume 1) dominance between alleles for each gene (Y > y; R > r);
2) both genes assort independently following Mendel's 2nd law;
3) gene Y governs fruit color: Y_ individuals = YELLOW and yy = WHITE;
4) gene R governs fruit texture: R_ individuals = ROUND and rr = WRINKLED.

Scenario: A plant heterozygous at both loci is crossed with a homozygous recessive plant.

How many different gamete genotypes can the heterozygous individual produce?

A = 1 B = 2 C = 4 D = 8 E = 16

How many different gamete genotypes can the homozygous recessive individual produce?
A = 1 B = 2 C = 3 D = 4 E = 6

What percent of the offspring are expected to be heterozygous at one or both loci?
A = 0 B = 25 C = 50 D = 75 E = 100

A male has genotype **AaBbCcDD** Assume that the four genes are <u>each on different chromosomes</u>. How many different genotypes of sperm can the male produce?
A = 1 B = 2 C = 4 D = 8 E = 16

Suppose two individuals of genotype **AabbCc** are mated. Assuming that the genes are not linked, what is the probability of producing an offspring that is heterozygous for both A and C and recessive for b
A = 1/8 B = 1/64 C = 1/256 D = 1/16 E = 1/4

A man who carries an allele of an X-linked gene will pass it on to _____. A = half of his daughters
B = half of his sons C = all of his sons D = all of his children E = all of his daughters

Given that the number of **pairs of homologous chromosomes** in somatic cells of a **diploid** sexually reproducing animal is 20, how many total chromosomes would be found in a typical somatic cell in this species? A = 20/2=10 B = 1 x 20=20 C = 2 x 20= 40 D = 20+10=30 E = 40+10=50

What is the haploid number of chromosomes in the above species?
A = 20 B = 40 C = 60 D =1023 E = Insufficient information to answer the question

You have four kids What is the exact probability that the offspring are all females?
A = 4 x ½ B = 1/8 C = 1/16 D=1/32 E=none of the above

In humans, ABO blood types refer to glyocproteins in the membranes of red blood cells. There are three alleles for this autosomal gene: A, B, and O. If a woman with type AB blood has offspring with a man with type O blood, which of the following blood types could their children possibly have?

A) = AB and O B) = AB C) = A, B, and O D) = A, B, and AB E = A, B

What is the ratio of alternate phenotypes in the offspring produced by the cross Aa X Aa? Assume complete dominance for the trait (A > a)?

A = 100% dominance
B = 100% recessive
C = 75% dominant: 25% recessive
D = 50% dominant: 50% recessive
E = 25% dominant: 75% recessive

Gray seed color in peas is dominant to white. Assume that plants with gray seeds were crossed among themselves, and the following progeny were produced: 302 gray and 98 white.

(a) What is the most probable genotype of each parent?

(b) what genotypic & phenotypic ratios are expected in the progeny? (G = gray and g = white.)

A = (a) Gg × Gg; (b) genotypic = 3:1, phenotypic = 9:3:3:1
B = (a) GG × Gg; (b) genotypic = 1:2:1, phenotypic = 2:1
C = (a) GG × gg; (b) genotypic = 3:1, phenotypic = 1:2:1
D = (a) Gg × Gg; (b) genotypic = 1:2:1, phenotypic = 3:1
E = (a) gg × Gg; (b) genotypic = 1:2, phenotypic = 3:1

A homozygous tomato plant with red fruit and yellow flowers (RRYY) was crossed with a homozygous tomato plant with golden fruit and white flower(rryy). The F1 all had red fruit and yellow flowers. The F1 was allowed to mate and following phenotypes were obtained in the F2 generation

Red fruit and yellow flowers—31
Red fruit and white flowers—17
Golden fruit and yellow flowers—18
Golden fruit and white flowers—34

Are the two traits linked on one chromosome or are they on different chomosomes?

a) on different chromosomes
b) linked
c) insufficient information to determine

If the two genes are on different chromosomes How many map units separate the fruit color and flower color genes?

A = Not on different chromosomes hence there is no map unit distance
B = 17
C = 31
D = 35
E = 48