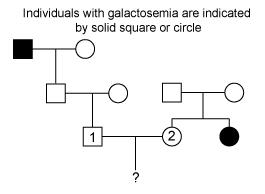
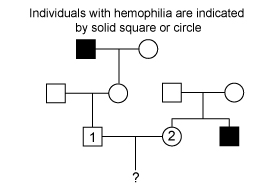
**Homework 1 - Due 01/12/2018**

1. A biologist examines a series of cells and counts 160 cells in interphase, 20 cells in prophase, 6 cells in prometaphase, 2 cells in metaphase, 7 cells in anaphase, and 5 cells in telophase. If the complete cell cycle requires 24 hours, what is the average duration (in hours) of the M phase in these cells?
   1. 4.8 hours
2. Assuming that a G1 somatic cell nucleus in M. pilosula female contains 8 picograms of DNA. How much DNA would be expected in a Metaphase II cell of a female?
   1. 8 picograms
3. Regarding cell divisions, which of the following statements is correct?
   1. Incorrect In meiosis, crossovers occur in prophase II.
   2. Incorrect Meiosis is typically seen in somatic cells.
   3. **Correct: In meiosis, homologous chromosomes pair at metaphase.**
   4. Incorrect In mitosis, DNA replication occurs in prophase.
   5. Incorrect Synaptonemal complexes are found in mitosis.
   6. Incorrect Meiosis II is also known as the reductional division.
4. The wild-type (normal) fruit fly, Drosophila melanogaster, has straight wings and long bristles. Mutant strains have been isolated that have either curled wings of short bristles. The genes representing these two mutant traits are located on separate autosomes. Carefully examine the data from the crosses shown below (The numbers represent the number of progeny). Abbreviations: Str=straight wings, Cur=curled wings, Sh=short bristles, Lg=long bristles. Based on the results, which of the following statement is correct?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parental Cross** | **Str, Lrg** | **Str, Sh** | **Cur, Lg** | **Cur, Sh** |
| Str, Sh x Str, Sh | 30 | 90 | 10 | 30 |
| Str, Lg x Str, Lg | 120 | 0 | 40 | 0 |
| Cur, Lg x Str, Sh | 40 | 40 | 40 | 40 |
| Str, Sh x Str, Sh | 40 | 120 | 0 | 0 |
| Cur, Sh x Str, Sh | 20 | 60 | 20 | 60 |

* 1. Incorrect Both short bristle and curled wing are dominant
  2. **Correct: Short bristle is dominant and curled wing is recessive**
  3. Incorrect Both short bristle and curled wing are recessive
  4. Incorrect Short bristle is recessive and curled wing is dominant
  5. Incorrect The parents of cross 1 are homozygous for both the wing and bristle traits

1. Consider the cross (capital letters represent the dominant traits) AaBbccDd × aaBbCcDd (a) What proportion of progeny will phenotypically resemble the first parent? Decimal answer only. (b) What proportion of progeny will genotypically resemble the first parent? Decimal answer only.
   1. 0.1400
   2. 0.0625
2. Black skin color is dominant to pink skin color in pigs. Two heterozygous black pigs are crossed. (a) If these pigs produce a total of four piglets, what is the probability that two will be pink and two will be black? Decimal answer only. (b) If these pigs produce a total of four piglets, what is the probability that three will be pink and one will be black? Decimal answer only. (c) If these pigs produce a total of four piglets, what is the probability that one will be pink and three will be black? Decimal answer only.
   1. 0.2100
   2. 0.0468
   3. 0.4218
3. As discussed in class, Drosophila males have XY and females have XX sex chromosomes. Both male and female fruit flies have three autosomes (2nd, 3rd, and 4th). Under normal conditions, wild type male germ cells do not undergo meiotic recombination. Based on these information, how many types of genotypically distinct germ cells can a Drosophila male generate?
   1. **Correct: 16**
   2. Incorrect 8
   3. Incorrect 4
   4. Incorrect 32
   5. Incorrect 2
4. Galactosemia is a autosomal recessive disorder affecting an individual’s ability to metabolize the sugar galactose properly. A man (1 in the pedigree below) whose paternal grandfather has galactosemia married a woman (2 in the pedigree) whose sister has galactosemia (the husband's and wife's parents are phenotypically normal). The couples are expecting their first child. What is the probability that their first child has galactosemia?
   1. 
   2. ?
5. Hemophilia is a X-linked recessive disorder affecting individual's blood clotting ability. A man (1 in the pedigree below) whose maternal grandfather has hemophilia married a woman (2 in the pedigree) whose brother has hemophilia (the husband's and wife's parents are phenotypically normal). The couples are expecting their first child. What is the probability that their first child has hemophilia? (Answer in decimal)
   1. 
   2. 0.1250

Grade: 8/9 = 89%