1. **Chapter 3**
   Basic Principles of Heredity
2. **Father of Genetics**
   - Mendel
   - Pea plants

3. **Terms**
   - Gene
   - Allele
   - Locus
   - Genotype
   - Phenotype
   - Heterozygote
   - Homozygote
     - Dominant
     - Recessive
4. **Monohybrid crosses**
   - P generation
   - F1 generation
     - Reciprocal crosses
   - F2 generation
     - 3:1 ratio

5.
   - Principle of Segregation (alleles)
     - Mendel's first law
     -
     - Meiosis
   -
6. **Predicting outcomes**
   - Punnett square
     - Backcross
   - Monohybrid Problems
     -
   -
7.
   - Punnett squares
     - Do not work well with complex questions
       - Parents Aa x Aa
       - Probability of having 3 children with albinism (aa)
   -
8.
   - Probabilities
     - Deck of 52 cards
     - Rolling a dice
     -
   - Multiplication rule
     - And
     - 1/6 X 1/6 = 1/36
   - Addition rule
     - either or
     - 1/6 + 1/6 = 1/3

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9
- Probability of having 3 children with albinism (and)
  - ¼ x ¼ x ¼ =1/64
- Probability of having 1 child with albinism and 2 normal (or)
  - ¼ x ¾ x ¾ =9/64
  - ¾ x ¼ x ¾ =9/64
  - ¾ x ¾ x ¼ =9/64
  - 9/64 + 9/64 + 9/64 = 27/64
- Probability of having 2 children with albinism and 3 normal?

10
- Binomial expansion & probability
  - $(a+b)^n$
    - a = probability of one event
    - b = probability of alternative event
    - n = number of times event occurs
    - Expansion
      - ☐$(a+b)^5 = a^5 + 5a^4b + 10a^3b^2 + 10a^2b^3 + 5ab^4 + b^5$
      - ☐Coefficient
        - ☐Previous term coefficient x a's exponent / # of term = next coefficient
      - ☐
    - Probability of having 2 child with albinism and 3 normal?
      - ☐$10a^2b^3 = 10(¼)^2 (¾)^3 = 270/1024 = .26$

11
- Problems from book
  - Page 68-69
    - 12, 13, 17, 18, 23, 24, 25, 26

12
- Practice problems
  - Group walk through on the board

13
- Testcross
- Incomplete dominance

14
- Symbols representing alleles
  - Wild type +
  - Upper case dominant
  - Lower case recessive
  - Ex:
    - Ln & ln
    - $Lfr_1$ & $Lfr_2$
    - $El^+$ /$El^R$ or +/ $El^R$

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15 **Dihybrid crosses**
- 9:3:3:1
- Principle of Independent assortment (loci)
  - Mendel's second law

16
- Branch diagrams
  - Same outcome as punnett squares

17 **How well do observed values fit expected**
- Probability that difference between observed & expected is due to chance.
- Example
  - Domestic Cats
    - ☐Balck (B)  Grey (b)
    - ☐
  - Cross a two heterozygous black cats.
    - ☐What ratio of black and grey do you expect in the offspring
    - ☐
    - ☐If there are 50 total offspring how many of each color do you expect
      - ☐Black expected x 50 =
      - ☐Grey expected x 50 =

    - ☐If 30 black and 20 gray are observed is the difference due to chance alone?

18 **Goodness-of-fit chi-square test**

<u>Only determines if chance alone could produce difference.</u>

Our cross produced 30 black & 20 gray
- null hypothesis – numbers due to chance
- Must use # of progeny
-

- Then determine degrees of freedom = n-1
  - N= number of different expected phenotypes
- Use table to determine if due to chance

19
20
21

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