

Math Review!

1. A cell with 1.2 M glucose concentration at 23 C has what as a Ψ_s ?

$$\Psi_s = -iCRT$$

$$-(1)(1.2)(0.0831)(296)$$

~~10.94~~ -29.52 bars
~~129.52~~ bars

2. If the cell from question #1 has a Ψ_p of -1 bars, what is Ψ of the cell?

$$-1 - 29.52$$

$$-30.52 \text{ bars}$$

3. The cell is placed in a beaker with a Ψ of -5 bars. What will happen to the cell? Justify your response.

$$\textcircled{-30.52} \text{ } -5 \text{ bars}$$

swell

More free water molecules on outside

4. A buffalo herd of 1000 has 490 showing the recessive trait. What are the genotypic frequencies if the population is in H-W?

$$.49 \quad q^2$$

$$.09 \quad p^2$$

$$.42 \quad 2pq$$

5. After 5,000 years, the buffalo herd is re-examined to see if evolution has occurred. The buffalo herd increased for some time, but then suffered a significant loss to the population during a 5-year drought in the region where they lived. 400 buffalo remain. 300 show the recessive trait. Use a Chi-square test to determine if evolution has occurred. Make sure to note which agent of evolution is likely to have had a role if evolution has occurred in the buffalo population.

| | O | E | $O - E$ | $(O - E)^2$ | |
|-----------|-----|--------------------|---------|-------------|-------|
| Dominant | 100 | 400 304 | -104 | 10,816 | 53.02 |
| Recessive | 300 | 196 | 104 | 10,816 | 55.78 |

$\chi^2 = 108.2$

6. 2 varieties of fruit flies mate. A fly with red eyes and white body is one of the parents, while a fly with white eyes and black body is the other parent. Out of 20,000 offspring, 5,000 have red eyes and a white body, 10,000 have red eyes and a black body, 2,000 have white eyes and a black body, and 3,000 have white eyes and a white body. You propose that eye color and body color are linked characters. Use a Chi-square test to determine if your hypothesis is supported by the evidence.

| | O | E | $O - E$ | $(O - E)^2$ | |
|---------------|---|-------------------------|---------|-------------|--------|
| Red / white | 1 | 5,000 10,000 | -5,000 | 25,000,000 | = 2500 |
| white / white | 0 | 3,000 | 3,000 | 9,000,000 | = 0 |
| red / black | 0 | 10,000 | 10,000 | 100,000,000 | = 0 |
| white / black | 1 | 2,000 | -8,000 | 64,000,000 | = 6400 |

$\chi^2 = 8,900$

7. A bandicoot is heterozygous for the character of fur color. Another bandicoot is also heterozygous for the character of fur color. Out of 15 offspring, 8 show the dominant phenotype and 7 show the homozygous recessive phenotype. Does this match the predicted pattern? Use a Chi-Square test to find out!

H h
 H HH Hh
 h Hh hh

| | O | E | O-E | $(O-E)^2$ | $\frac{(O-E)^2}{E}$ |
|-----------|---|-------|------|-----------|---------------------|
| Dominant | 8 | 11.25 | 3.25 | 10.56 | 0.938 |
| Recessive | 7 | 3.75 | 3.25 | 10.56 | 2.816 |

$$\chi^2 = 3.75$$

