Quiz 4 Key (Ave 94, high 100(7), low 67)
BI-102-2, Fall '06, Dr. C. S. Tritt

Please keep your answers concise (more words will not necessarily lead to more points). Use the amount of space provided as a guide as to how detailed to make your answers. This is a 4 question test, 2-sided! The first 2 are worth 20 points each, that last 2 are worth 30 points each.

1. Briefly explain the significance of the $G_0$ stage of the cell cycle.

$G_0$ is a waiting (called "resting" in the slide show) stage between the $G_1$ and S stages. Not mentioning $G_1$ or S or not indicating that some cells wait (and do their "jobs") in $G_0$ (rather than continuing with replication) was -2 points. Answering as if $G_0$ is a check point was -5. Saying or directly implying that the cell is "getting ready" to replicate was -4.

2. What is meant when meiosis is called a reductive process?

Because it starts with a diploid cell and produces (4) haploid cells. Describing sexual reproduction in general -15. Taking about crossing over, but eventually getting to the correct answer -1. Just saying it produces 4 daughter cells was -5.

3. A man with type A blood and a women with type B blood have children with the following blood types: AB, B and O. Tell me as much as you can about the genotypes of these parents.

The fact that a child with type O blood is produced indicates that both parents must have at least 1 i allele. In this case it means they must be heterozygous ($I^Ai$ and $I^Bi$).
Full credit was given for simply giving the Punnett square:

| | $I^A$ | i |
|---|---|---|
| $I^B$ | $I^AI^B$ (AB) | $iI^B$ (B) |
| i | $I^Ai$ (A) | ii (O) |

Using any set of reasonable symbols. Using symbols a and b to represent I was -3 (A and B and I and O were okay). Answering this problem as if blood type is sex linked was -20.

4. In my spare time, I've been breading and studying MSOE camels. In particular I've determined their eye colors are determined by just 2 genes. One of these genes controls the brownness of animals' eyes. This gene has 2 alleles. I call them B (the dominant form that results in brown eyes) and b (the recessive form that results in blue eyes). The other gene controls the greenness of their eyes. This gene also has 2 alleles. I call them G (the dominant form that results in green eyes) and g (the recessive form that results in blue eyes). These genes assort independently (they're not linked). Also, B is epistatic with respect to G and g meaning that B with either of these results in a brown eyed animal. Similarly, G is epistatic with b in that G with b results in green eyed animals.

   Now for the problem, predict the ratio of eye colors in the $F_2$ offspring when true breeding brown eyed animals that are homozygous recessive (g) for the greenness gene are crossed with true breeding green eyed animals and the resulting $F_1$ animals are self-crossed.

The parental generation consists of BBgg and bbGG animals so the F1 animals are all BbgG (double heterozygous) and would all have brown eyes. When these animals are self-crossed, the following gametes are possible BG, Bg, bG, bg. The Punnett square for this cross is:

| | BG | Bg | bG | bg |
|---|---|---|---|---|
| BG | BBGG (Brown) | BBGg (Brown) | BbGG (Brown) | BbGg (Brown) |
| Bg | BBgG (Brown) | BBgg (Brown) | BbgG (Brown) | Bbgg (Brown) |
| bG | bBGG (Brown) | bBGg (Brown) | bbGG (Green) | bbGg (Green) |
| bg | bBgG (Brown) | bBgg (Brown) | bbgG (Green) | bbgg (Blue) |

So the $F_2$ ratio is 12 (brown): 3 (green) to 1 (blue). Misreading the square (writing in the wrong genotype) was -6. Completely messing up the square (as in putting only B's on one edge and G's on the other) was -25 (even if you got the correct answer). Getting just one letter wrong -12.