Name: _____

Quiz 3B
BI-102-2, Fall '08, 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. **Answer all 6 questions on this 2-sided test.**

1. In which form, *condensed* or *uncondensed*, does DNA spend the majority of the cell cycle?

DNA spends most of it time in its uncondensed form. It only condenses during mitosis and meiosis. Half credit was given for saying it spends most of its time condensed but also indicating that it is only condensed during mitosis and meiosis.

2. Name and describe the purpose (in terms of why the cell cycle is halted at the point and/or what conditions are necessary for it to proceed) of any one of the 3 main checkpoints that occur during the cell cycle.

Any reasonable portion of the following any **one** of the following answers was accepted:

> G_1/S – Occurs during Interface. Internal signals include nutritional state & cell size. External signals include growth factors.
>
> G_2/M – Occurs at the end of Interphase. Proper DNA replication as indicated by M-phase-promoting factor (MPF) and p53.
>
> Spindle (or Metaphase) – Occurs between metaphase and anaphase. Allows mitosis to proceed only if all the chromosomes are correctly placed as indicated by anaphase promoting complex (APC).

Getting the name wrong -3, completely general answers -5. just describing interphase stages -7.

3. What is the difference between *proto-oncogenes* and *tumor-suppressor genes*?

Proto-oncogenes allow cancer to develop when they mutate to oncogene form. The normally exist in the proto-oncogene form. A single mutation (in either of the 2 copies a cell typically has) is sufficient to cause unrestricted proliferation. Having then genes get stuck "on" is bad. Examples include *Ras*, *Src*, *myc*, *fos* & *jun*.

Tumor-suppressor genes normally prevent cancer but allow it to develop when they mutate to non-functional forms. They are switched on in normal cells. Generally, both copies of these genes generally must mutate before cells proliferate excessively. Having these genes get switched "off" is bad. Examples include *p53* and *Rb*.

4. What is the difference between *gametes* and *somatic* cells?

Gametes are haploid cells involved in sexual reproduction (ova and sperm in animals). Somatic cells are diploid and make up the non-reproductive tissues of the body. The words *haploid* and *diploid* were not required, but should have been used.

Saying that diploid cells have two "copies" of the DNA was -3 (they have 2 versions of each chromosome).

5. What is the difference between *haploid* and *diploid* cells?

Haploid cells have a single set of chromosomes, while diploid cells have two sets.

Saying or implying haploid cells have only one chromosome and diploid cells have 2 chromosomes was -2 to 4 (depending on context and rest of answer). Saying diploid cells have 2 copies of each chromosome was -3 (cells have 2 versions of each chromosome).

6. What happens during *crossing-over* and why this is important?

During crossing-over sister chromatids exchange corresponding DNA segments. This is important because it increases genetic diversity (variation) in the offspring by creating new combinations of alleles on the chromosomes.

Saying that this produces variety in the "cells" was -1 or 2 (depending on context). Crossing over only occurs during meiosis and the point is to produce variety in the offspring.