IB HL Biology: Mitosis Review

1. How many chromosomes are in your somatic cells? 46
2. How many chromosomes are in your gametes? 23
3. How many chromatids are in one of your somatic cells that has duplicated its chromosomes prior to mitosis? 92
4. What are the three subphases of interphase? G1, s and G2
5. What key event happens during the S phase? DNA replication
6. What is MPF? Cyclin and Cyclin Dependent Kinase combined
   High MPF levels will trigger the cell to enter Mitosis
7. Describe the relative concentration of MPF and its constituent molecules throughout the cell cycle:
   MPF begins to build up during the S phase and reaches its peak at the end of G2 – high MPF is the trigger to move past the G2 checkpoint. Levels will decrease at anaphase when Cdk breaks down cyclin.
   Cdk levels remain constant throughout the cell cycle
   Cyclin If the cell moves past the G1 checkpoint it will begin to produce cyclin during the S phases. Levels will peak at the end of G2 and decrease at anaphase as Cdk begins to break down cyclin.

Fill in the blank: identify the appropriate phase of the cell cycle.

8. most cells that will no longer divide are in this phase ____G0_____
9. sister chromatids separate and chromosomes move apart anaphase
10. mitotic spindle begins to form ____ prophase ____
11. cell plate forms or cleavage furrow pinches cells apart ____ cytokinesis ____
12. chromosomes duplicate ____ S phase ____
13. chromosomes line up at central plane ____ metaphase ____
14. nuclear membranes form around separate d chromosomes ____ telophase ____
15. chromosomes become visible ____ prophase _____
16. A plant cell has 12 chromosomes at the end of mitosis. How many chromosomes would it have in the G2 phase of its cell cycle?
   a. 6
   b. 9
   c. 12
   d. 24
17. How many chromatids would this plant have in the G2 phase of its cell cycle?
   a. 6
   b. 9
   c. 12
   d. 24
   e. 48
18. The longest part of the cell cycle is
   a. prophase
   b. G1 phase
   c. G2 phase
   d. mitosis
   e. interphase
19. Humans have 46 chromosomes. That number of chromosomes will be found
   a. in cells in anaphase
   b. in egg and sperm cells
   c. in somatic cells (somatic cells = body cells)
   d. in all the cells of the body
   e. only in cells in G1; of interphase
20. A cell that passes the restriction point in G1 will most likely
   a. undergo chromosomes duplication
   b. have just completed cytokinesis
   c. continue to divide only if it is a cancer cell
   d. show a drop in MPF concentration
   e. move into the G0 phase
21. The rhythmic changes in cyclin concentration in a cell cycle are related to
   a. its increased production one the restriction point is passed
   b. the cascade of increased production once its enzyme is phosphorylated by MPF
   c. its degradation, which is initiated by active MPF
   d. the correlation of its production with the production of Cdk
22. Which of the following would not be exhibited by cancer cells?
   a. changing levels of MPF concentration
   b. passage through the restriction point
   c. density-dependent inhibition
   d. metastasis
   e. G1 phase of the cell cycle
23. What initiates the separation of sister chromatids?
   a. the drop in MPF concentration
   b. a rapid rise in Cdk concentration
   c. movement past the G2 checkpoint
   d. a signal pathway initiated by the binding of a growth factor
24. Which phases of mitosis are shown in the figures below.

1. According to cell theory all cells arise from pre-existing cells. The following diagram shows the cell cycle of a eukaryotic (body) cell of a diploid organism.

(a) Define the term diploid. (1)

(b) Identify the parts of the cell cycle labeled A and B. (2)

(c) State three activities that occur during part A of the cell cycle. (3)

(d) Outline the differences in cytokinesis in animal and plant cells. (3)

2. (a) State two processes that involve mitosis. (2)

(b) Explain the importance of the surface area to volume ratio as a factor limiting cell size. (3)

(c) State one difference between the proteins produced by free ribosomes and those produced by ribosomes attached to the endoplasmic reticulum. (1)