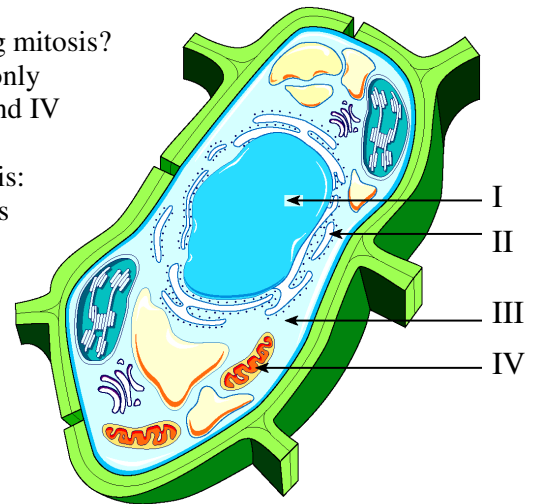


Review for Unit Test #3:
Cellular Reproduction: Mitosis, Meiosis, Karyotypes and Non-disjunction Disorders

1. The cell cycle is divided into:
 - a) interphase and mitosis
 - b) mitosis and meiosis
 - c) mitosis and cytokinesis
 - d) interphase and division
2. Cells divide by mitosis to:
 - a) decrease their surface area to volume ratio
 - b) increase the efficiency of diffusion
 - c) increase their genetic diversity
 - d) all of the above
3. Mitosis refers to division of the:
 - a) cell
 - b) nucleus
 - c) cytoplasm
 - d) homologous pairs
4. Prokaryotic cells do not carry out mitosis because they do NOT have:
 - a) RNA
 - b) DNA
 - c) a nucleus
 - d) genetic material

5. In the diagram to the left, which part of the cell is replicated during mitosis?
 - a) I only
 - b) I and II only
 - c) I and IV only
 - d) I, II, III and IV



6. The type of cells that usually spends the longest time in interphase is:
 - a) cells that line the stomach and intestine
 - b) red blood cells
 - c) nerve cells
 - d) skin cells

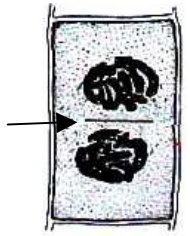
7. Which is the correct order of the stages of mitosis?
 - a) metaphase, anaphase, telophase, prophase
 - b) prophase, anaphase, metaphase, telophase
 - c) telophase, metaphase, anaphase, prophase
 - d) prophase, metaphase, anaphase, telophase

8. Which of the following organelles is directly involved in mitosis?
 - a) centrioles
 - b) the nucleolus
 - c) ribosomes
 - d) Golgi bodies

9. Which of the following statements is correct?
 - a) DNA is wound around histone proteins to make chromatin
 - b) DNA is wound around histone proteins to make chromosomes
 - c) DNA is wound around ribosomes to make chromatin
 - d) chromatin is wound around histone proteins to make chromosomes

10. Mitosis is important in ALL of the following processes EXCEPT:
 - a) growth and repair of body tissues
 - b) replacing old or dying cells
 - c) creating gametes
 - d) cell division in zygotes
11. During which stage of the cell cycle does chromatin coil into chromosomes?
 - a) G1 of interphase
 - b) S of interphase
 - c) G2 of interphase
 - d) prophase
12. During which stage of the cell cycle does DNA replicate?
 - a) G1 of interphase
 - b) S of interphase
 - c) G2 of interphase
 - d) prophase
13. During which stage(s) of the cell cycle is DNA present as chromatin?
 - a) G1 of interphase
 - b) S of interphase
 - c) G2 of interphase
 - d) all of these
14. Which of the following are somatic cells?
 - a) ova (eggs)
 - b) sperm cells
 - c) cheek cells
 - d) all of these are somatic
15. Which is the final step of cell division?
 - a) anaphase
 - b) telophase
 - c) cytokinesis
 - d) interphase

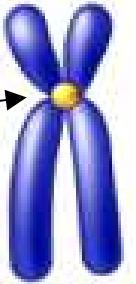
16. In the diagram of the cell on the right, the arrow is pointing at the:
- a) spindle fiber b) cleavage plane c) cell plate d) centromere



17. Which of the following is/are important in order for DNA to perform its functions?
- a) it is capable of being significantly condensed
 b) it has a “built in” template for replication
 c) it can code for 20 different amino acids using a combination of only four nucleotides
 d) all of the above

18. The diagram to the right represents:

- a) one duplicated chromosome c) one chromatid
 b) one unduplicated chromosome d) one homologous pair of chromosomes



19. In the diagram to the right, the arrow is pointing to a circle which represents a:
- a) sister chromatid b) centrosome c) centromere d) centriole

20. During mitosis, sister chromatids are separated to form two unduplicated chromosomes in:
- a) interphase b) prophase c) metaphase d) anaphase

21. Which of the following does **NOT** take place in prophase of mitosis?

- a) the DNA is replicated c) the nuclear membrane dissolves
 b) spindle fibers begin to form d) chromatin condenses into chromosomes

22. During which stage of the cell cycle is the DNA replicated?

- a) Gap 1 b) Synthesis c) Gap 2 d) prophase

23. During what stage of the cell cycle do the spindle fibers form?

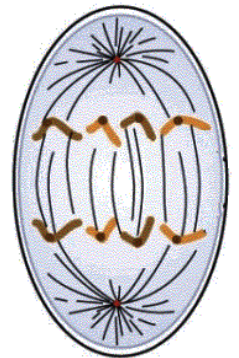
- a) interphase b) metaphase c) prophase d) anaphase

24. During what stage of the cell cycle does the nuclear membrane dissolve and disappear?

- a) interphase b) cytokinesis c) prophase d) Gap 2

25. The cell shown to the right is in which phase of mitosis?

- a) anaphase b) metaphase c) telophase d) prophase



26. The function of the centrioles is to:

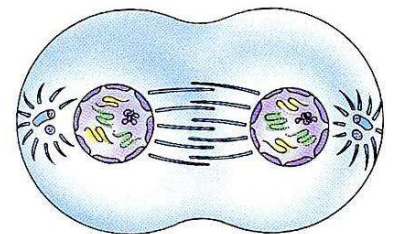
- a) produce the spindle fibers
 b) hold the chromosomes together when they line up at the centre of the cell
 c) package and store proteins until they are needed
 d) cause the cell wall to dissolve when plant cells undergo mitosis

27. During which phase of mitosis do individual chromosomes first become distinctly visible?

- a) interphase b) metaphase c) prophase d) anaphase

28. The cell shown to the right is in which phase of mitosis?

- a) cytokinesis c) metaphase
 b) prophase d) telophase



29. The process of mitosis ensures that:

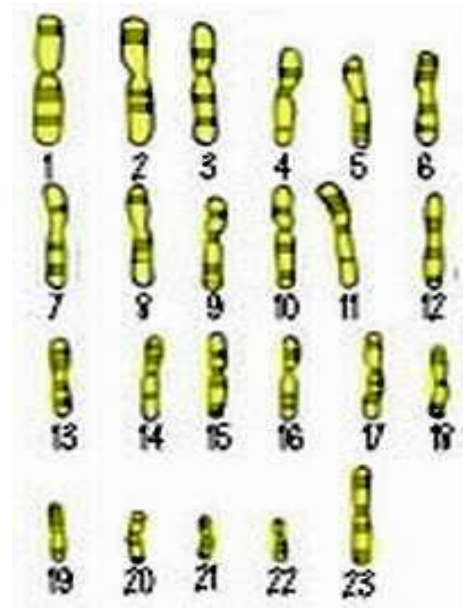
- a) each new cell is genetically different from its parent
 b) each new cell receives the proper number of chromosomes
 c) cells will divide at the appropriate time
 d) DNA is replicated without errors

30. A cell with 10 chromosomes undergoes mitosis and cell division. How many daughter cells are produced and what number of chromosomes do they have?

- a) 2 daughter cells with 5 chromosomes each c) 2 daughter cells with 10 chromosomes each
 b) 4 daughter cells with 5 chromosomes each d) 4 daughter cells with 10 chromosomes each

31. Which of the following types of cells will reproduce the most quickly?
 a) skin cells b) muscle cells c) nerve cells d) all cells divide at the same rate
32. One of the most common forms of cystic fibrosis is caused by:
 a) a point mutation (base pair substitution) c) a frameshift mutation
 b) eating too much high fat food d) a mother getting a virus during pregnancy

33. The human karyotype shown to the right:
 a) is haploid c) is from a gamete
 b) shows 23 chromosomes d) all of the above



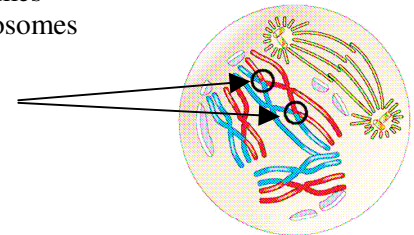
34. The human karyotype shown to the right has:
 a) 1 autosome c) 22 autosomes
 b) 4 autosomes d) 23 autosomes
35. The human karyotype shown to the right could be from:
 a) a zygote c) a somatic cell
 b) a sperm cell d) all of the above

36. The process of meiosis begins with:
 a) diploid cells and ends with diploid cells
 b) haploid cells and ends with haploid cells
 c) diploid cells and ends with haploid cells
 d) haploid cells and ends with diploid cells

37. Crossing-over takes place during:
 a) anaphase I b) prophase I c) interphase I d) metaphase I

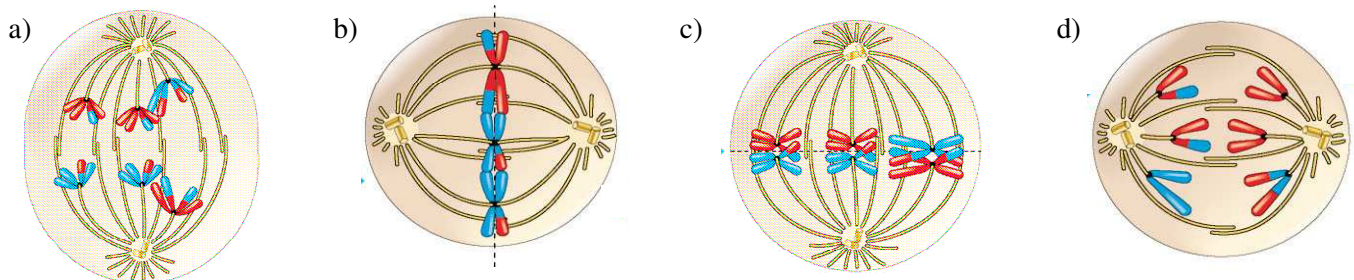
38. During *mitosis*, a parent cell with four chromosomes will produce two daughter cells, each with:
 a) two chromosomes c) four chromosomes
 b) eight chromosomes d) sixteen chromosomes

39. What is the name of the circled regions in the diagram to the right?
 a) zygotes c) centrosomes
 b) chiasmata d) centrioles



40. What is the name of the stage of meiosis in the cell in question 39?
 a) interphase I b) prophase I c) metaphase I d) prophase II

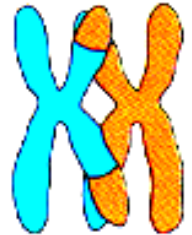
Answer questions 41 – 43 about the cells shown below:



41. Cell 'a' is in which stage of meiosis?
 a) anaphase I b) telophase I c) anaphase II d) telophase II
42. Which of the cells above show independent (random) assortment?
 a) cell 'a' b) cell 'c' c) cell 'd' d) both 'b' and 'd'
43. Cell 'b' is in which stage of meiosis?
 a) metaphase I b) metaphase II c) anaphase I d) anaphase II

44. DNA is replicated during which phase(s) of meiosis?
 a) interphase I b) prophase I c) interphase II d) both 'a' and 'c'
45. Which stage of meiosis is responsible for producing haploid cells?
 a) interphase I b) interphase II c) anaphase I d) telophase II
46. Synapsis and crossing over:
 a) takes place during prophase I c) mixes genes from non-sister chromatids
 b) increases genetic diversity d) all of the above
47. If a cell with 32 chromosomes divides by meiosis, how many chromosomes will each nucleus contain after telophase I and cytokinesis have occurred?
 a) 64 b) 32 c) 16 d) 8

48. Following the cell from the question above, how many chromosomes will each nucleus contain after telophase II and cytokinesis have occurred?
 a) 64 b) 32 c) 16 d) 8



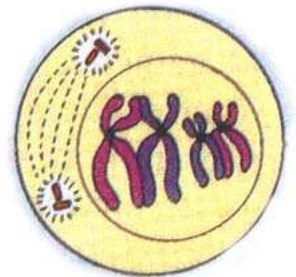
49. The diagram to the right shows:
 i) one tetrad
 ii) one homologous pair
 iii) four chromatids
 iv) two chromosomes
 a) i only b) i and ii only c) iii and iv only d) i, ii, iii and iv

50. Turner's syndrome has the genotype:
 a) XXY b) XYY c) XO d) XXX

51. A student has trisomy XXY. They will probably be a:
 a) slightly feminine boy c) slightly masculine girl
 b) very feminine girl d) very masculine boy

52. Trisomy 21 is also known as:
 a) Patau syndrome b) Edwards syndrome c) Klinefelter's syndrome d) Down syndrome

53. The pairing up of homologous chromosomes (shown to the right) is called:
 a) synapsis c) segregation
 b) homology d) mutation



54. Prophase I of meiosis is different from prophase of mitosis because in meiosis I:
 a) no spindle fibers form c) tetrads form
 b) the nuclear membrane stays intact d) the cell is haploid

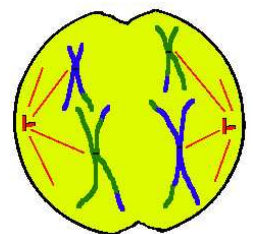
55. When crossing over is complete, the tetrads are made up of:
 a) four identical chromatids c) four different chromatids
 b) two identical homologous pairs d) four different homologous pairs

56. Non-disjunction means that homologous chromosomes:
 a) do not cross over during synapsis c) do not separate from one another during anaphase
 b) do not replicate during interphase d) have serious mutations

57. Synapsis is the name of the process when:
 a) sister chromatids join at a centromere c) homologous pairs join at a centromere
 b) sister chromatids pair all along their length d) homologous chromosomes pair all along their length

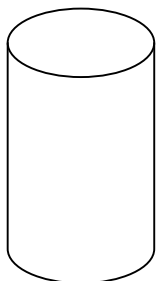
58. The stages of mitosis and meiosis which are the most similar are:
 a) prophase in mitosis and prophase I in meiosis c) prophase in mitosis and prophase II in meiosis
 b) metaphase in mitosis and metaphase I in meiosis d) interphase in mitosis and interphase II in meiosis

59. The jimson weed plant normally has 12 chromosomes in its stem and leaf cells. How many chromosomes will the pollen from jimson weed have?
 a) 4 b) 6 c) 12 d) 24
60. Meiosis can be carried out by cells in the:
 a) liver b) testes c) skin d) all of the above
61. In anaphase I, which of the following structures separate and move to opposite poles?
 a) sister chromatids b) centromeres c) homologous pairs d) centrioles
62. In telophase I of meiosis, the two daughter cells are:
 a) identical and haploid c) non-identical and haploid
 b) identical and diploid d) non-identical and diploid
63. If a zygote has 4 chromosomes, the somatic cells formed from it will have:
 a) 2 chromosomes b) 4 chromosomes c) 8 chromosomes d) 16 chromosomes
64. What separates during Anaphase II?
 a) the cytoplasm b) sister chromatids c) homologous chromosomes d) tetrads
65. The process of production of sperm and eggs is called:
 a) gametogenesis b) patagonia c) ovulation d) fertilization
66. After fertilization, the resulting zygote divides by:
 a) mitosis b) meiosis c) binary fission d) synapsis
67. The major advantage of meiosis is that it increases the:
 a) genetic stability of the individual c) genetic stability of the species
 b) genetic diversity of the individual d) genetic diversity of the species
68. The nuclear membrane is ALWAYS visible during which stage of both mitosis and meiosis?
 a) interphase b) prophase c) metaphase d) anaphase
69. Which of the following stages of interphase and processes are correctly paired?
 a) Gap 1, the centrioles are replicated c) Gap 2, the nucleus is replicated
 b) Synthesis, proteins are replicated d) Gap 1, all organelles except the nucleus are replicated
70. Which of the following is a reduction division?
 a) mitosis b) meiosis I c) meiosis II d) cytokinesis
71. A cell which contains two copies of each chromosome is:
 a) haploid b) diploid c) tetraploid d) a gamete
72. A zygote has 8 chromosomes. Which statement is true?
 a) the zygote is diploid c) the zygote will reproduce by mitosis
 b) the gametes would have had 4 chromosomes d) all of the above
73. Oogenesis results in:
 a) one viable egg b) one viable sperm c) four viable eggs d) four viable sperm
74. The cell in the diagram shown to the right is in:
 a) mitosis b) anaphase I c) anaphase II d) synapsis
75. Which of the following is an example of a non-disjunction disorder?
 a) Down syndrome c) cystic fibrosis
 b) hemophilia d) red-green colour blindness

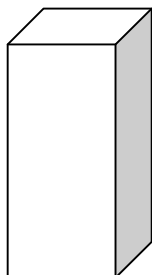


76. Which organelles reproduce by binary fission, independently of the cell cycle (mitosis or meiosis)?
 a) mitochondria b) Golgi apparatus c) endoplasmic reticulum d) spindle fibers
77. Sister chromatids are present during:
 a) mitosis but not meiosis c) both mitosis and meiosis
 b) meiosis but not mitosis d) cytokinesis
78. Crossing over during prophase I introduces genetic diversity by:
 a) genetic recombination c) independent assortment
 b) binary fission d) all of the above
79. During DNA replication, the enzyme that unwinds and unzips the double helix is called:
 a) unwindase b) helicase c) DNA polymerase d) protease
80. In which of the following cells will diffusion be most efficient?

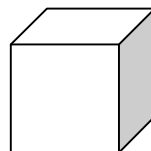
a)



b)



c)



d)



1. d	11. d	21. a	31. a	41. a	51. a	61. c	71. b
2. b	12. b	22. b	32. a	42. c	52. d	62. c	72. d
3. b	13. d	23. c	33. d	43. b	53. a	63. b	73. a
4. c	14. c	24. c	34. c	44. a	54. c	64. b	74. b
5. a	15. c	25. a	35. b	45. c	55. c	65. a	75. a
6. c	16. c	26. a	36. c	46. d	56. c	66. a	76. a
7. d	17. d	27. c	37. b	47. c	57. d	67. d	77. c
8. a	18. a	28. d	38. c	48. c	58. c	68. a	78. a
9. a	19. c	29. b	39. b	49. d	59. b	69. d	79. b
10. c	20. d	30. c	40. b	50. c	60. b	70. b	80. d