***Campbell's Biology: Concepts and Connections, 7e* (Reece et al.)**
Chapter 8 The Cellular Basis of Reproduction and Inheritance

8.1 Multiple-Choice Questions

1) The creation of genetically identical offspring by a single parent, without the participation of sperm and egg, is called
A) asexual reproduction.
B) sexual reproduction.
C) regeneration.
D) spontaneous generation.
Answer: A
Topic: 8.1
Skill: Knowledge/Comprehension

2) Which of the following statements regarding sexual and asexual reproduction is *true*?
A) Cell division only occurs after sexual reproduction.
B) Only offspring from asexual reproduction inherit traits from two parents.
C) Sexual reproduction typically includes the development of unfertilized eggs.
D) Sexual reproduction is more likely to increase genetic variation than is asexual reproduction.
Answer: D
Topic: 8.1
Skill: Knowledge/Comprehension

3) Strictly speaking, the phrase "like begets like" refers to
A) all forms of reproduction.
B) sexual reproduction only.
C) asexual reproduction only.
D) production of gametes from a premeiotic cell.
Answer: C
Topic: 8.1
Skill: Knowledge/Comprehension

4) Asexual reproduction requires _____ individual(s).
A) 0
B) 1
C) 2
D) 3
Answer: B
Topic: 8.1
Skill: Knowledge/Comprehension

5) With the exception of identical twins, siblings who have the same two biological parents are likely to look similar, but not identical, to each other because they have
A) identical chromosomes, but different genes.
B) identical genes but different chromosomes.
C) the same combination of traits, but different genes.
D) a similar but not identical combination of genes.
Answer: D
Topic: 8.1
Skill: Knowledge/Comprehension

6) Which of the following statements regarding cell division is *false*?
A) Cell division can reproduce an entire organism.
B) Cell division is necessary for development to occur.
C) Cell division is the basis of both sexual and asexual reproduction.
D) Cell division is common in eukaryotes but rare in prokaryotes.
Answer: D
Topic: 8.1
Skill: Knowledge/Comprehension

7) Which of the following statements regarding prokaryotes is *false*?
A) Prokaryotic chromosomes are more complex than those of eukaryotes.
B) Most prokaryotes reproduce by binary fission.
C) Prokaryotic cells are generally smaller and simpler than eukaryotic cells.
D) In prokaryotes, daughter chromosomes are separated by an active movement away from each other and the growth of a new plasma membrane between them.
Answer: A
Topic: 8.2
Skill: Knowledge/Comprehension

8) Eukaryotic chromosomes differ from prokaryotic chromosomes in that they
A) are simpler.
B) are circular in structure.
C) include fewer proteins.
D) are housed in a membrane-enclosed nucleus.
Answer: D
Topic: 8.3
Skill: Knowledge/Comprehension

9) Which of the following helps maintain the structure of chromosomes and control the activity of genes?
A) the nuclear membrane
B) proteins
C) centromeres
D) ribosomes
Answer: B
Topic: 8.3
Skill: Knowledge/Comprehension

10) Sister chromatids are
A) found right after a cell divides.
B) joined together at a centromere.
C) made only of DNA.
D) unique to prokaryotes.
Answer: B
Topic: 8.3
Skill: Knowledge/Comprehension

11) Prior to mitosis, each chromosome of a eukaryotic cell consists of a pair of identical structures called
A) chromatin.
B) sister chromosomes.
C) nucleoli.
D) sister chromatids.
Answer: D
Topic: 8.3
Skill: Knowledge/Comprehension

12) Eukaryotic cells spend most of their cell cycle in which phase?
A) interphase
B) prophase
C) metaphase
D) telophase
Answer: A
Topic: 8.4
Skill: Knowledge/Comprehension

13) Which of the following occurs during interphase?
A) a reduction in the size of the nuclear membrane
B) cytokinesis
C) cell growth and duplication of the chromosomes
D) separation of newly formed DNA to opposite ends of the cell
Answer: C
Topic: 8.4
Skill: Knowledge/Comprehension

14) The genetic material is duplicated during
A) the mitotic phase.
B) G_1.
C) the S phase.
D) G_2.
Answer: C
Topic: 8.4
Skill: Application/Analysis

15) The process by which the cytoplasm of a eukaryotic cell divides to produce two cells is called
A) mitosis.
B) cytokinesis.
C) binary fission.
D) telophase.
Answer: B
Topic: 8.4
Skill: Knowledge/Comprehension

16) Looking into your microscope, you spot an unusual cell. Instead of the typical rounded cell shape, the cell has a very narrow middle separating two bulging ends. It sort of looks like the number 8! Then you realize that this cell is
A) undergoing cytokinesis.
B) in the S phase of interphase.
C) in the G1 phase of interphase.
D) about to undergo mitosis.
Answer: A
Topic: 8.4
Skill: Application/Analysis

17) The phase of mitosis during which the mitotic spindle begins to form is
A) interphase.
B) prophase.
C) metaphase.
D) anaphase.
Answer: B
Topic: 8.5
Skill: Knowledge/Comprehension

18) During which phase of mitosis do the chromosomes line up on a plane equidistant from the two spindle poles?
A) prophase
B) metaphase
C) anaphase
D) telophase
Answer: B
Topic: 8.5
Skill: Knowledge/Comprehension

19) At the start of mitotic anaphase,
A) the centromeres of each chromosome come apart.
B) the chromatid DNA replicates.
C) nuclear envelopes begin to form around the chromosomes.
D) equivalent and complete collections of chromosomes have reached the two poles.
Answer: A
Topic: 8.5
Skill: Knowledge/Comprehension

20) During which phase of mitosis does the nuclear envelope re-form?
A) anaphase
B) metaphase
C) prophase
D) telophase
Answer: D
Topic: 8.5
Skill: Knowledge/Comprehension

21) Which of the following is a feature of plant cell division that distinguishes it from animal cell division?
A) formation of a cell plate
B) formation of a cleavage furrow
C) lack of cytokinesis
D) production of four (rather than two) new cells per mitotic division
Answer: A
Topic: 8.6
Skill: Knowledge/Comprehension

22) Which of the following features likely accounts for the difference between plant and animal cell cytokinesis?
A) Animal cells lack the microfilaments required for forming a cleavage furrow.
B) Animal cells lack chloroplasts.
C) Plant cells have cell walls.
D) Plant cells have two sets of chromosomes; animal cells have one set of chromosomes.
Answer: C
Topic: 8.6
Skill: Knowledge/Comprehension

23) Which of the following must occur for a plant or animal to grow and develop normally?
A) The organism must receive a supply of the appropriate hormones from its parents.
B) The organism must be able to control the timing and rate of cell division in different parts of its body.
C) Sufficient light must be available to stimulate cell division.
D) Sufficient oxygen must be available to stimulate cell division.
Answer: B
Topic: 8.7
Skill: Knowledge/Comprehension

24) When animal cells are grown in a petri dish, they typically stop dividing once they have formed a single, unbroken layer on the bottom of the dish. This arrest of division is an example of
A) cell constraint.
B) density-dependent inhibition.
C) cell division repression.
D) growth factor desensitization.
Answer: B
Topic: 8.7
Skill: Knowledge/Comprehension

25) As a patch of scraped skin heals, the cells fill in the injured area but do not grow beyond that. This is an example of
A) density-independent inhibition.
B) density-dependent inhibition.
C) anchorage independence.
D) growth factor inhibition.
Answer: B
Topic: 8.7
Skill: Application/Analysis

26) Which of the following is probably the main factor responsible for the phenomenon of density-dependent inhibition?
A) a local accumulation of growth-inhibiting factors
B) cells' innate ability to "sense" when the organ of which they are a part has no need for additional cells
C) a local deficiency of nutrients
D) physical contact of cell-surface proteins between adjacent cells.
Answer: D
Topic: 8.7
Skill: Knowledge/Comprehension

27) Mature human nerve cells and muscle cells
A) become cancerous more easily than other cell types.
B) continue to divide throughout their lifetime.
C) are permanently in a state of nondivision.
D) cease dividing after a predetermined number of cell generations.
Answer: C
Topic: 8.8
Skill: Knowledge/Comprehension

28) Which of the following statements regarding the cell-cycle control system is *false*?
A) The cell-cycle control system receives messages from outside the cell that influence cell division.
B) The cell-cycle control system triggers and controls major events in the cell cycle.
C) The cell-cycle control system includes three key checkpoints to complete a cell cycle.
D) The cell-cycle control system operates independently of the growth factors.
Answer: D
Topic: 8.8
Skill: Knowledge/Comprehension

29) You are asked to culture an unidentified sample of animal tissue. You notice that the cells seem to fail to exhibit density-dependent inhibition. The source of this tissue sample is most likely
A) a cancer.
B) skin.
C) a fetal liver.
D) the sperm-producing tissue of the testis.
Answer: A
Topic: 8.9
Skill: Application/Analysis

30) A benign tumor differs from a malignant tumor in that a benign tumor
A) is cancerous.
B) spreads from the original site.
C) does not metastasize.
D) never causes health problems.
Answer: C
Topic: 8.9
Skill: Knowledge/Comprehension

31) Which of the following shows the greatest promise as a cancer chemotherapy agent?
A) a drug that interferes with cellular respiration
B) a drug that prevents mitotic spindle from forming
C) a drug that prevents crossing over
D) a drug that prevents tetrad formation
Answer: B
Topic: 8.9
Skill: Application/Analysis

32) Which of the following statements regarding the function of mitosis is *false*?
A) Mitosis allows organisms to grow.
B) Mitosis allows organisms to generate genetic diversity.
C) Mitosis allows organisms to reproduce asexually.
D) Mitosis allows organisms to repair tissues.
Answer: B
Topic: 8.10
Skill: Knowledge/Comprehension

33) Two chromosomes in a nucleus that carry genes controlling the same inherited characteristics are
A) homologous chromosomes.
B) heterologous chromosomes.
C) complementary chromosomes.
D) parallel chromosomes.
Answer: A
Topic: 8.11
Skill: Knowledge/Comprehension

34) A pair of sex chromosomes found in a human male is most like
A) a pair of blue jeans.
B) a bride and groom.
C) a knife, fork, and spoon.
D) identical twins.
Answer: B
Topic: 8.11
Skill: Application/Analysis

35) Which of the following statements regarding mitosis and meiosis is *false*?
A) Meiosis only occurs in the ovaries and testes.
B) All sexual life cycles involve an alternation of diploid and haploid stages.
C) Mitosis produces daughter cells with half the number of chromosomes as the parent cell.
D) A normal human zygote has 46 chromosomes.
Answer: C
Topic: 8.12
Skill: Knowledge/Comprehension

36) Which of the following statements is *false*?
A) Gametes are haploid cells.
B) Two haploid cells fuse during fertilization.
C) An X chromosome is an autosome.
D) A zygote is a fertilized egg.
Answer: C
Topic: 8.12
Skill: Knowledge/Comprehension

37) During which stage of meiosis do synapsis and crossing over occur?
A) interphase I
B) prophase I
C) prophase II
D) metaphase I
Answer: B
Topic: 8.13
Skill: Knowledge/Comprehension

38) Which of the following options correctly describes the behavior of a tetrad during anaphase I of meiosis?
A) It goes intact to one pole of the dividing cell.
B) It splits into two pairs of sister chromatids, and one pair goes to each pole of the dividing cell.
C) It splits into two pairs of homologous, nonsister chromatids, and one pair goes to each pole of the dividing cell.
D) It splits into four chromosomes, which distribute in random pairs to the two poles of the dividing cell.
Answer: B
Topic: 8.13
Skill: Knowledge/Comprehension

39) Which of the following statements regarding the differences between mitosis and meiosis is *false*?
A) In meiosis four daughter cells are produced, whereas in mitosis two daughter cells are produced.
B) Cells produced by mitosis are diploid, whereas cells produced by meiosis are haploid.
C) In mitosis cytokinesis occurs once, whereas in meiosis cytokinesis occurs twice.
D) Crossing over is a phenomenon that creates genetic diversity during mitosis.
Answer: D
Topic: 8.14
Skill: Conceptual Understanding

40) Which of the following statements regarding mitosis and meiosis is *false*?
A) Mitosis provides for growth and tissue repair.
B) Meiosis provides for asexual reproduction.
C) In mitosis, the chromosomes replicate only once in the preceding interphase.
D) All the events unique to meiosis occur during meiosis I.
Answer: B
Topic: 8.14
Skill: Knowledge/Comprehension

41) Both mitosis and meiosis are preceded by
A) prometaphase.
B) interphase.
C) prophase.
D) telophase.
Answer: B
Topic: 8.14
Skill: Knowledge/Comprehension

42) Independent orientation of chromosomes at metaphase I and random fertilization are most like
A) shuffling cards and dealing out hands of poker.
B) cutting up a pie into eight even-sized slices.
C) alphabetizing files in a filing cabinet.
D) pairing up similar socks after washing your clothes.
Answer: A
Topic: 8.15
Skill: Application/Analysis

43) Independent orientation of chromosomes at metaphase I results in an increase in the number of
A) gametes.
B) homologous chromosomes.
C) possible combinations of characteristics.
D) sex chromosomes.
Answer: C
Topic: 8.15
Skill: Knowledge/Comprehension

44) Which of the following statements regarding genetic diversity is *false*?
A) Genetic diversity is enhanced by random fertilization.
B) Genetic diversity is enhanced by independent orientation of chromosomes at metaphase I.
C) Genetic diversity is enhanced by mitosis.
D) Genetic diversity is enhanced by crossing over during meiosis.
Answer: C
Topic: 8.15-8.17
Skill: Knowledge/Comprehension

45) At a chiasma, two _____ are attached to each other.
A) homologous or non-sister chromatids
B) homologous or sister chromatids
C) non-homologous chromosomes
D) daughter cells
Answer: A
Topic: 8.17
Skill: Knowledge/Comprehension

46) Without crossing over
A) cells could not complete meiosis.
B) meiosis could not produce haploid gametes.
C) only a small number of unique gametes could be produced by a single individual.
D) genetic recombination could not occur.
Answer: D
Topic: 8.17
Skill: Knowledge/Comprehension

47) Karyotyping
A) shows chromosomes as they appear in metaphase of meiosis II.
B) can reveal alterations in chromosome number.
C) examines points of crossing over.
D) reveals the presence of cancerous genes.
Answer: B
Topic: 8.18
Skill: Knowledge/Comprehension

48) A karyotype is most like
A) a map showing the hidden location of buried treasure.
B) a movie showing the stages of the reproductive cycle of a beetle.
C) photographs of every couple at a high school prom.
D) the answer key to a multiple-choice exam.
Answer: C
Topic: 8.18
Skill: Application/Analysis

49) Which of the following statements regarding Down syndrome is *false*?
A) Trisomy 21 is the cause of Down syndrome.
B) Down syndrome is the most common serious birth defect in the United States.
C) People with Down syndrome usually have a shorter life span than normal.
D) Down syndrome is least likely to be seen in the infants of mothers over 40.
Answer: D
Topic: 8.19
Skill: Knowledge/Comprehension

50) Nondisjunction occurs when
A) a portion of a chromosome breaks off and is lost.
B) two chromosomes fuse into one.
C) members of a chromosome pair fail to separate.
D) an entire pair of chromosomes is lost during meiosis I.
Answer: C
Topic: 8.20
Skill: Knowledge/Comprehension

51) Which of the following statements about nondisjunction is *false*?
A) Nondisjunction in meiosis can affect autosomes and sex chromosomes.
B) In mammals, extra copies of the Y chromosome are typically inactivated.
C) In general, a single Y chromosome is enough to produce "maleness."
D) Women with a single X chromosome have Turner syndrome and are sterile.
Answer: B
Topic: 8.21
Skill: Knowledge/Comprehension

52) Which of the following types of organisms commonly demonstrates polyploidy?
A) mammals
B) reptiles
C) flowering plants
D) fish
Answer: C
Topic: 8.22
Skill: Knowledge/Comprehension

53) How many generations does it take to develop a new plant species by polyploidy?
A) one
B) two
C) ten
D) about twenty
Answer: A
Topic: 8.22
Skill: Knowledge/Comprehension

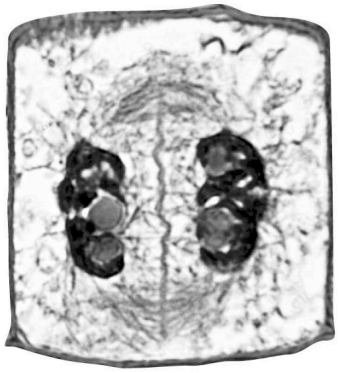
54) Which of the following variations of the sentence "Where is the cat" is most like a chromosomal deletion?
A) Where is cat?
B) Where is the the cat?
C) Where the is cat?
D) Where is cat the the cat?
Answer: A
Topic: 8.23
Skill: Knowledge/Comprehension

55) If a chromosome fragment breaks off and then reattaches to the original chromosome, but in the reverse direction, the resulting chromosomal abnormality is called a(n)
A) deletion.
B) inversion.
C) translocation.
D) reciprocal translocation.
Answer: B
Topic: 8.23
Skill: Knowledge/Comprehension

56) Cancer is not usually inherited because
A) the chromosomal changes in cancer are usually confined to somatic cells.
B) people with cancer usually die before reproducing.
C) the causes of cancer are not usually genetic.
D) the cancerous cells usually interfere with the ability to produce gametes.
Answer: A
Topic: 8.23
Skill: Knowledge/Comprehension

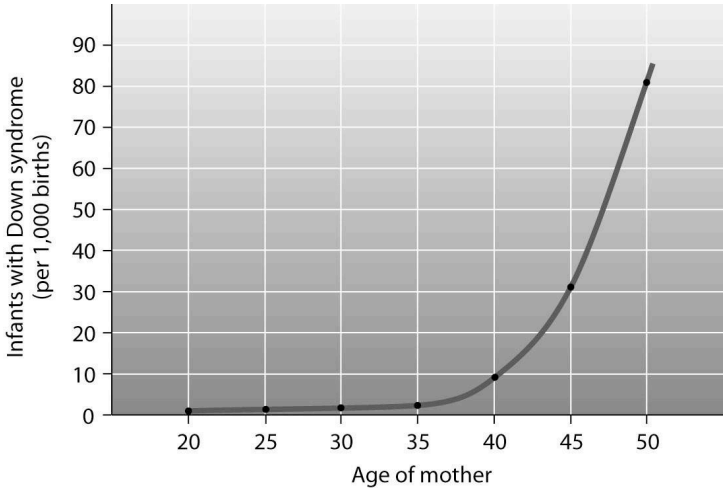
8.2 Art Questions

1) What type of cell is shown?



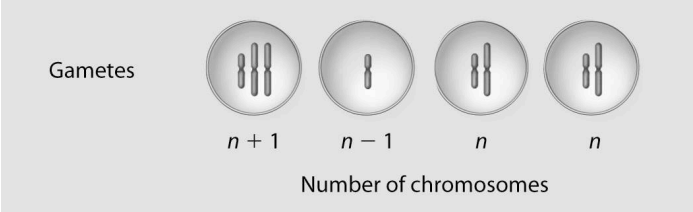
A) animal cell in metaphase
B) animal cell in telophase
C) plant cell in metaphase
D) plant cell in telophase
Answer: D
Topic: 8.5, 8.6
Skill: Application/Analysis

2) According to the graph, at what maternal age does the incidence of Down syndrome begin to increase substantially?



A) about 26 or 27
B) about 31 or 32
C) about 37 or 38
D) about 42 or 43
Answer: C
Topic: 8.19
Skill: Application/Analysis

3) If these four cells resulted from cell division of a single cell with diploid chromosome number $2n = 4$, what best describes what just occurred?



A) normal meiosis
B) translocation
C) inversion
D) nondisjunction
Answer: D
Topic: 8.20, 8.23
Skill: Knowledge/Comprehension

8.3 Scenario Questions

After reading the paragraph, answer the question(s) that follow.

Mr. and Mrs. Smith have three sons in elementary school. Two of their children are progressing normally, but their last son, Charles, has been much slower than his siblings at developing speech and language skills. His parents are concerned that he has a learning disability and decide to investigate further. Since some learning disabilities can be genetically based, their pediatrician recommends a chromosomal analysis.

The results show that Charles has a trisomy of the sex chromosomes, diagnosed as XYY, which is caused by nondisjunction in the formation of the father's sperm. The nondisjunction resulted in an extra copy of the Y chromosome. The extra copy was passed on to Charles during fertilization. Most often, this chromosomal change causes no unusual physical features or medical problems, but those with trisomy of the sex chromosomes do have a higher than normal risk of delays in learning development.

1) During which stage of meiosis could this nondisjunction have occurred?
A) telophase I
B) prophase I
C) anaphase II
D) telophase II
Answer: C
Topic: 8.13, 8.20, 8.21
Skill: Application/Analysis

2) If Charles gets married and starts a family, which of the following chromosomal abnormalities might be found in his children?
A) XY
B) XX
C) XO
D) XXY
Answer: D
Topic: 8.13, 8.20, 8.21
Skill: Application/Analysis