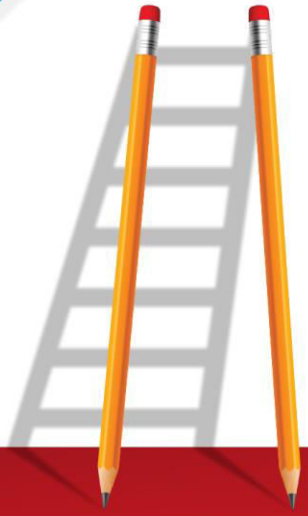
BIOLOGY



Worksheet-11

STEP

A PROJECT BY PUNJAB GROUP

Worksheet-11
(Cell Division)

Q.1 **The cell undergoes a sequence of changes which involves all of the following, EXCEPT:**
A) Period of growth
B) Replication of DNA
C) Followed by cell division
D) Followed by nuclear mitosis

Q.2 **Pick up the phase of cell cycle with non-apparent division _____ phase:**
A) Inter
B) Mitotic
C) Meiotic
D) Post mitotic

Q.3 **The phase of cell cycle with period of division is called:**
A) Interphase
B) Mitotic phase
C) Meiotic phase
D) Post mitotic phase

Q.4 **_____ is the period of extensive metabolic activity:**
A) G_1 C) S
B) G_2 D) G_o

Q.5 **Which one of the following is misleadingly called resting phase?**
A) Interphase C) G_1 phase
B) Mitotic phase D) S phase

Q.6 **The phase of cell cycle in which specific enzymes are synthesized and DNA base units are accumulated for the DNA synthesis:**
A) G_1 phase C) G_0 phase
B) G_2 phase D) S phase

Q.7 **The phase of cell cycle during which the DNA is synthesized is called:**
A) G_1 C) G_2
B) S D) G_0

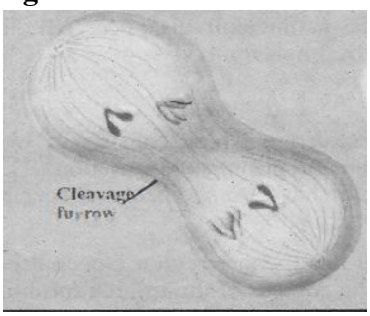
Q.8 **Length of cell cycle in case of human is about:**
A) 24 hours C) 12 hours
B) 1.5 hours D) 5 hours

Q.9 **Length of cell cycle in yeast cell is about of _____ minutes:**
A) 30 C) 90
B) 60 D) 150

Q.10 **Spindle fibers attach on to:**
A) Centromere of the chromosome
B) Kinetochore of the chromosome
C) Telomere of the chromosome
D) Tip of the chromosome

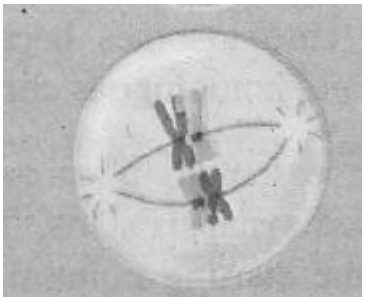
Q.11 **During meiosis I, the chromosomes start pairing in:**
A) Zygote C) Pachytene
B) Diplotene D) Leptotene

Q.12 **Identify the stage of mitosis in the given below figure:**



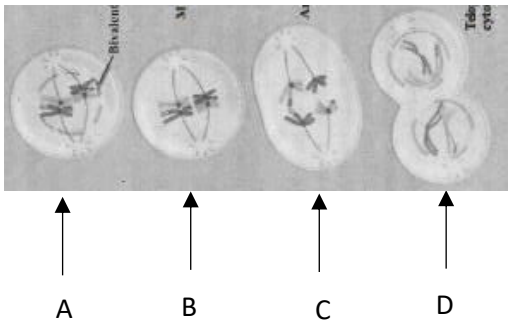
A) Late prophase C) Anaphase
B) Metaphase D) Telophase

Q.13 **Identify the stage of meiosis in the given below figure:**



A) Prophase C) Anaphase
B) Metaphase D) Telophase

Q.14 Identify the anaphase I of meiosis I:



Q.15 Microtubules are composed of a protein _____ and traces of _____:
A) Tubulin, RNA C) Myosin, RNA
B) Actin, RNA D) Tubulin, DNA

Q.16 The centromere has special area, the _____:
A) Telomere
B) Kinetochore
C) Primary constriction
D) Secondary constriction

Q.17 Which one of the following is the most critical phase of mitosis?
A) Prophase C) Anaphase
B) Metaphase D) Telophase

Q.18 The phase of mitosis which ensures the equal distribution of chromatids in the daughter cells:
A) Prophase C) Anaphase
B) Metaphase D) Telophase

Q.19 Reaching of the chromosomes at opposite poles terminates _____ and start _____:
A) Prophase, Metaphase
B) Anaphase, Telophase
C) Metaphase, Anaphase
D) Prophase, Telophase

Q.20 Tissue culture and cloning seek help through:
A) Crossing over C) Meiosis
B) Mitosis D) Binary fission

Q.21 Regeneration, healing of wounds and replacement of older cells all are the gifts of:
A) Crossing over C) Meiosis
B) Mitosis D) Binary fission

Q.22 An exchange of segments between non-sister chromatids of homologous chromosomes during meiosis is called:
A) Chiasmata C) Crossing over
B) Recombination D) Mutation

Q.23 Disc-shaped protein structure within the centromere to which the spindle fibres attached during mitosis or meiosis called:
A) Telomere
B) Kinetochore
C) Primary constriction
D) Secondary constriction

Q.24 Homologous chromosomes, each having sister chromatids, that are joined by a nucleoprotein lattice during meiosis called:
A) Monovalent C) Tetravalent
B) Bivalent D) Pentavalent

Q.25 During which phase of meiosis, the kinetochore fibers contract and the spindle or pole fibers elongate:
A) Prophase I C) Anaphase I
B) Metaphase I D) Telophase I

Q.26 Meiosis usual takes place in all of the following, EXCEPT:
A) Spore formation in plants
B) Sex cell formation
C) Healing of wounds
D) Gametes

Q.27 The four chromatids in each cluster during synapsis; formed by the two sister chromatids in each of the two homologous chromosomes called:
A) Recombinant C) Tetrad
B) Non homologous D) Bivalent

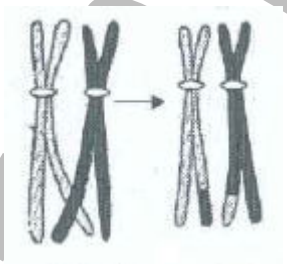
Q.28 During meiosis I, the chromosomes start pairing at:
A) Zygotene C) Pachytene
B) Diplotene D) Leptotene

Q.29 During the metaphase stage of mitosis, spindle fibres attach to chromosomes at:
A) Kinetochore
B) Both centromere and kinetochore
C) Centromere, kinetochore and areas adjoining centromere
D) Centromere

Q.30 A stage of mitosis is shown in the diagram. Pickup the stage along with its characteristics:

A) Metaphase –centromeres split and chromatids separate
B) Metaphase – Chromosomes moved to spindle equator
C) Anaphase – Centromeres split and chromatids separate and start moving away
D) Telophase – Chromosomes move to spindle equator

Q.31 The given diagram is the representation of a particular stage of a type of cell division. Identify this stage?



A) Prophase I during meiosis
B) Prophase II during meiosis
C) Prophase of mitosis
D) Telophase of mitosis

Q.32 At metaphase, chromosomes are attached to the spindle fibres by their:
A) Primary constrictions
B) Secondary constrictions
C) Kinetochores
D) Centromeres

Q.33 Spindle fibre unit with which structure of chromosomes?
A) Chromocentre C) Kinetochore
B) Chromomere D) Centriole

Q.34 Microtubule is involved in which of the following?
A) Muscle contraction
B) Membrane architecture
C) Cell division
D) DNA recognition

Q.35 Number of mitotic divisions are required to make 128 cells?
A) 28 C) 7
B) 32 D) 14

Q.36 When paternal and maternal chromosomes changes their materials with each other in cell division this event is called:
A) Bivalent forming C) Synapsis
B) Tetard D) Crossing over

Q.37 Meiosis II performs:
A) Separation of sex chromosomes
B) Synthesis of DNA and centromere
C) Separation of homologous chromosomes
D) Separation of chromatids

Q.38 Each kinetochore gets _____ fibers in mitosis:
A) 2 C) 4
B) 3 D) 6

Q.39 Pick up the most critical phase of mitosis:
A) Prophase C) Anaphase
B) Metaphase D) Telophase

Q.40 Which one of the following is reverse of prophase?
A) Interphase C) Metaphase
B) Anaphase D) Telophase

Q.41 Spread of tumor cells and establishment of secondary areas of growth is called:
A) Benign tumors C) Cancer
B) Metastasis D) Apoptosis

Q.42 Pick up the longest phase of meiosis I:
A) Metaphase I C) Anaphase II
B) Prophase I D) Telophase I

Q.43 Morphology of chromosomes is best studied during:
A) Telophase C) Metaphase
B) Prophase D) Anaphase

Q.44 Cytokinesis refers to division of:
A) Nucleus C) Cytoplasm
B) Cell D) Mitochondria

Q.45 S-phase in case of human cell cycle is:
A) 30 minutes C) 9 hours
B) 10 hours D) 4.5 hours

Q.46 Which one of the following is absent in animal cell?
A) Spindle C) Centriole
B) Chromatids D) Phragmoplast

Q.47 The spindle fibers are composed of RNA and protein called:
A) Myoglobin C) Tubulin
B) Actin D) Myosin

Q.48 The condensation of chromosomes reaches to its maximum at:
A) Leptotene C) Zygotene
B) Pachytene D) Diakinesis

Q.49 Separation of homologous chromosomes occurs during:
A) Prophase C) Metaphase
B) Anaphase D) Telophase

Q.50 The stage of mitosis or meiosis during which the microtubules become organized into a spindle and the chromosomes come to lie in the spindles equatorial plane is called:
A) Prophase C) Anaphase
B) Metaphase D) Telophase

ANSWER KEY (Worksheet-11)					
1	D	21	B	41	B
2	A	22	C	42	B
3	C	23	B	43	C
4	A	24	B	44	C
5	A	25	C	45	B
6	A	26	D	46	D
7	B	27	C	47	C
8	A	28	A	48	D
9	C	29	A	49	B
10	B	30	B	50	B
11	A	31	A		
12	C	32	C		
13	B	33	C		
14	C	34	C		
15	A	35	C		
16	B	36	D		
17	C	37	D		
18	C	38	A		
19	B	39	C		
20	B	40	D		

EXPLANATION

Q.1 **Answer is "Followed by nuclear mitosis"**
Explanation: The cell undergoes a sequence of changes, which involves period of growth, replication of DNA, followed by cell division. This sequence of changes of called cell cycle.

Q.2 **Answer is "Inter"**
Explanation: It comprises two phases viz., interphase which is the period of non-apparent division and the period of division also known as mitotic phase. Each phase is further subdivided into different sub-phases.

Q.3 **Answer is "Meiotic phase"**
Explanation: The period of division also known as mitotic phase. Each phase is further subdivided into different sub-phases.

Q.4 **Answer is "G_1"**
Explanation: G_1 (Gap 1) is the period of extensive metabolic activity, in which cell normally grows in size, specific enzymes, are synthesized and DNA base units are accumulated for the DNA synthesis.

Q.5 **Answer is "Interphase"**
Explanation: The period of life cycle of cell (cell cycle) between two consecutive division is termed as the interphase or misleadingly called resting phase.

Q.6 **Answer is "G_1 phase"**
Explanation: G_1 (Gap 1) is the period of extensive metabolic activity, in which cell normally grows in size, specific enzymes, are synthesized and DNA base units are accumulated for the DNA synthesis.

Q.7 **Answer is "S"**
Explanation: The phase of cell cycle during which the DNA is synthesized is called synthesizes phase.

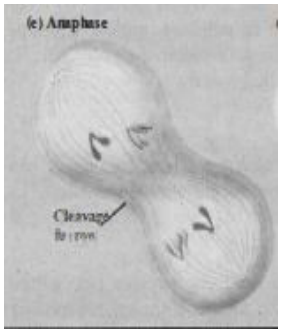
Q.8 **Answer is "24 hours"**
Explanation: Length of each phase is variable. In the case of human cell, average cell cycle is about 24 hours, mitosis takes 30 minutes.

Q.9 **Answer is "90"**
Explanation: Whereas full cycle in yeast cells is only 90 minutes.

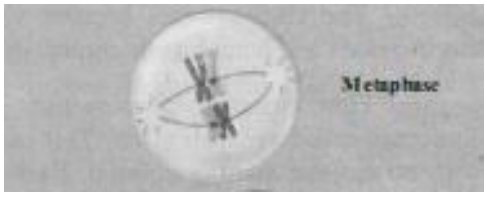
Q.10 **Answer is "Kinetochore of the chromosome"**
Explanation: Spindle fibers attach on to kinetochore of the chromosome.

Q.11 **Answer is "Zygote"**
Explanation: First essential phenomenon of meiosis i.e. pairing of homologous chromosomes called synapsis starts. This pairing is highly specific and exactly pointed but with no definite starting points. Each paired but not fused, complex structure is called bivalent or tetrad.

Q.12 Answer is "Anaphase"



Q.13 Answer is "Metaphase"



Q.14 Answer is "C"

Q.15 Answer is "Tubulin, RNA"
Explanation: Microtubules are composed of a protein tubulin and traces of RNA.

Q.16 Answer is "Kinetochore"
Explanation: The centromere has special area known as kinetochore which is formed a special protein.

Q.17 Answer is "Anaphase"
Explanation: Anaphase is the most critical phase of mitosis.

Q.18 Answer is "Anaphase"
Explanation: The phase of mitosis which ensures the equal distribution of chromatids in the daughter cells is called anaphase.

Q.19 Answer is "Anaphase, Telophase"
Explanation: Reaching of the chromosomes at opposite poles terminates anaphase and start telophase.

Q.20 Answer is "Mitosis"
Explanation: . Tissue culture and cloning seek help through mitosis.

Q.21 Answer is "Mitosis"
Explanation: Regeneration, healing of wounds and replacement of older cells all are the gifts of mitosis.

Q.22 Answer is "Crossing over"
Explanation: An exchange of segments between non-sister chromatids of homologous chromosomes during meiosis is called crossing over.

Q.23 Answer is "Kinetochore"
Explanation: Disc-shaped protein structure within the centromere to which the spindle fibres attached during mitosis or meiosis called kinetochore.

Q.24 Answer is "Bivalent"
Explanation: First essential phenomenon of meiosis i.e. pairing of homologous chromosomes called synapsis starts. This pairing is highly specific and exactly pointed but with no definite starting points. Each paired but not fused, complex structure is called bivalent or tetrad.

Q.25 Answer is "Anaphase I"
Explanation: The kinetochore fivers contract and the spindle or pole fibers elongate, which pull the individual chromosome (each hiving two chromatids) towards their respective poles.

Q.26 Answer is "Gametes"
Explanation: It takes place in diploid cells only, in animals at the time of gamete formation, while in plants when spores are produced.

Q.27 Answer is "Tetrad"
Explanation: First essential phenomenon of meiosis i.e. pairing of homologous chromosomes called synapsis starts. This pairing is highly specific and exactly pointed but with no definite starting points. Each paired but not fused, complex structure is called bivalent or tetrad.

Q.28 Answer is "Zygotene"
Explanation:
During zygotene or zygonema of meiotic prophase I the chromosomes become shorter and thicker. homologous chromosomes come to lie side-by-side in pairs. This pairing of homologous chromosomes is known as synapsis, or syndesis. A pair of homologous chromosomes lying together is called a bivalent.

Q.29 Answer is "Kinetochore"
Explanation:
In metaphase, chromosomes consisting of two sister chromatids get arranged at equator. Discontinuous fibres radiate out from two spindle poles and get connected to the disc shaped structure at the surface of the centromere called kinetochores. These are known as chromosome fibres or tractile fibrils. A kinetochore is a complex protein structure that is analogous to a ring for the microtubule hook; it is the point where microtubules attach themselves to the chromosome.

Q.30 Answer is "Metaphase – Chromosomes moved to spindle equator"
Explanation:

Q.31 Answer is "Prophase I during meiosis"
Explanation: The given figure shows crossing over i.e., exchange of segments between two homologous chromosomes. Crossing over is characteristic of meiosis and occurs during pachytene stage of prophase I.

Q.32 Answer is "Kinetochores"
Explanation:
The key feature of metaphase is the attachment of spindle fibres to kinetochores of chromosomes. Kinetochores are disc-shaped structures at the surface of the centromeres. These structures serve as the sites of attachment of spindle fibres to the chromosomes that are moved into position.

Q.33 Answer is "Kinetochore"
Explanation:
Spindle is microtubular apparatus that appears in many eukaryotic cells at the beginning of nuclear division and is responsible for the ordered separation of the chromosomes, chromosomes being attached to the spindle libres by their centromeres. Two types of spindle fibres can be distinguished as the interpolar fibre, which stretches continuously from pole to pole of the spindle; the kinetochore fibre, which stretches from the pole to the centromere (kinetochore) of an individual chromosome. The mechanism by which the chromosomes move and the spindle fibres contract remains unclear. Cells of animals and lower plants possess centrioles, which act as organizer regions for spindle microtubule formation, but centrioles are absent from the cells of higher plants.

Q.34 Answer is "Cell division"
Explanation:
Microtubules are unbranched hollow submicroscopic tubules of protein tubulin which develop on specific nucleating regions and can undergo quick growth or dissolution at their ends by assembly or disassembly of monomers. Microtubules form spindle during cell division. Centrioles help in cell division by forming spindle poles or microtubules. In animal cells, microfilament collect in the middle region of the cell below the cell

membrane. They induce the cell membrane to invaginate.

In plant cells, cell plate is formed to separate the two daughter cells. Some of the spindle fibres called interzonal microtubules are deposited around phragmoplast. Vesicles from Golgi apparatus are deposited and coalesce on the phragmoplast to form a cell plate.

Q.35 Answer is "7"

Explanation: Mitosis is an equational division where after division each cell produces two daughter cells, therefore after 7 divisions one cell will give 128 cells in case of mitosis.

$$1 \xrightarrow{1} 2 \xrightarrow{2} 4 \xrightarrow{3} 8 \xrightarrow{4} 16 \xrightarrow{5} 32 \xrightarrow{6} 64 \xrightarrow{7} 128$$

Q.36 Answer is "Crossing over"

Explanation: Crossing over is responsible for inducing variability. It involves an exchange of equal segments of non-sister chromatids belonging to two different but homologous chromosomes. Crossing over takes place at four stranded stage. Only two of the four chromatids take part in crossing over. The other two are called non crossovers. Zygotene is characterized by pairing of homologous chromosomes which is called synapsis. The first meiotic division which is completed at first telophase may be followed by cytokinesis giving rise to a dyad.

Q.37 Answer is "Separation of chromatids"

Explanation: Meiosis II is shorter than the typical mitotic division because of the shortening of prophase of this division. The division maintains the number of chromosomes produce at the end of reduction division. Hence, it is called homotypic or equational division, though it is similar to mitosis. The main function of homotypic division or meiosis II is to separate the chromatids of univalent chromosomes which differ from each other in their linkage groups due to crossing over.

Q.38 Answer is "2"

Explanation:

Each kinetochore gets 2 fibers in mitosis.

Q.39 Answer is "Anaphase"

Explanation: It is the most critical phase of the mitosis, which ensures equal distribution of chromatids in the daughter cells.

Q.40 Answer is "Telophase"

Explanation: Telophase is reverse of prophase.

Q.41 Answer is "Metastasis"

Explanation: Spread of tumor cells and establishment of secondary areas of growth is called metastasis.

Q.42 Answer is "Prophase I"

Explanation: This is very prolonged phase, and differs from the prophase of mitosis, because in this chromosomes behave as homologous pairs.

Q.43 Answer is "Metaphase"

Explanation: Morphology of chromosomes is best studied during metaphase.

Q.44 Answer is "Cytoplasm"

Explanation: Cytokinesis refers to division of cytoplasm.

Q.45 Answer is "10 hours"

Explanation: In the case of human cell, average cell cycle is about 24 hours, mitosis takes 30 minutes, G_1 9 hours, the S-phase 10 hours, and G_2 4.5 hours, where full cycle in yeast cells is only 90 minutes.

Q.46 Answer is "Phragmoplast"

Explanation: Phragmoplast is absent in animal cell and present in plant cell.

Q.47 Answer is "Tubulin"

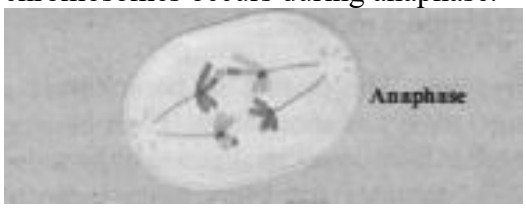
Explanation: The spindle fibers are composed of RNA and protein called Tubulin.

Q.48 Answer is "Diakinesis"

Explanation: During this phase the condensation of chromosomes reaches to its maximum. At the same time separation of the homologous chromosomes (started during diplotene) is completed, but still they are united at one point, more often at ends, Nucleoli disappear.

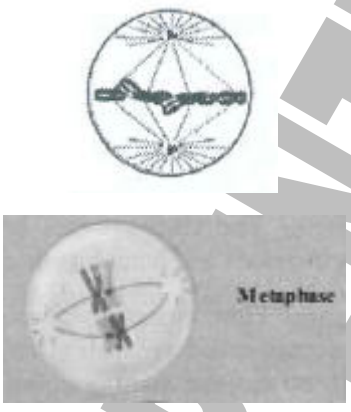
Q.49 Answer is "Anaphase"

Explanation: Separation of homologous chromosomes occurs during anaphase.



Q.50 Answer is "Metaphase"

Explanation: The stage of mitosis or meiosis during which the microtubules become organized into a spindle and the chromosomes come to lie in the spindles equatorial plane is called metaphase.



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