Name _Homework Answer Key_

Mitosis vs. Meiosis Questions

1) A cell with 10 pairs of chromosomes undergoes mitosis. How many chromosomes does each of the resulting cells have? Pick all correct answers.

A. 2 pairs
B. 5
C. 5 pairs
D. 10
E. 10 pairs
F. 20
G. 20 pairs

Explain your choice(s):

In mitosis the point is to make 2 cells IDENTICAL to the original cell. If the original cell has 10 pairs, the new cells need to have the SAME 10 pairs of information.

2) A cell with 10 pairs of chromosomes undergoes meiosis. How many chromosomes does each of the resulting cells have? Pick all correct answers.

A. 2 pairs
B. 5
C. 5 pairs
D. 10
E. 10 pairs
F. 20
G. 20 pairs

Explain your choice(s):

Each cell in meiosis gets ½ of the parent's information. Must have a copy of EACH chromosome (can't get a pair of anything because that would mean it's missing some other chromosome)

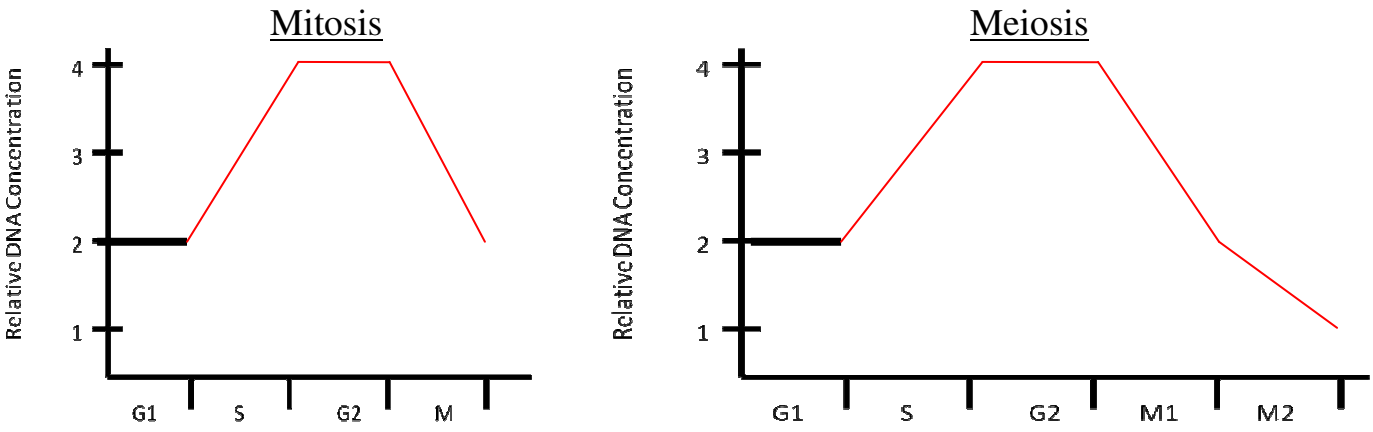
3) Phases of the mitotic cell cycle are listed below in alphabetical order.
Starting with metaphase as #1, order the phases consecutively (2-7) in the spaces to the left.

__2__ Anaphase — E_____
__4__ G1-phase — A and C _____
__6__ G2-phase — A, H, and C _____
__1__ Metaphase — D _____
__7__ Prophase — B, F, and I (chromosomes *finish* condensing) __
__5__ S-phase — G and A _____
__3__ Telophase — A (nucleus reappears)_____

4) Below are nine statements that refer to one or more of the cell cycle phases. Match each statement to a phase of the mitotic cell cycle by writing the letter or letters in the spaces to the right of each phase listed above. If there is no adequate description for a particular phase, write one in. You will use all nine statements, some more than once.

A. Nuclear membrane is intact throughout the duration of the phase.
B. Nuclear membrane and nucleolus disappear.
C. Environment is sensed for presence of adequate nutrients.
D. Chromosomes are aligned on a plane.
E. Sister chromatids begin the "walk" away from each other.
F. Centrioles duplicate.
G. Chromosomes replicate.
H. Cyclin binds to a protein kinase to form MPF.
I. Chromosomes begin to condense.

5) Fill in the two graphs below with a continuous line to indicate the relative DNA concentration of diploid cells during the mitotic and meiotic cell cycles.



6) Explain your reasoning for drawing the above graphs the way you did. **Note: lines are simplified to show the trends!**

During the S phase the DNA replicates (copies) and the DNA concentration doubles. The DNA drops during mitosis when the cells split into 2 new cells and therefore returns to the original amount of DNA. In Meiosis, there is the additional DNA split in M2 (meiosis 2) and the DNA concentration drops to 1.

7) Consider the process of meiosis. Put the following events in order by numbering them 1-7. To the right of each event, write in the name of that phase based on the event/description.

__6__ Sister chromatids separate _Anaphase 2_
__3__ Chromosomes line up as tetrads along equator of cell _Metaphase 1_
__5__ Chromosomes (not tetrads) line up along equator of cell _Metaphase 2_
__1__ DNA replicates _Interphase (S)_
__2__ Homologous chromosomes pair _Prophase 1_
__7__ Cytokinesis produces haploid cells from a diploid cell _Cytokinesis (end of meiosis 2)_
__4__ Homologous chromosomes separate _Anaphase 1_

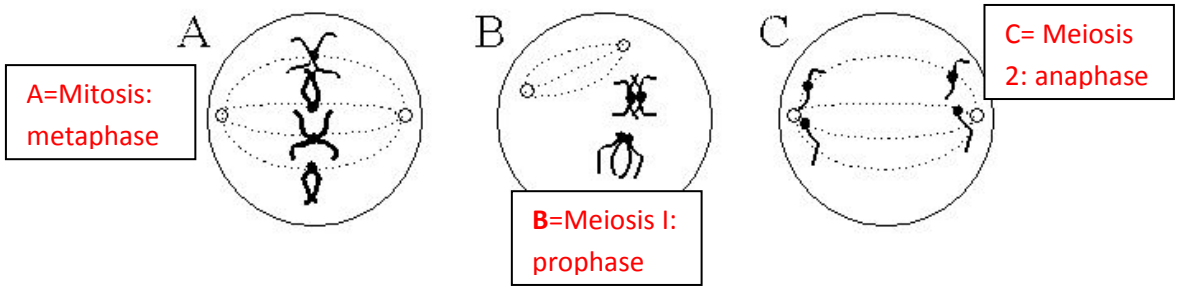
8) **True or False**: Two homologous chromosomes carry exactly the same genes.

A. **One is from mom and one is from dad, it is VERY VERY unlikely they would ever be identical**. They have information about the same genes though. The homologues could have genes for height for instance. Both homologues have height genes, but one might say short and the other tall.

9) **True or False**: The Chromosome Theory of Inheritance states that genes are chromosomes

A. **If the question said "genes are ON chromosomes" we'd be closer to the truth**!

10) Each of the cells shown below comes from the *same species*. Given this information, indicate below each cell whether it is undergoing mitosis, meiosis I or meiosis II, and then indicate which phase of the process the cell is in.



11) **True or False?** A normal somatic cell has 46 chromosomes (2n); a gamete has 23 (n). Explain.

*Somatic cell = a regular body cell which has half of the information from mom (n) and half the information from dad (n), for a total of 2n.
*Gametes = sex cells (sperm and eggs) which can only GIVE half of the information of a parent (n) to the child because it must be combined with the other parent to have a complete child.