



Exercises on cell division, mitosis and meiosis

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1 – Targeted outcomes

1. Describe the purpose and stages of
 - i. Mitosis
 - ii. Meiosis

2. Compare the daughter cells to the parent cell in
 - i. Mitosis
 - ii. Meiosis

3. Explain how Meiosis leads to genetic variation in the offspring

2 – Exercises on cell division terminology

- The terms 'haploid' and 'diploid' are used to describe certain characteristics of cells – can you describe said characteristics of both haploid and diploid cells?

	<i>Haploid</i>	<i>Diploid</i>
Number of chromosome <i>sets</i>		
Contains a ' <i>full set</i> ' of chromosomes? (y/n)		
Number of chromosomes in terms of <i>n</i>		
Number of homologous pairs		
Number of chromatids when <i>unreplicated</i>		
Number of chromatids when <i>replicated</i>		
Number of sister chromatids when <i>unreplicated</i>		
Number of sister chromatids when <i>replicated</i>		
Number of non-sister chromatids when <i>replicated</i>		
Number of non-sister chromatids when <i>unreplicated</i>		
Two examples of this type of cell		

2. Can you explain the relationship between the terms

daughter cell and *parent cell*?

3. Can you compare the characteristics of the *parent cell* versus the *daughter cells* in *mitosis* and *meiosis*?

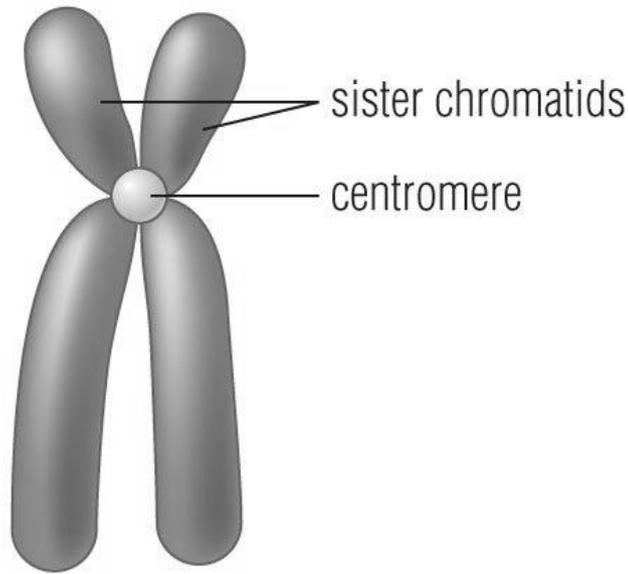
	<i>Mitosis</i>		<i>Meiosis</i>	
	<i>Parent</i>	<i>Daughter</i>	<i>Parent</i>	<i>Daughter</i>
Number of chromosome sets				
Contains a 'full set' of chromosomes? (y/n)				
Number of chromosomes in terms of <i>n</i>				
Number of homologous pairs				
Number of <i>chromatids</i>				
Number of <i>sister chromatids</i>				
Number of non-sister <i>chromatids</i>				
Type of cell				
Daughters are identical to the parent?				
Number of cells				

4. *Homo* is a prefix derived from Greek meaning

'same'.

In consideration of this, why do you think that *homologous chromosomes* are named as such?

5. Can you elaborate on the following queries about *sister chromatids*?



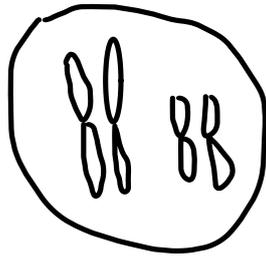
Why would we call two chromatids ' <i>sisters</i> '?	
Is it true to say that 'sister chromatids are always <i>identical</i> to each other'?	
Please explain why or why not.	
What structure joins sister chromatids together?	
What <i>event</i> must occur in order for sister chromatids to be formed?	
Are sister chromatids ever separated? If so, in what processes, and what steps specifically?	

3 – Exercises on mitosis and meiosis

1. Can you explain the characteristics of the processes of *mitosis* and *meiosis*?

	<i>Mitosis</i>	<i>Meiosis</i>
What <i>type</i> of process is this? (is there a <i>broader</i> category of process that could encompass both of these?)		
What do you define this process as <i>doing</i> ?		
<i>Where</i> within the human organism does this process occur?		
What structure(s) is/are involved in this process?		
What is the purpose of this process?		
What specifically makes this process different from its counterpart in the other column?		
What <i>structures/events</i> does this process require in order to start?		
What is the result of this process? And is this result aligned with the process' purpose? Why or why not?		

2. The body wants the below cell to undergo *mitosis*:



- a. Can mitosis validly begin on this cell? If you think not, please explain why in respect to *what needs to occur*.
- b. Please draw the cell that is your answer to (a), and put it through mitosis before identifying and describing the preceding unknown process:

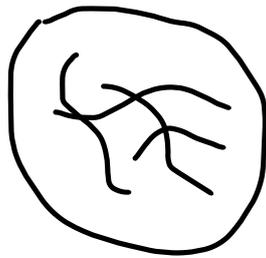
Mitosis

<i>Step name</i>	<i>What the cell looks like at this stage</i>	<i>Key events</i>
1.		1.
		2.
2.		
3.		
4.		1.
		2.

_____ (?)

<i>What the cell looks like</i>	<i>Key event</i>

3. The body wants the below cell to undergo *meiosis*:



a. Can *meiosis* validly begin on this cell? If you think not, please explain why in respect to *what needs to occur*.

Please see next page.

- b. Please draw the cell that is your answer to (a), and put it through *meiosis* before identifying and describing the preceding unknown process:

Meiosis

<i>Step name</i>	<i>What the cell looks like at this stage</i>	<i>Key events</i>
1.		1.
		2.
		3.
2.		1.
		2.
3.		
4.		1.
		2.

5.		1.
		2.
6.		

7.		
8.		1.
		2.

_____ (?)

<i>What the cell looks like</i>	<i>Key event</i>

4. A student named Mark makes the following claim:



'Meiosis does not lead to genetic variation in the offspring'

- a. Do you agree with Mark's claim?
- b. Present your argument to (a) along with at least two pieces of supporting evidence.