**Chart, pie chart

Description automatically generatedCELL CYCLE & MITOSIS**

3 main phases in the cell cycle

1. **Interphase** is normal cell function and \_\_\_\_\_\_\_\_\_\_\_\_\_

**Split into 3 parts:**

1. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
2. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
3. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
4. **Mitosis** is the division of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
5. **Cytokinesis** is the division of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**End result**: 2 new, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cells are produced.

**INTERPHASE**

|  |  |
| --- | --- |
| A picture containing diagram  Description automatically generated  **Chart, pie chart  Description automatically generated**  *(see fig 5.5 from text re: replication)* | * Nucleus is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and bounded by the nuclear membrane. * Outside of the nucleus are two \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. * Their function is to organize the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ into a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. They will begin to move apart as spindle microtubules   grow out of them.  **G1 – 1st Gap**   * Cell \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and makes the proteins and molecules necessary for the cell to function. * Some \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ begin to **duplicate**.   **S – synthesis**   * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of DNA occurs. * The DNA molecule \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ with the help of an enzyme. * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ with the bases on the original DNA. * **Two** new \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ DNA molecules are produced. * The chromosomes have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and appear as a jumbled mass of fibers. * They have \_\_\_\_\_\_\_\_ yet condensed.   **G2 – 2nd Gap**   * Cell continues to \_\_\_\_\_\_\_\_\_\_\_ and make materials such as proteins * The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, which contains the replicated DNA, is in its loosely coiled form * Remaining organelles (such as mitochondria and chloroplasts) are |

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ***Now the cell is ready to divide!***

**Diagram

Description automatically generatedMITOSIS**

The \_\_\_\_\_\_\_\_\_\_\_- stage of the cell cycle where the **nuclear contents** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and \_\_\_\_\_\_\_\_ daughter nuclei are formed.

As the nucleus prepares to divide, replicated DNA in interphase joins to form \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, joined by a **centromere**.

**PMAT**

**EARLY PROPHASE**

|  |  |
| --- | --- |
|  | * The chromosomes coil and thicken and become \_\_\_\_\_\_\_\_\_\_\_\_ from one another. The chromosomes are now visible. * The nucleolus \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ * The chromosomes are doubled throughout their length. * The centrioles separate and start moving to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ends of the cell. A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ made of microtubules begins to form. |

**LATE PROPHASE**

|  |  |
| --- | --- |
|  | * The nuclear membrane ­­­­­­­­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ * The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ move to the opposite poles, completing \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (microtubules form spindle) * The chromosomes attach to the spindle fibres at their \_\_\_\_\_\_\_\_\_\_\_\_\_ |

**METAPHASE**

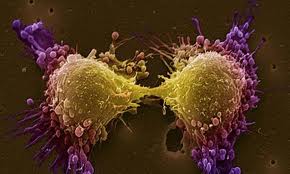
|  |  |
| --- | --- |
|  | * Each chromosome is connected to a spindle fiber at its \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ * The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are now at opposite sides of the cell. * The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ fibers will push and pull the chromosomes. * The chromosomes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ at the center of the cell. |

**ANAPHASE**

|  |  |
| --- | --- |
|  | * The microtubules begin to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and this pulls the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ apart to opposite sides of the cell * Once they separate, each sister chromatid is considered to be a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. * By the end of anaphase, the two ends of the cell have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ sets of chromosomes. |

**TELOPHASE**

|  |  |
| --- | --- |
|  | * One \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ set of chromosomes is now at each pole of the cell * Spindle fibres begin to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ forms around each set of chromosomes * A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ appears within each nucleus * Now there are \_\_\_\_\_\_\_\_\_ nuclei in one cell, and the cell is ready to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

**CYTOKINESIS**

* The final stage in the cell cycle, and happens in conjunction with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* The \_\_\_\_\_\_\_ nuclei are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ into \_\_\_\_\_\_\_ daughter cells
* These new cells are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to the original parent cell

**Shape, circle

Description automatically generatedCELL CYCLE CHECKPOINTS**

Checkpoints in the cell cycle will prevent division if:

* + If the cell is short of **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
  + If the DNA within the nucleus has **not** been **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
  + If the DNA is **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Mutations in genes involving checkpoints can result in an

out-of-control cell cycle.

The result can be uncontrolled cell division: **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.

**CANCER**

* Cancer is a loss of a cell’s ability to **control** its own rate of **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.
* Typically results from a **mutation** in the genetic control mechanism.
* In its simplest sense, cancer is rapid and uncontrolled **cell growth**.

**Characteristics of Cancer Cells:**

1. They lack **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

2. Have abnormal shaped **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

3. Form **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

4. Lack **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

5. Don’t **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** to each other

6. Can **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

7. Can stimulate **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Diagram

Description automatically generated

***Problematic because….***

* These cells are reproducing so rapidly (up to once every 3 hours) that they do not have a chance to **differentiate** and become **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.
* Despite being useless, they still must be **\_\_\_\_\_\_\_\_\_** and provided with the **metabolites** of life. They survive at the expense of **\_\_\_\_\_\_\_\_\_\_\_\_\_** cells that ***do*** have a function.
* This ultimately can lead to the death of the individual as so many normal cells become **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** to satisfy the voracious appetite of the cancer cells.