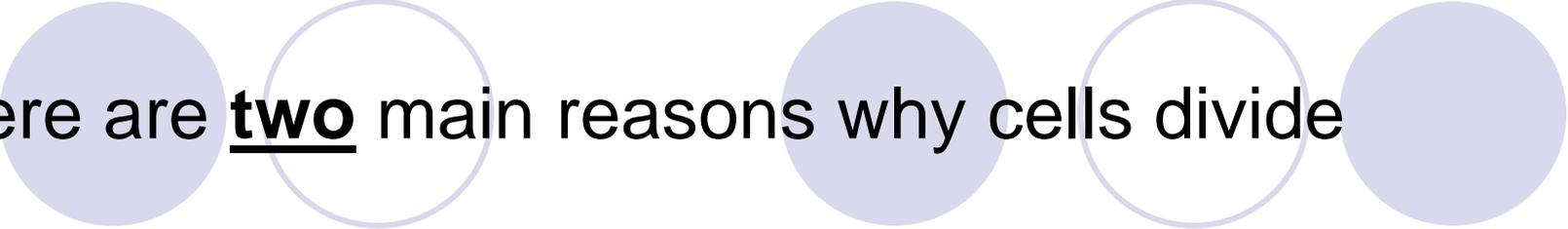
The slide features five light purple circles arranged in two rows. The top row contains three circles, and the bottom row contains two circles. The text is centered within these circles.

Cell Growth

Most organisms grow by producing more cells, not by producing larger cells



There are **two** main reasons why cells divide

- The larger a cell becomes, the more demands the cell places on its **DNA**
- Also, a larger cell has more **trouble** keeping up with the needs of the cell
 - moving nutrients in and
 - exporting wastes out
 - Through the **cell membrane**

The process by which cells divide

- Cells divide to form two **“daughter”** cells
- This is called cell division
- allows organisms to grow **larger** while, allowing cells to remain **small**
- Before a cell divides it must copy its **genetic** information, so each daughter cell can get a copy



The cells genetic information is carried by the **chromosomes**

Chromosomes are composed of bundles of
DNA

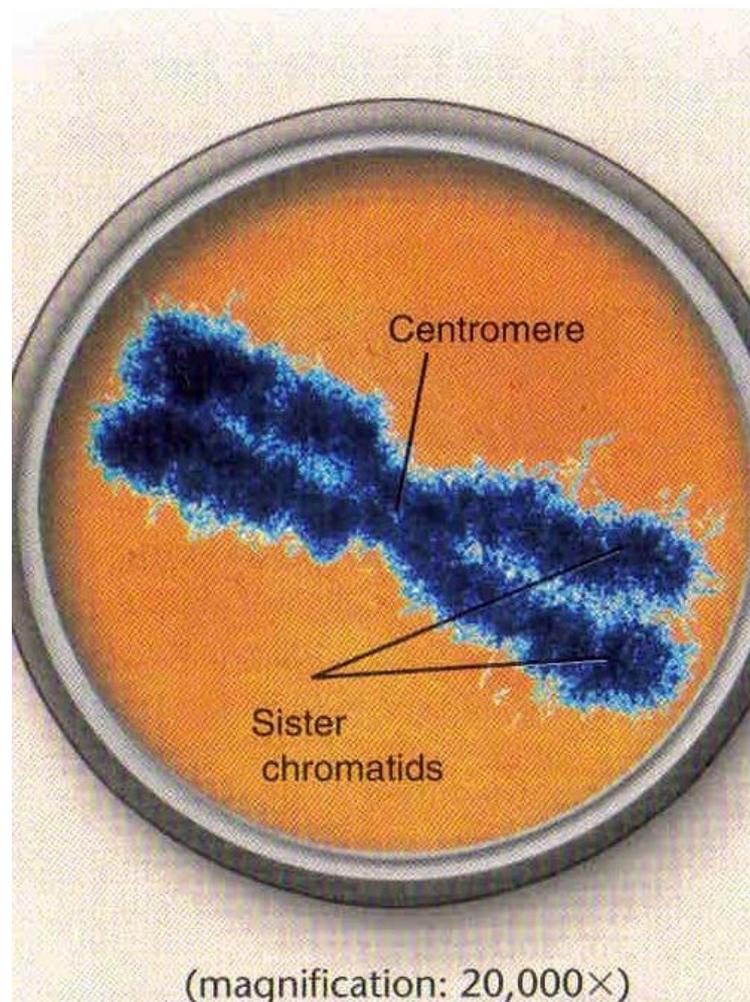
Cells of different organisms have different
numbers of chromosomes

Fruit fly cells have **8** chromosomes

Carrot cells have **18** chromosomes

Human cells have **46** chromosomes

The DNA of a cell is not **visible** until it begins to condense into chromosomes for cell division



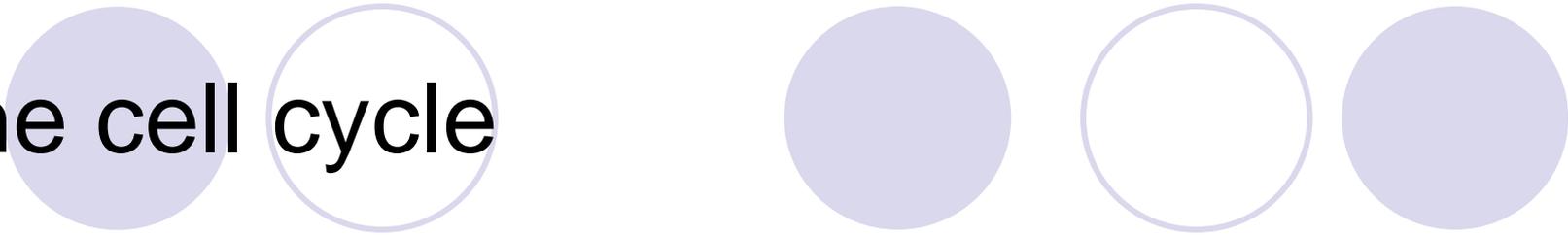
Before DNA condenses into chromosomes it is **replicated**

The copies condense into two identical **sister** chromatids

Attached at an area called the **centromere**

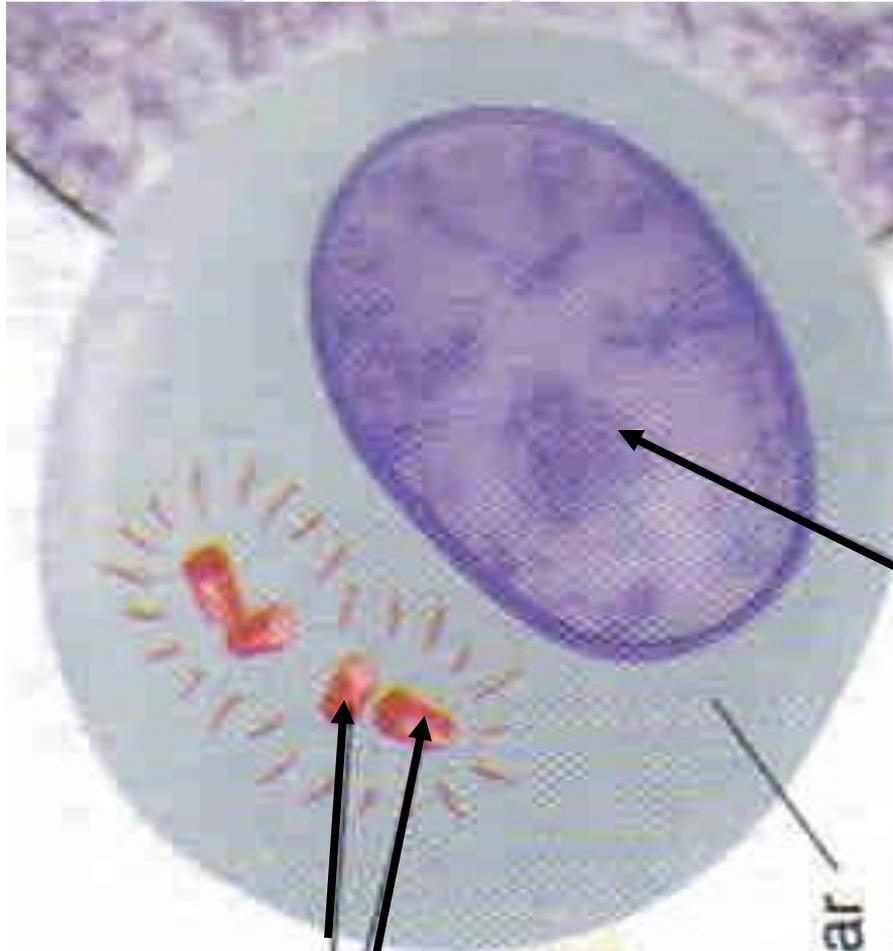
When the cell divides these sister chromatids separate so that each new cell formed gets one set of chromosomes

The cell cycle



- The steps that a cell goes through as it **grows** and **divides**
- During this cycle the cell grows
- Prepares for cell division
- Divides to form two identical daughter cells
- These new cells begin the cycle again
- The cell cycle consists of **five** phases

The first group of phases is called interphase and has three stages



G₁ phase is where cell growth occurs

S phase follows and is where DNA gets replicated and proteins associated with chromosomes are synthesized

- G₂ phase is where organelles and molecules required for cell division are produced

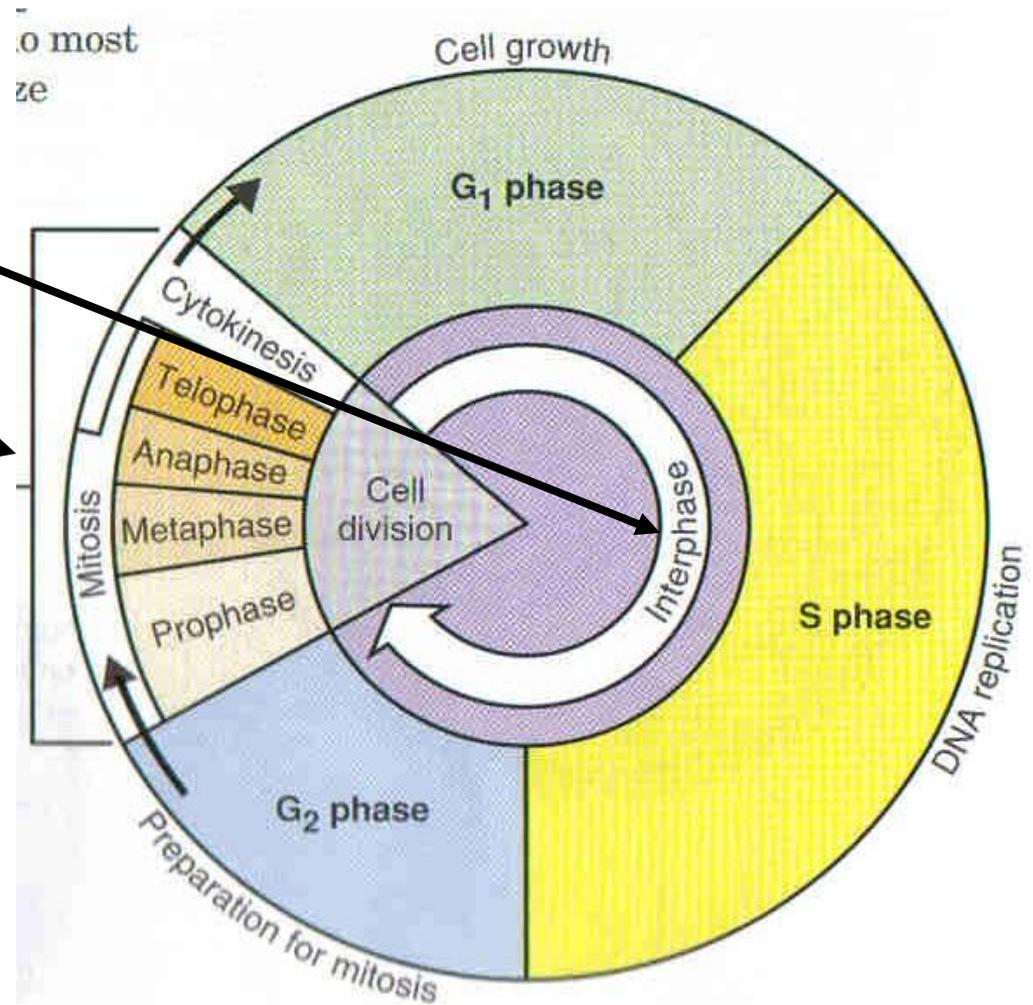
The time frame for the cell cycle

Most of the cell cycle is spent in interphase

The last phase is called the **M** phase

This phase consists of mitosis and cytokinesis

Mitosis is divided into **four** steps

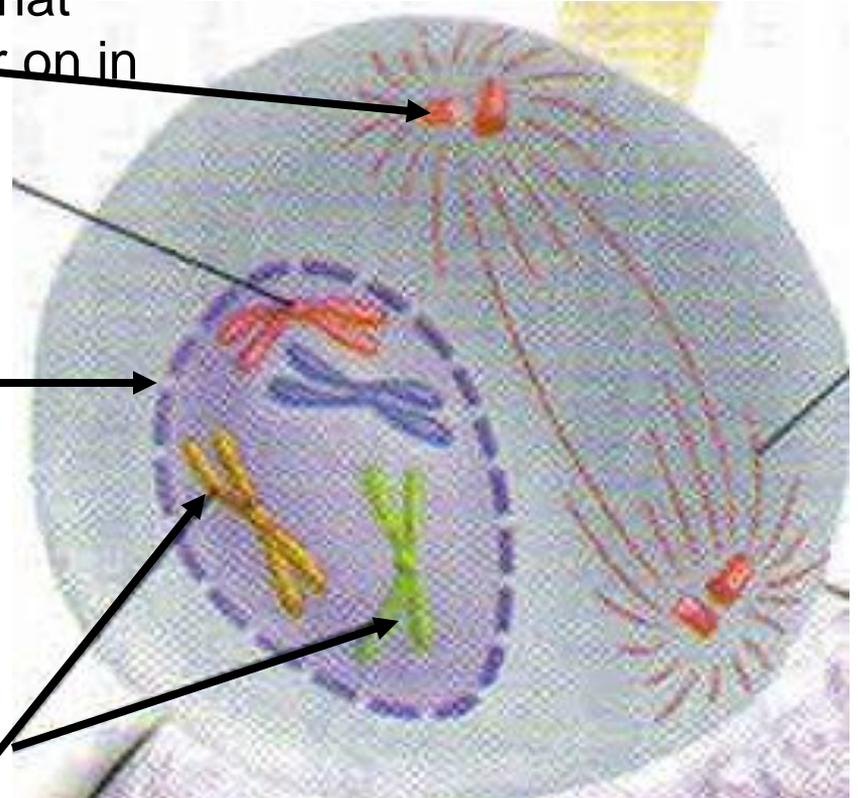


Step one of mitosis is prophase

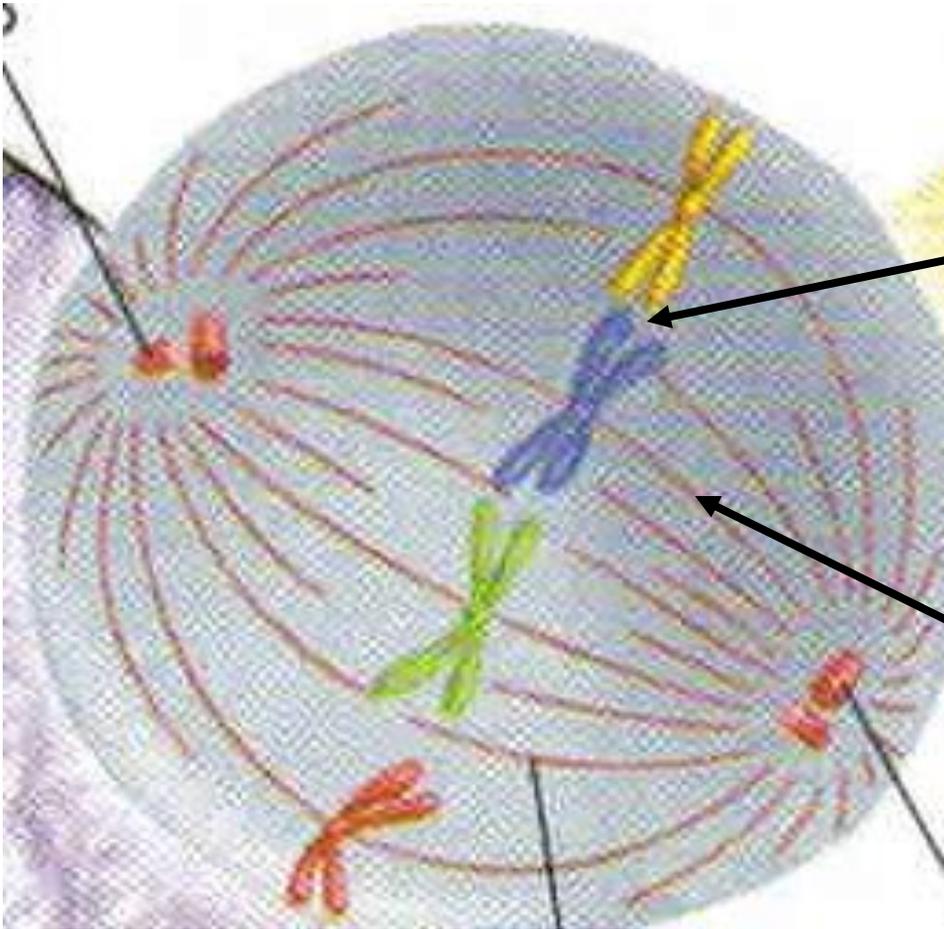
Centrioles produce spindle fibers that separate the sister chromosomes later on in mitosis

Nucleolus disappears and nuclear envelope breaks down

Chromosomes condense and become visible and form structures like this



Step 2 of mitosis is metaphase



The chromosomes line up across the center of the cell

Spindle fibers are connected to each chromosome

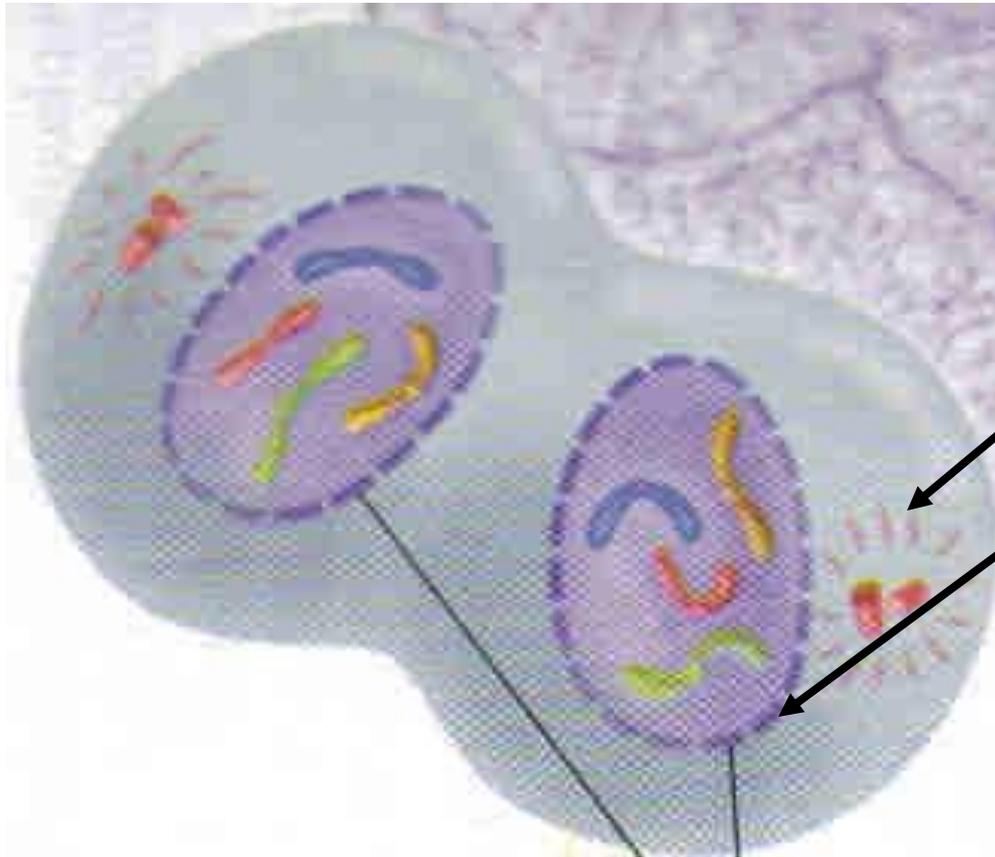
Step 3 of mitosis is anaphase



Centromeres that join the sister chromatids split

Chromatids separate and are pulled to either side of the cell by the spindles

Step 4 of mitosis is telophase



Condensed chromosomes begin to disperse

Spindle fibers break down

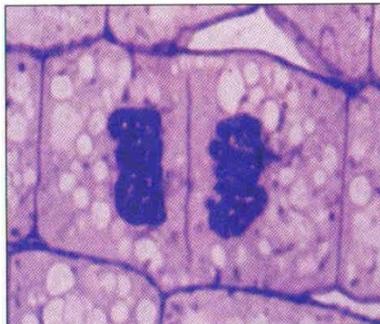
Nuclear envelope begins to develop around each set of separated chromosomes

At this time mitosis is **complete** but cell division is **not** completed

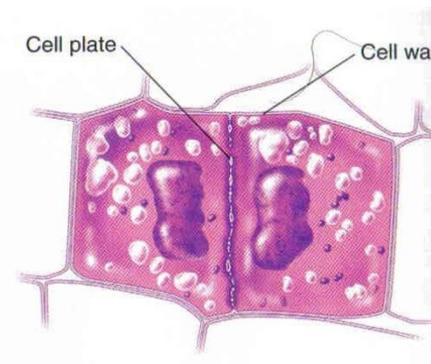
- Because DNA is **replicated** in interphase
- Each copy is condensed and **separated** in mitosis
- If the original parent cell has **4** chromosomes, then mitosis will produce **2** daughter cells each containing **4** chromosomes

The second part of the M phase is called cytokinesis

- This process divides the cytoplasm between the two newly formed nuclei
- In animal cells, the cell membrane is pinched in the center until it touches to form two separate cells
- In plant cells, a cell plate forms between the two new nuclei and then a cell wall forms around it

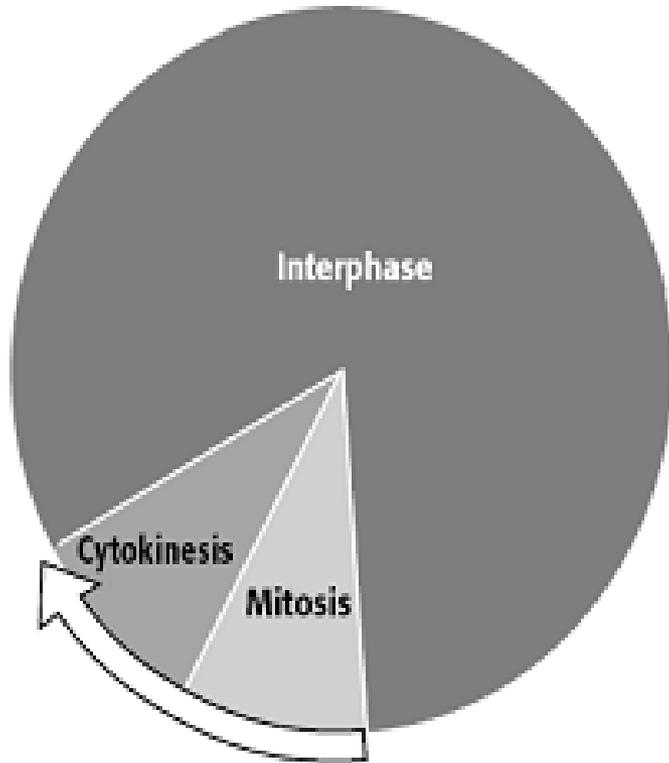


(magnification: 2200×)



1. The following chart shows the lengths of the different stages of the cell cycle. How is the cell occupied most of the time?

The Cell Cycle



Cancer

- A disorder in which cells lose the ability to control growth
- Cancer cells do not respond to the signals that regulate growth
- This can result in un-controlled growth
- Can lead to tumors
- Many different cancers have different causes but...
 - All have lost control over the cell cycle