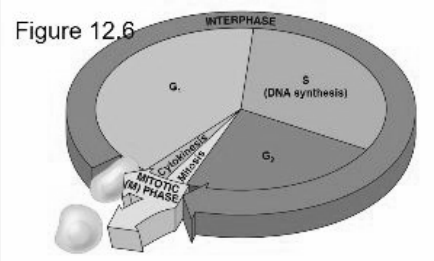
## Cell cycle phases

| | |
|---|---|
| G1 | The cell grows and does it's job |
| G0 | Cell nondividing, could resume division |
| S | DNA replicated |
| G2 | Prepares for division by making organelles |
| M-phase | Division |
| Cytokinesis | Cell membrane divides |

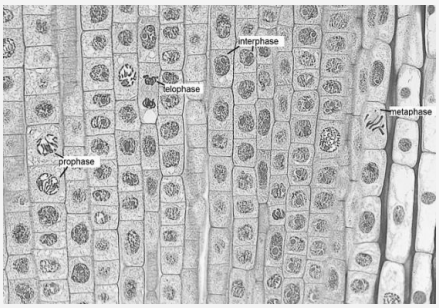
## Cell cycle




## Mitosis

| | |
|---|---|
| Prophase | Chromatin starts to condense, nuclear envelope dissolves, mitotic spindle forms, centrioles divide in animal cells |
| Promet-aphase | Cells start to move to middle, 2 complete spindles at poles |
| Metaphase (2n) | Chromosomes line up on metaphase plate, spindle attaches to kinetochore at centromere |
| Anaphase (2n) | Chromatid pulled apart at centromere, migrate to cell poles by kinetochore |
| Telophase | Chromosomes decondense, nuclear envelope reforms, cells start seperating |

## Mitosis




## Hormones

| | |
|---|---|
| Testosterone | Male determining hormone |
| Estrogen | Peaks before LH and FSH, leads other to peak |
| LH | Stimulates follicular growth and ovulation |
| FSH | Stimulates follicular growth and ovulation |
| Progesterone | Promote thickening in endometrium |

## Stages of Human development

| | |
|---|---|
| Zygote | When sperm meets egg, Fertilized egg |
| Embryo | Cells that will develop into baby, Beginning stages, cells differentiate |
| Fetus | Developing baby in Uterus |

## Formation of Zygote

| | |
|---|---|
| 1 | Ovulation |
| 2 | Conception |
| 3 | Cleavage |
| 4 | Cleavage continues |
| 5 | Implantation in uterus |

## 3 germ layers

| | |
|---|---|
| Endoderm | Inner layer, lines digestive tract |
| Mesoderm | Space between endo and exoderm, ex: muscular and skeletal system |
| Ectoderm | Outer layer, ex: skin and nerves |

## Stages of birth

| | |
|---|---|
| 1 | Dilation of cervix |
| 2 | Expulsion/delivery of baby |
| 3 | Delivery of placenta |

## Labor Hormones

| | |
|---|---|
| Oxytocin | Increases during labor |
| Positive feedback | simulates uterus to contract |
| Positive feedback | simulates placenta to make prostaglandins which simulate more contractions |



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## Basics of cell signaling

| | |
|---|---|
| 1 | Reception-Oxytocin received |
| 2 | Transduction-Oxytocin passed through molecules of signal transduction pathway |
| 3 | Response-Contraction of Uterus |

## Male reproductive system

| | |
|---|---|
| Scrotum | Holds testes, regulates temperature for sperm |
| Testis | Produce sperm and testosterone, sperm manufactured in testis |
| Epididymis | Sperm stored to mature |
| Vas deference | Passageway for sperm and place for sperm storeage |
| Bulbourethral gland | Secrets fluid that protects sperm from acid in urethra |
| Rectum | |
| Seminal vesicle | Secretes fluid that nourishes and enables sperm to move |
| Bladder | |
| Prostate gland | Secretes alkaline found in male urethra |
| .Urethra | Semen and urine pass through to leave the body |
| Penis | Male organ for sexual intercourse, reproduction and urination |

## Female reproductive system

| | |
|---|---|
| Ovary | Store and release eggs and produce estrogen and progesterone |
| Fillopain tubes | Site of fertilization |
| Bladder | |
| Urethra | opening of blatter |
| Vagina | Empty passage way, leads from vaginal opening to uterus |
| Cervix | Opening of uterus, usually plugged by mucus |
| Rectum | |

## Cell regulation

| | |
|---|---|
| Cyclin | CDK on switch made in increasing amounts in interphase |
| No cyclin= | No mitosis |
| CDK | cyclin dependent kinase |
| Proto-oncogenes | Simulate cell division, accelerator, mutated versions always on |
| Tumor suppressor genes | Inhibit cell division, break, mutated versions always off |

## Checkpoints

| | |
|---|---|
| G1 | Most important- determines if cell should replicated DNA |

## Cancer-Uncontrolled cell division

| | |
|---|---|
| Apoptosis | Programmed cell death |

## Stages of cancer

| | |
|---|---|
| 1 | Tumor grows from single cell |
| 2 | Cancer cells invade neighboring tissue |
| 3 | Cancer cells spread through lymph and blood vessels to other parts of body |
| 4 | Cancer cells may survive and establish new tumor |

## Forms of DNA

| | |
|---|---|
| Chromosome | Tightly coiled DNA, made of 2 sister chromatid |
| Chromatid | 1/2 chromosome |
| Tetrads | 2 pairs homologous chromosomes next to each other |
| Centromere | Spindle fibers attach via kinetochore |
| Daughter chromosomes | Separated sister chromatid |

## Meiosis 1

| | |
|---|---|
| Prophase 1 | Chromosomes condense, homologous pair connect to each other (synapsis) -> tetrads |
| Metaphase 1 | Tetrads align at metaphase plate |
| Anaphase 1 | Homologous pairs separate, sister chromatid still attached |



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## Meiosis 1 (cont)

| | |
|---|---|
| Telophase 1 | Cell divides into 2 cells |

## Meiosis 2

| | |
|---|---|
| Prophase 2 | Chromosomes of 2 sister chromatid begin to condense |
| Metaphase 2 | Chromosomes line up on metaphase plate |
| Anaphase 2 | Sister chromatid separate |
| Telophase 2 | Starts dividing into 4 haploid cells |

## Meiosis

| | |
|---|---|
| Sperm | Produces 4 sperm, prioritizes quantity |
| Egg | Creates 1 egg, quality over quantity, discarded eggs become polar bodies |

## Cytokinesis

| | |
|---|---|
| Animals | Contractile ring of microfilaments pinches the cell in 2, creates a cleavage furrow |
| Plant | Vesicles from each cell bring materials over to create cell wall of plant, creates cell plate between 2 cells |

## Increase genetic diversity

| | |
|---|---|
| Crossing over | DNA exchange between homologous pairs at chiasma |
| Indepe-ndent assortment | During metaphase 1, one set of traits doesn't depend on another, each gamete has one of many combin-ations |

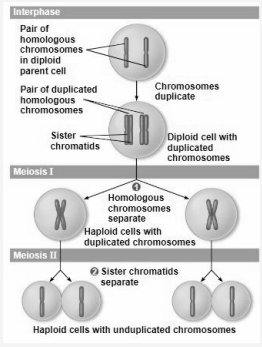
## Asexual vs Sexual reproduction

| | |
|---|---|
| Asexual | Quick, doesn't take care of young, no diversity |
| Sexual | Long process, non self-sufficient, diversity |

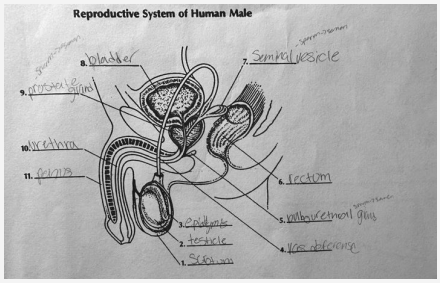
## Fertilization

| | |
|---|---|
| Acrosomal reaction | Sperm breaks down to enter egg |
| Cortical reaction | Egg releases calcium ions to prevent polyspermy |

## Meiosis




## Male reproductive system




## Female reproductive system

