Phases of the cell cycle Mitosis

Prophase	Chromosomes condense and spindle aparatus forms
Promet-aphase	Kinetochores assembled at centromere, 2 opposite sides connected to microtubles
Metaphase	Lined up on imaginary metaphase plate. Polar microt-ubles extend from each spindle, overlap in middle, pole-pole connection
Anaphase	Cohesions are cleaved, daughters to opposite sides of cell. poles pulled apart
Telophase	Nuclear envelope reforms, chromosomes begin to condence
Cytoki-nesis	Division of cytoplasm

Types of dominance

Incomplete dominance	Phenotypes are blended together
	ex. pink flowers come from red and white allels
Co-dominance	Both phenotypes show up
	ex. polka dots

Mitosis

Mitosis	When cells divide, two gentetically identical sister cells are their products
Uses	Somatic cells

G1 checkpoint

1.	Cells big enough
2.	Sufficient nutrients
3.	social signals present
4.	Cells undamaged

G2 checkpoint

1.	No errors in replication
2.	Activated MPF (cyclin + CDK) present
3.	Undamaged

Metaphase checkpoint

1.	Chromosomes attatch to spindles
2.	Chromosomes properly segregated
3.	MPF absent

Mechanisms of cell cycle progression

Nucleotide excision repair	1. Error detected in DNA by proteins
	2. DNA nicking (cut at both sides of damage)
	3. Helicase unwinds and removes region with damaged bases
	4. DNA polymerase fills gap with undamadged strand as template
	5. Nuleotide linkage (DNA ligase links the strand into esisting strand.
	If sucessful continues past G1 checkpoint
P53 gene	Creates CDK inhibitors if the cell is damaged so if cyclin is still present, CDK can still say no if damaged
UVRA	recgonizes DNA damage, signals to start repair, if damage cant be repaired cell wont divide anymore.
recA	Facilitates DNA repair

Genes on X-chromosome

The X chromosome is larger	it holds most all of the sex-linked traits
In females	Females have 2 copies of X chromosome
	When sex linked traits are recessive they would need 2 copies to express the mutation
In males	Males only have one X-chromosome
	Males only need 1 copy of recessive X-linked trait to express the mutation

Segregation and Independent assortment

Law of segregation	Each diploid parent forms a haploid gamete
Independent assortment	Allels of different genes seperate indipendently of eachother to form gametes

Epistasis

Epistasis	The expression of one gene influences or masks the expression of another gene
Ex.	Fur color in golden retrievers

Map distance for F2 generation

Greater than 50 map units	Independently assorting

Independent assortment

Linked genes	Do not follow rules of independent assortment
	Too close together on chromosome to seperate
Closer genes are	More likely they are linked
Independent assortment	occurs between chromosomes not within

Reciprocal vs Test cross

Reciprocal cross	The cross between a male with one phenotype and a female with another and then flipping
	Determines if sex plays a role in inheritance
Test Cross	Dominant phenotype crossed with recessive genotype
	Determines genotype of dominant phenotype

Genes arranged on chromosomes within genome

Karyotype	# and visual appearance of gametes
Genes hold	Instructions for making mRNA
Homologous chromosomes	Same genes in same location, but different versions of gene
Allels	versions of genes
Genotype	Allels present
Gene locus	location of genes

Asexual vs Sexual reproduction

Asexual	Sexual
No variation, exact clones	More variation
Quicker	Slower
Binary fission	Humans
Mitosis	Meiosis

Importance of Telomeres

Protect from	important DNA being cut out
Everytime cell divides	become shorter
Replication limit	prevents cancer
Why?	There is no 3' hydroxyl at end of lagging stand.
What?	G-rich series of repeats
Telomerase	elongates parental in 3' to 5' direction.

Both leading and Lagging strands	
Single stranded binding proteins (SSBs)	Keep stands from attatching back together
Ligase	Fills in gaps or breaks in phosphodi-ester bonds of backbone
Helicase	Seperares, unwinds double stranded DNA
Topoisomerase	Helps with stress on wound DNA, ex. Gyrase

DNA synthesis in lagging strand	
Synthesized	in fragments (Okazaki fragments)
Initiated by	RNA polymerase
RNA polymerase	builds primers
DNA polymerase	replicates DNA off of primers
RNA primer	popped out of gaps and replaced with DNA polymerase

DNA synthesis in Leading strand	
Synthesized	Continously
Begins with	RNA primer
After RNA primer	DNA polymerase