Genetics: the basics
Genes: responsible for ____________________________
DNA: composed of _____________________________
Chromosomes: composed of _____________________________
23 chromosome pairs
  22 _____________________________ pairs
  1 sex pair

Genetics: The Basics
Each chromosome contains a gene
There are two pairs of each gene
Typically one is _____________________________ over the other, so only one is _____________________________
Ex. One gene for blue eyes and one for brown eyes… brown is dominant over blue

Terms to know

Genetic composition of an organism
Observable appearance of an organism
XY is the genotype of a male
Being male is their phenotype

Cell Division
Mitosis
_____________________________: 1 cell divides into 2 cells

Cell Division
Meiosis
Produces _____________________________ (ie. sperm and egg cells)
When life begins a sperm and an egg fuse
Sperm and egg cells must have _____________________________ number of chromosomes
A single cell divides into two copies and then into four cells, each having half the chromosomes that the original had

Meiosis

Sex Chromosomes
The X Chromosome is _____________________________ than the Y
  It contains _____________________________ than the Y Chromosome
Instead of having two copies of genes, males only have _____________________________ of certain genes
  Called sex-linked characteristics
What is all this DNA for?
Through many steps, DNA is eventually ________________
Proteins are responsible for the ________________

**Diversity**
Diversity is good!
Adapted to ________________
Able to ________________ in environments
Sources of diversity
  - Crossing over of DNA

**Mutations**
Errors in the genetic code that occur ________________
Most mutations have ________________
Some mutations are ________________
  - Fragile X
  - ________________ Syndrome
  - ________________ Syndrome

**Fragile X syndrome**
Inherited ________________
Cause of autism
Delay in ________________ development
Sex linked mutation
  - Leads to the silencing of a portion of the ________________

**Turner’s Syndrome**
Only one ________________
Only effects women
Characteristics
  - Short stature
  - Lack of ________________ development
  - Webbed neck
Arms that turn out at the elbow

**Down Syndrome**
Trisomy ________________
Cognitive development varies from mild to severe
  - ________________ is lagged
Motor skills are ________________

**Other increased risks: Down Syndrome**
Congenital _____________________________ (50% increase)
Increased susceptibility to infection
_____________________________ problems
Obstructive sleep apnea
Thyroid dysfunctions (hypothyroidism) (20% increase)
Acute myeloid leukemia, although their survival and relapse rate is much better than average
_____________________________ (nearly absolute in males, fertility in females is possible)
_____________________________ (80% increase)
Eye problems (cataracts, strabismus, near and far sightedness)
Alzheimer's disease

Random fact
X inactivation
Females have ___________________________ of the X chromosome
Only 1 X chromosome is active
The _____________________________ can change within an organism
_____________________________

So why do we talk about mutations in a biological psychology class?
Deals with the biology of the brain
Most evolutionary change has occurred _____________________________
Evolution has _____________________________ of the human brain

Evolution of the Nervous System
Nervous systems are very _____________________________ in the scheme of things
Single cell organisms obviously didn’t have _____________________________
Animals with simple nerve nets
_____________________________ years ago
First real nervous system with a brain
_____________________________ years ago
  True brains: chordates

Evolution of the Nervous System

The evolution of the brain
The different parts of the brain are _____________________________
Fish have _____________________________ that are larger than their cerebrum

What about the evolving brain seems to matter?
_____________________________?
Seems to matter some
_____________________________ have huge brains

What about the evolving brain seems to matter?
Seems to matter some
Chimp and human brains are fairly ________________
__________________________________________ have the most ________________

What about the evolving brain seems to matter?
Jerison (1973) suggested that it is a ratio of ________________

Evolution of the Human brain
Very fast
Within a few million years it ________________

Why so fast?
Rapid human brain growth may have resulted from ________________
__________________________________________and learning to plan for the future.
Agriculture, ________________ have not produced additional changes in brain size.
The advantages of further increases in brain size may be offset by:
__________________________________________ required by the nervous system.

How does the nervous system develop?
Within a week of contraception
______________ has 3 layers
__________________________________________
Forms skin and nervous tissue
Mesotherm
Forms ________________ (blood vessels, muscles)
Endotherm
Forms ________________

Nervous system development
______________ from ectotherm
Six stages:
Formation of ________________ of cells to their location
______________ of neurons into types
Formation of ________________ between neurons
______________ of particular neurons
Rearrangement of neural connections

Stages 1-2
First rapid cell division to form new ________________
Up to ________________ new cells per minute
Next cells _____________________________ to their location
Radial glia guide the migration
- Occurs in an _____________________________manner
- Inner layers are formed first

Stages 3-4
- _____________________________of cells into types
  - Cells differentiate into glia or neurons
  - The neural tube differentiates into _____________________________halves (for the peripheral nervous system)
  - Other cells differentiate into spinal cord, _____________________________, and forebrain
Formation of connections
  - NOT random
  - _____________________________to particular locations

Development of the Nervous System

Cell Death
The nervous system _____________________________
- All cells contain genes that program their death
  - _____________________________
- When activated these cells die
- Seems to be very important
  - Lack of _____________________________has been shown to lead to
    - _____________________________

Synaptic Pruning
The nervous system overproduces the number of _____________________________
- Within the first year of life, up to _____________________________may be eliminated
- Probably based upon _____________________________
  - Possibly a use it or lose it philosophy

Effect of Experience on Development
Life experience changes our _____________________________
- Visual system
- Language
- When the _____________________________neurons are both active: the bond gets strengthened
- When one is active and the other is not: the bond gets _____________________________

The visual system: Development
Remember the _____________________________gets input from different eyes
- Originally this is not the case
- Early in development, both eyes _____________________________
Connections from one eye is ______________________ and the connections from the other eye is _____________________________

Eventually only input from one eye is available

**Critical Periods**

Some development is contingent upon ______________________________

Language

Learn it before _____________________________ or cannot learn language at all ________________________________, the brain is unable to develop a proper language system

**Critical periods**

Birds think the thing they first see is their _______________________________

Human imprinting?

Neglected orphans that formed connections to parents before age of ______________________________ fully recovered from deprivation

Those that formed connections after 6 months, did ______________________________

**Plasticity**

Ability for the ______________________________

Can occur throughout life

After strokes, most patients experience the ______________________________

Occurs because of programmed cells death, ______________________________, and the regrowth of synapses

**Stem cells**

Most cells in a full grown adult have ______________________________ into their types

These cells replicate, but if they are damaged, ______________________________ cannot usually completely repair the damage

Stem cells are ______________________________ cells in the body

Adults have them

Fetuses as well

**Adult stem cells**

Most of them have “____________________________”

Ex. They can become any part of the liver, but cannot become part of the spleen

Fetal stem cells have ______________________________

Can become part of any piece of the body

Place in these cells to the damaged area, and healthy new cells replace the damaged cells

**Disorders of Brain Development**

____________________________

Significant portions of the brain and skull don’t develop

Usually leads to in utero death
The neural tube doesn’t fully develop
Surgery can fix most of the problem
Still typically leads to paralysis of the lower limbs