Name _____

COGS17	HOMEWORK 1
Given the definitions provided below, enter the corresponding vocabulary term(s) in the column on the left. HINT: A "vs." in definition indicates that 2 terms are re	
SOME BASIC TERMS	
Ipsilateral / Contralateral	Connecting to the SAME side vs. connecting to the OPPOSITE side
Lateral / Medial	Towards the sides vs. toward the middle
Ventral / Dorsal	Towards the stomach or the bottom of the human head vs. towards the back or the top of the human head
Superior / Inferior	A structure above another vs. one below another
Coronal / Saggital / Horizontal	Planes through head as seen from the front vs. the side vs. above/below
CNS / PNS	
Diencephalon	Division of the Forebrain that ultimately becomes the Thalamus, Hypothalamus and the eye
Telencephalon	Division of the Forebrain that ultimately becomes the Cerebral Cortex, Basal Ganglia, Limbic System, etc.
Medulla	Hindbrain structure, controls vital reflexes
Pons	Hindbrain structure, acts as bridge between Hindbrain and higher centers
Cerebellum	Hindbrain structure, involved primarily with guided, timed movements
Reticular Formation	Network of cells moving medially through hind- and mid-brain, involved in arousal
Raphe System	Core strip of cells through hind-and mid-brain, involved in sleep
Tegmentum	Midbrain structure involved in motor processes
Tectum	Midbrain structure involved in sensory processes, includes Superior (visual) and Inferior (auditory) Colliculi
Hypothalamus	Forebrain structure, oversees 4Fs, temperature, clock; communicates with and through the endrocrine system
Pituitary Gland	Forebrain structure, "Master Gland", stimulated by Hypothalamus
Thalamus	Forebrain structure, a principal stop along most sensory, motor & arousal pathways, projects to cortex
Limbic System	A set of forebrain structures involved in motivation and emotional expression
Hippocampus	Part of above system, involved in the formation of new memories
Amygdala	Part of above system, associated especially with anger and fear, also with recognizing emotion in others
Cingulate Gyrus	Part of above system, "re-entrant" layer mediating between cortex and lower systems, especially for +/-evaluation
Olfactory Bulb	Part of above system, receives smell info from olfactory receptors
Basal Ganglia	Forebrain structure including Caudate Nucleus, Putamen & Globus Pallidus, involved in organization of movement sequences
Basal Forebrain	Forebrain structure including Nucleus Accumbens, involved in arousal of cortex, attention & reinforcement
Cerebral Cortex	Forebrain structure, outer "bark" of brain, 6-layered, highly convoluted
Corpus Callosum	Set of axons connecting the two cerebral hemispheres
Occipital Lobe	Lobe of the cortex, posterior, primarily involved in visual processing, including V1 (Striate Cortex)
Temporal Lobe	Lobe of the cortex, lateral, primarily involved in auditory processing (e.g. A1 and Wernicke's) and higher visual (IT)
Parietal Lobe	Lobe of the cortex posterior to the Central Sulcus, primarily involved in somatosensory and visuo-spatial mapping
Frontal Lobe	Lobe of the cortex anterior to Central Sulcus, including Motor & Premotor Areas (including Broca's and Mirrors cells) and...
Prefrontal Cortex	Most anterior part of above lobe, involved in self control, strategy, cultural rules, etc.
Spinal Cord	Part of the CNS other than the brain
Dorsal Root / Ventral Root	Part of the Spinal Cord through which sensory info enters. vs. through which motor info exits
Bell-Magendie Law	"Law" governing above directions of information flow
Grey / White Matter	Area of the Spinal Cord (as seen in cross-section) consisting of soma vs. of myelinated axons
Central Canal	Tube through core of Spinal Cord containing fluid
Ventricles	Four hollow chambers (plus aqueducts) in brain that produce the fluid that feeds, cleans and cushions brain
Cerebral Spinal Fluid (CSF)	Fluid, produced by ventricles, found within Spinal Cord and in covering surrounding CNS
Meninges	Three-layered (Dura-Mater, Fluid-filled Arachnoid-Space, and Pia-Mater) protective covering that surrounds CNS

Name _____

Blood Brain Barrier	Semi-permeable barrier, controls what chemicals enter brain, created by closing gaps between capillaries' endothelial cells
Somatic Nervous System	That part of the PNS that is responsible for the body's interaction with the environment
Autonomic Nervous System	That part of the PNS that is responsible for assessing and maintaining the body's internal environment
Vagus Nerve	"Wandering" nerve in the ANS that enervates multiple organs
Sympathetic / Parasympathetic NS	That part of the ANS that produces the "fight or flight" response vs. that which facilitates relaxation and replenishment
Parasympathetic Rebound	Extreme compensatory response of one system to extreme activation of the other - can lead to fainting, ulcers, voodoo death

NEURAL FUNCTIONING

Neurons	Cells in the Nervous System responsible for information transmission
Glial cells	Cells in the Nervous System responsible for support, feeding, recycling, development, etc
Ribosomes	Organelles in a cell that are the site of protein production, crucial to much neural functioning
Mitochondria	Organelles in a cell that are the source of energy (ATP) to power active (rather than passive) functions in cell
Dendrites / Axon	Processes (branches) of a neuron that receive the incoming message vs. the one that releases the outgoing message
Concentration / Electrical Gradient	Difference in the amount of a given **chemical** inside/outside a cell vs. a difference in **charge** inside/outside a cell
Na+, K+, Ca++, Cl-	Symbols for 4 key chemical elements in neural functioning - including 3 positive ions, 1 negative ion
Resting Potential (-70mV)	Name for *and* amount of difference in charge inside/outside cell, in millivolts (mV), in a polarized cell ready to fire
Sodium-Potassium Pump	Energy-requiring pump that helps restore membrane potential after cell fires
Action Potential	A sequence of depolarization that moves along an axon, resulting in the all-or-nothing release of NT
Axon Hillock	Section of axon where depolarization sequence begins
Graded Potential	A greater or lesser change in the polarity of a neuron that results in a greater or lesser release of NT
Ionic / Electrical Conduction	Propagation of info down an axon by way of chemical gates opening/closing vs. by flow of electrons
Saltatory Conduction	"Jumping" electrical conduction that occurs in myelinated axons
Myelination	Glia cells wrapping around sections of an axon to insulate it and speed its information transmission
Nodes of Ranvier	Gaps between myelin sheaths on an axon
Multiple Sclerosis (MS)	Disease that destroys myelin; no ion gates under sheath so neurons cannot fire
Refractory Period	Period following an Action Potential during which the cell cannot (or is more difficult to) fire
Synapse	The event in which one cell releases NT and that NT affects another cell
Synaptic Cleft	The gap between cells across which NT passively floats
Pre- / Post Synaptic Cell	The cell that releases the NT vs. the cell that receives the NT
Pre-Synaptic Terminal	The end of the axon from which NT is released, also called "button" or "end bulb"
Vesicles	Packets of NT released by a neuron
Exocytosis	The release of NT into cleft via its packet opening at a Fusion Pore in the cell's membrane
Receptor Site	Area, usually on a dendrite, that is specialized for the attachment of NT
EPSP / IPSP	An increase vs. a decrease in a cell's likelihood of releasing neurotransmitter
Hypo / Hyper-Polarization	Less polarized, less difference between inside of cell and outside of cell vs. more difference
Summation	Cumulative effect of the activity of multiple Presynaptic cells; Can be temporal or spatial
Ionotropic / Metabotropic	When NT has direct effect on ion channels in Postsynaptic cell vs. indirect effects via internal metabolic processes
Second Messenger	Chemical in Postsynaptic cell involved in energy-requiring processes (including altering ion channels) triggered by NT
Neuro-transmitters / -modulators	Chemicals released by Presynaptic cells that directly affect local Postsynaptic cells vs. ones that widely influence neural activi
Agonist / Antagonist	Chemical (endogenous or man-made) that acts to facilitate vs. to reduce the effects of specific NTs
Reuptake	Process by which NTs or their components re-enter the Presynaptic cell for re-use.
Acetylcholinesterase	Enzyme in cleft that breaks down Acetylcholine
Auto-Receptors	Site on Presynaptic terminal that reacts to that cell's own NT, usually acting to turn off/down that cell's further NT release
Axoaxonic Synapses	Synapses at a Presynaptic terminal that reacts to NT from another cell, excitatory or inhibitory

Name _____

PLUS: List six important NTs (with their abbreviations) and three important hormones	
NTs	**Hormones**
ACh Acetylcholine	**Epinepherine (Adrenalin)**
DA Dopamine	**Testosterone**
5-HT Serotonin	**Estrogen**
NE Norepinepherin	**Oxytocin**
Epinepherine	**Insulin**
Glutamate	**Cortisol**
GABA	
Substance P	
Endorphins	
DEVELOPMENT	
Ectoderm	In the new embryo, the outermost layer of cells - becomes the nervous system and skin
Neural Plate	In the growing (wormlike) embryo, the surface along the back that thickens and hardens
Neural Folds	A pair of ridges all along the above that begin to curl towards each other
Neural Tube	The long hollow chamber that is formed when the above meet and fuse; Inner surface becomes the CNS
Neural Crest	Outer surface of the above ridges that separate off and become the PNS
Spina Bifida	A pathological condition involving a failure of the edges above to completely fuse, leading to birth defects or death
Ventricular Zone	Hollow core of developing embryo, source of cells of nervous system
Stem Cells	The original type of cells in this area that undergo division to populate the nervous system
Proliferation	General term for the production of new cells
Symmetrical / Asymmetrical Divisi	Cell division that produces two identical offspring vs. produces one identical and one new (neuron or glial) cell
Migration	The movement of cells from their place of origin to their later position
Radial Glia	An early type of glial cell that extends its processes out like wheel spokes for the developing neurons to move along
Synaptogenesis	The process by which neurons form new connections
Growth Cone (Fillopodia)	The specialized tip of a growing axon that detects the chemicals that guide its path
Guidepost cells	Glia cells that are positioned to direct growing axons towards their target cells
Neurotrophins	Chemicals that attract/repel Axon growth, help prevent cell death, and/or promote Axonal branching
Nerve Growth Factor (NGF)	One type of the above, from muscles & organs, that promotes survival and growth of axons in the brain and Sympathetic NS
Apotosis	Cell Death as determined by "suicide genes" that cause developing neurons to package their contents & destroy themselves
Collateral sprouts	Newly formed axonal branches that replaces another (that has died off) at a synapse
Dendritic spines / branching	New outgrowths on, or subdividing of, the processes that receive NT, in response to an enriched enviornment, learning, etc.
Fire together > Wire together	A mnemonic for the rule that co-activated cells tend to be strengthened in their connectivity and out-compete neighboring cells

Name _____

BRAIN STUDY TECHNIQUES	
Golgi, Nissl, Weigert	Name 3 types of neuronal stain that are injected live, but then examined in brain tissue slices
Lesion method	Creating or exploiting brain damage to determine if that area is necessary to a certain function
Electrical stimulation	Method used to generate, for example, the "Penfield Map" of somatosensory cortex in live patients
Spatial resolution	Do all three of the above get good spatial or temporal resolution?
Lesions & Electrical Stimulation	Which of the above yield information on brain FUNCTION?
Single Cell Recording	Record activity using a micro-electrode probe in an active subject
EEG / Electroencephalography	Using a "electrode cap", technique detects the electrical dipoles generated by changing electrical potentials
Summation	Does the above record *localized* changes in electrical activity or *summation* of changes over thousands of neurons?
ERP / Event-Related Potential	The time-locked average of many EEG trials to factor out other brain activity & focus on a particular response
MEG / Magnetoencephalography	Detection of naturally occurring changes in magnetic fields created by brain activity (complementary to EEG)
SQUID	Devise used to measure extremely weak magnetic fields, such as those produced by brain activity
MEG / Magnetoencephalography	Of the above four techniques, which requires confining the subject in a large apparatus?
Single Cell Recording	Of the above four techniques, which has the best spatial resolution?
MEG / Magnetoencephalography	Of the above four techniques, which is the most expensive?
Resonance	Aspect of MRI that involves using pulse of radio waves to make hydrogen protons gyrate in body's fluid
Magnetic	Aspect of MRI that involves aligning the magnetic fields of those gyrating protons
Imaging	Aspect of MRI that involves the release of energy when the protons are allowed to return to 'natural' alignment
MS (Multiple Sclerosis)	Example of a neurological disease revealed by MRI's capacity to distinguish white from grey matter
fMRI	Technique that makes use of the diff in how oxygenated vs deoxygenated hemoglobin in blood respond to magnetic fields
Active	Is deoxygenated hemoglobin more likely to be found at Active or Non-active sites in the brain?
Functional	What does the "f" in "fMRI" stand for?
PET / Positron Emission Tomogra	Patient is injected w/radioactive fluid that is absorbed w/glucose into active cells & detected as gamma emissions
CAT / Computed Axial Tomograph	Technique using 2-D x-rays of tissues that vary in how x-rays penetrate, to build up 3-D image
MRI > fMR I> PET > CAT	Order of above four scanning techniques, best to worst, for detail resolution