

Volume 1

# Neuroscience

ACTIVITY

Word Finds  
Coloring  
Sudoku  
Brain Teasers  
Maze  
Notes

BOOK

biotechne®

# Types of Neurons

## Word Find

D O A K Q M U J V B H G F K M M S J N B R U B U L U S N K C I Q  
 D W U Z F X B M L N A X R J T S P U C T L X R G N P H D Z B Y Y  
 O W H Y M M L A Y Y R D V A L E D Y Z Q I B U H X N K T M S V Z  
 V O G J V J F X O Q Q C Z S E N G E R Y Y S S M B C P Z S D Q Q  
 M Q J Q I S Y N A P S E S D F S G X D G D B H A E V S G C A M G  
 C E Q O V S E T J N B X W T G O N I A M Y K Q Y E O O M H I X P  
 D K P C C W R N Q H J N Z Z U R H R J L E Z B F B U F O E U S W  
 D K D G R A R Q J L K O E O T Y F E C B W J B N J Z I T M D A W  
 Y R E N R H K J A L T V V X I I O Y K Z R U O V G A M O I O R L  
 K J Q Y B S L N R H P O N R V V Q N D E N D R I T E S R C P U F  
 V D S D W N F F X S C G Q M L E O M W O S K R T S A A U A I Z K  
 H B V A J E P K Z J B W K C L U K W P N A F S I H Z U M L J K E  
 C K M L Q R I S O M A G V B K E U G O D R X K Z C V H W Y P L Y  
 Z H T G R P B U G N E I F R F T K I N T E R N E U R O N S E A I  
 G B R N L Z P C R K T V R E J F N O I L G N A G U L R G S T I V  
 G S A Y T J Q H A Z Y T L T Q R V N A V R D S V T K I H T T T V  
 O A E T S T K W N C C P K Y X Y L H G E V R E N X S M I F N N N  
 J X I G P Y O G U Y O H G I C L A C I R T C E L E Y Z G O E E J  
 X M O O R R O Y L R R V V M C T F Y G J M V P E T L M A G R T J  
 V J M D F A L N E R D F Z S I O A Q I D I E Z S Y J C O O E O V  
 G C V E C E F P K A N X K N Y A E V K Q P W E Z E G A I O F P N  
 Y F X Z O T I V R L E E E A E Y E A W L I Y V G O Q R L A F N J  
 R Z J D J T C G X O D I J R J R K L W W N T S Z Q Q J A H A O U  
 F M O X N G V W X P O M N T L G N P V T Y P D K D Z N D L H I N  
 I B G E K V N L H I G N I O J L M I C G S U Q S F N O I A V T I  
 N R Y Y K O P R R T I O K R O S E H I P A I T C R S X M C T C P  
 T W X X O X G M L L L R R U Q S R V E L D N I P S H A A K I A O  
 U P S F Y L B N Q U O U U E L O C M R E Y V B Z N G T R B G D L  
 K U N T V R G L M M N E P N M R C N G O I T O D H G Z Y T D J A  
 T Y R A L O P I B J R N Q W O Y E W O D B O I Y J L P P B M M R  
 P U R T D S O O I Z I N N D S C L A Z Z S I S E N E G O R U E N  
 D G R P K O Z Q J P W A Q Y Z X N Z O O H V L L Q D P S Z F H Q

Neuron  
 Nerve  
 Oligodendrocyte  
 Soma  
 Dendrites  
 Axon

Unipolar  
 Pyramidal  
 Multipolar  
 Bipolar  
 Purkinje  
 Rosehip

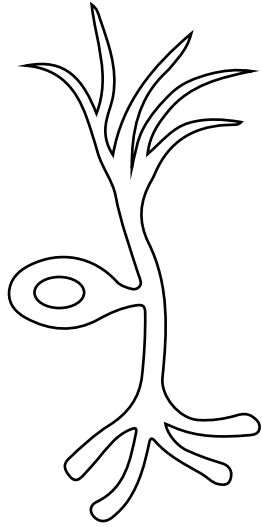
Renshaw  
 Brush  
 Granule  
 Ganglion  
 Spindle  
 Motor

Sensory  
 Interneurons  
 Afferent  
 Synapses  
 Electrical  
 Chemical

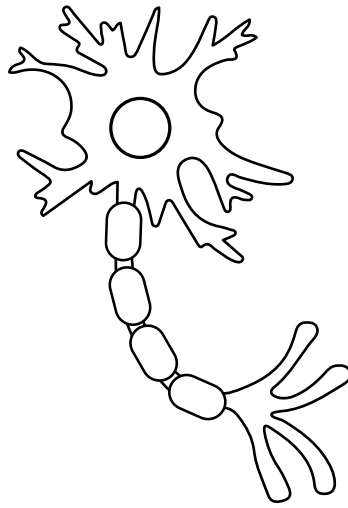
Action potential  
 Neurogenesis  
 Neurotransmitter

# Types of Neurons

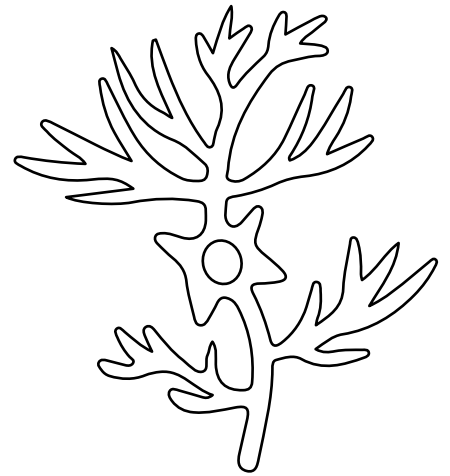
## Coloring Page



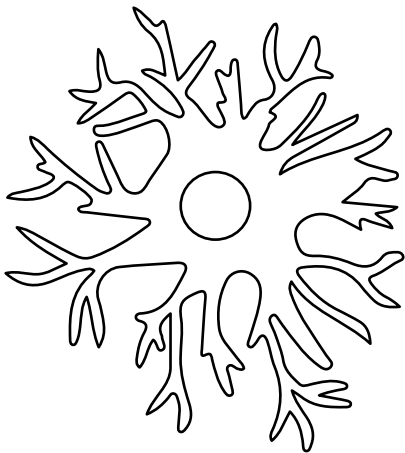
**Sensory Neuron**  
(Unipolar Neuron)



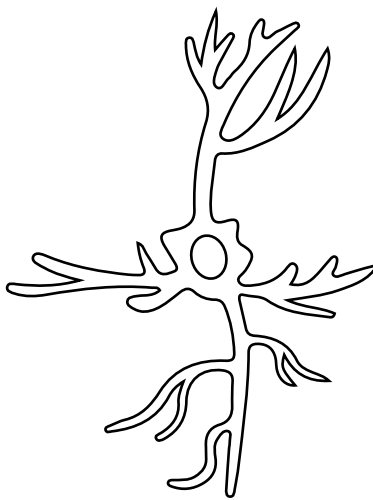
**Motor Neuron**  
(Multipolar Neuron)



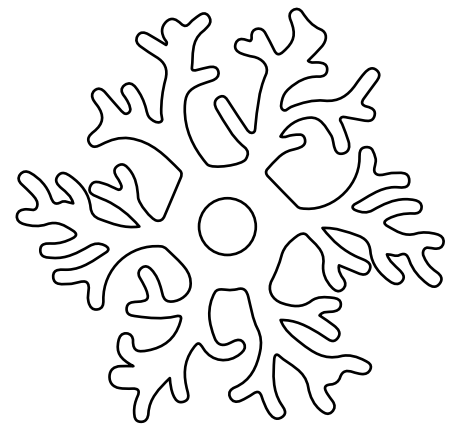
**Pyramidal Neuron**



**Astrocyte**



**Betz Cell**



**Microglia**

# Sudoku

	1	6	5			8	9	
		3				4		
	7			3				2
7			2		3	9		
			7		5			
		1	8		9			7
8				9				6
		2				7		
	5	9			1	3	2	

			3	6			7	9
	5			7	8	1		
					1		8	5
1							6	3
		5					9	
	9	7						1
5	3		1					
		8	5	4				9
9	4			8	6			

6					3			8
	1		8					
8		4		6		1	7	
		2	3	9				1
	9							4
	6			8	2	7		
	5	9		7		4		3
					9			6
	4		5					7

	5	7						
		1			6	5		
6			5	8				1
8			9	5				6
	9	4		6		2	8	
2				7	4			3
4				9	5			2
		8	6			4		
						6	3	

# Neuroscience

## Rebus Puzzles

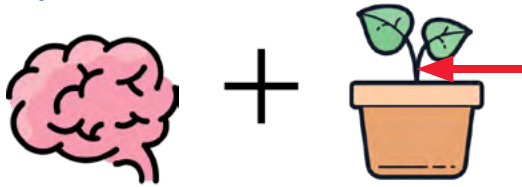
Decode the neuroscience terms from the pictures below

1.



Answer: \_\_\_\_\_

2.



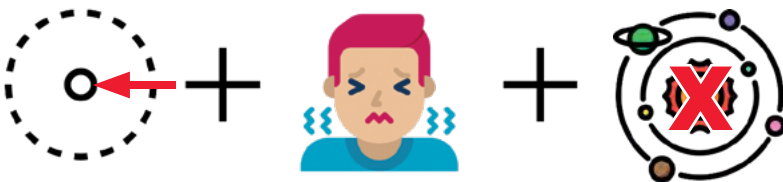
Answer: \_\_\_\_\_

3.



Answer: \_\_\_\_\_

4.



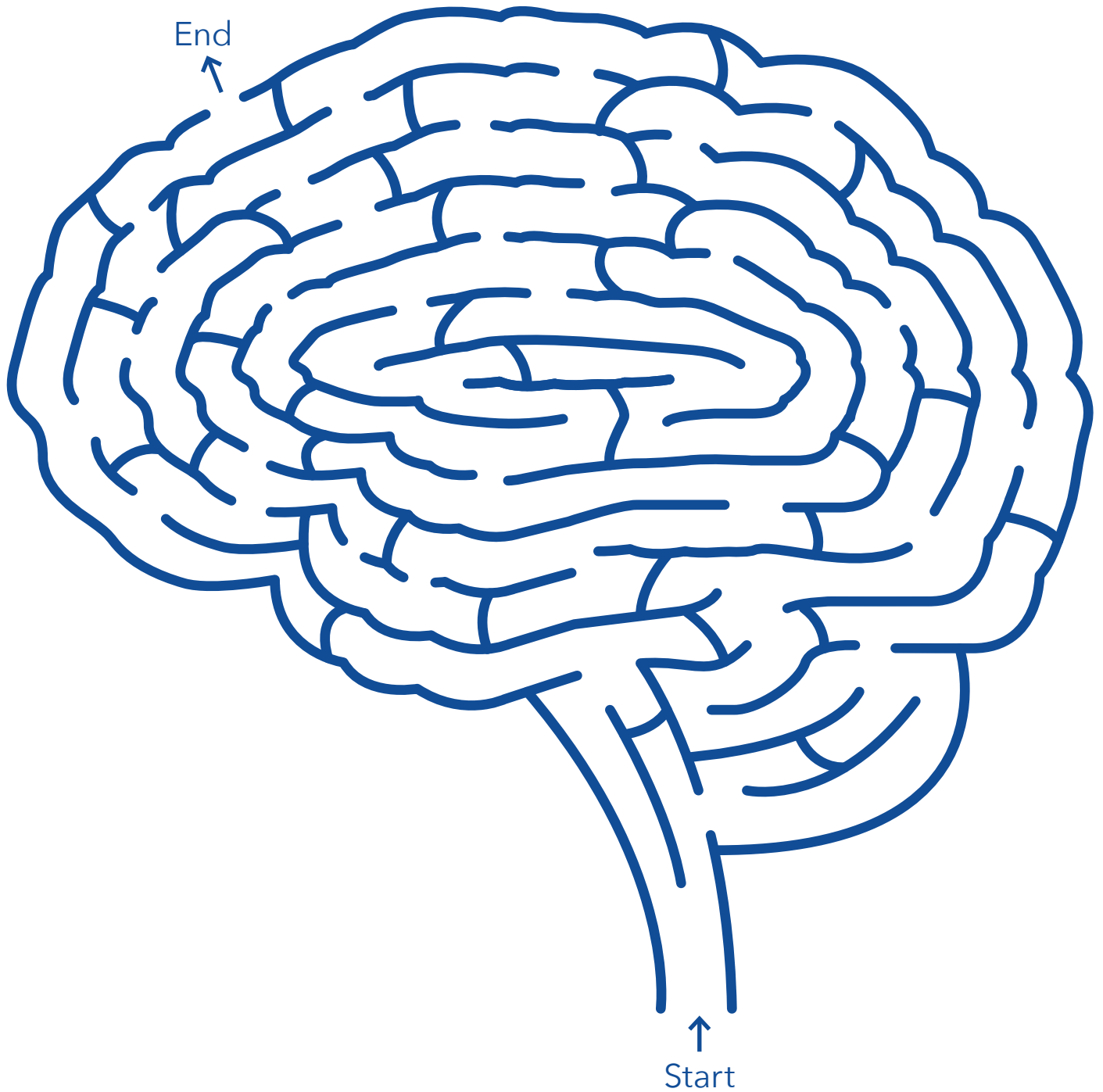
Answer: \_\_\_\_\_

5.



Answer: \_\_\_\_\_

# Find your Way Through the **Brain Maze**



# Brain Anatomy

## Word Find

H S C Q G S U N B R F U D H T A U L Q W A T S N O P H Q U G V R  
 K J U V A T K D P P P N H N O N Q C E O U Y H E O J Y C Z A H W  
 D F I Y N F T P M W L E Q L K K Q F O E P E S L R C P P F C X F  
 O Z Z M G V F L H B C B J Y Z E H I C P N S I A T Z O V M O T Q  
 O P W U L L Z A X O B O U U D W Q M E Z F K M E J C T R T A X R  
 D M E R I V S S F I A L R Y Z F A X N D O L N N R X H K B Z Z J  
 P E M B A O U A A C C G W T X F S P W X F O D I V D A V C O H X  
 G D B E V L L B Z E P V D I E R G Q V I D B H P R B L T M L K N  
 T U J R E O C S L K A L N Y K X O N A X Q N Y X R C A P I Q Q L  
 Q L P E N L U B D L Z E C S A D S T P N O W N A I Q M L H X Q D  
 W L W C T X S R H Z D C N E H Q P H B M I G C T K A U O B R N E  
 E A G D R Y Y O H R N G L P N V E P D Q A T Q A A Q S B L M U H  
 F H J N I W H G K S W E C I T X G L Z J P S F G U M E Q W D X W  
 L H B V C R K X J G H R S W A I U G V M Q R G N M R T W H F E N  
 O S X C L J T L Z Z R R R W W W X H T U H P M O G V Q W X M O B  
 P U E M E X K I T A H T G K Q E H H H E W B N L E J I N Z E R K  
 C U C V S S V U U T Y V J D Z H C M P A A B Z B K U B Z F U D A  
 N F J K C C Z N S E F W P L Q W S P C O L Q D O M M A W Q R W E  
 G M Z X T U T N N J H P B J Y R F T I C Y D L P A R I E T A L Y  
 D E F N H R E L J S P J M B M A L P T A K I A N D X H Z M M O Q  
 X T E Q X M J A X O U D S L E R A G Y U G S G T J K V H W B L L  
 C S V L Z T U V E L Y V U C M R T C X C H R V B L L U Q Y O Z X  
 E N Y S I D U P Y A A F Z U I P I X B J D N E Q P I B V S A A K  
 X I L D O M Q E D O G C X H A H P Y U T E M P O R A L V W W D T  
 X A I R U G P G K B O I X P M I I S U P M A C O P P I H A S F I  
 G R X F I A M Q X I X K B N Y M C Q M D M N W V C T G R Q J C V  
 F B J S Y Q C J A S E R Q V G K C G Y R U S S M E N I N G E S W  
 L T H H K R O W P Z V J V T D S O Y J R J Y C S X N I Y U X I W  
 T G B E R G N R V W H S O D A L V L W V T Q Q I Y B L J W L Z F  
 J G A B B T G A X N A U M H L N W C C B N R C D Z K V I E S K P  
 I E H M T T Q N W O R N V D A L C H U V T N I A R B D I M D J D  
 D F O Z Z S S Z O R N U Q N F Z W J W Y D O L X W O Z N I L X J

Cerebrum  
 Cortex  
 Temporal  
 Occipital  
 Brainstem

Medulla  
 Oblongata  
 Pons  
 Midbrain  
 Hypothalamus

Pineal  
 Amygdala  
 Hippocampus  
 Basal  
 Ganglia

Sulcus  
 Gyrus  
 Ventricles  
 Meninges  
 Parietal

# Sudoku

	4	1				8		
9					8			6
		6			2		1	
	6		1					4
	2	5	3		4	9	8	
7					5		6	
	5		8			1		
2			4					8
		8				6	2	

					9	8	7	
		7		6				4
					2	6	9	3
		6	3				4	1
	2						6	
1	4				7	3		
4	6	2	9					
3				4		1		
	1	5	7					

				1	7			6
		1						8
3	2		9		8			
2	7				4	5	6	
1								
	6	5	1				7	8
			4		6		3	5
	8					6		
5			7	2				

4				1	5			
8		2			3	1		
	1							
		3	9	2	8		4	5
		8		4		7		
6	9		7	5	1	3		
							7	
		7	1			5		3
			5	8				4



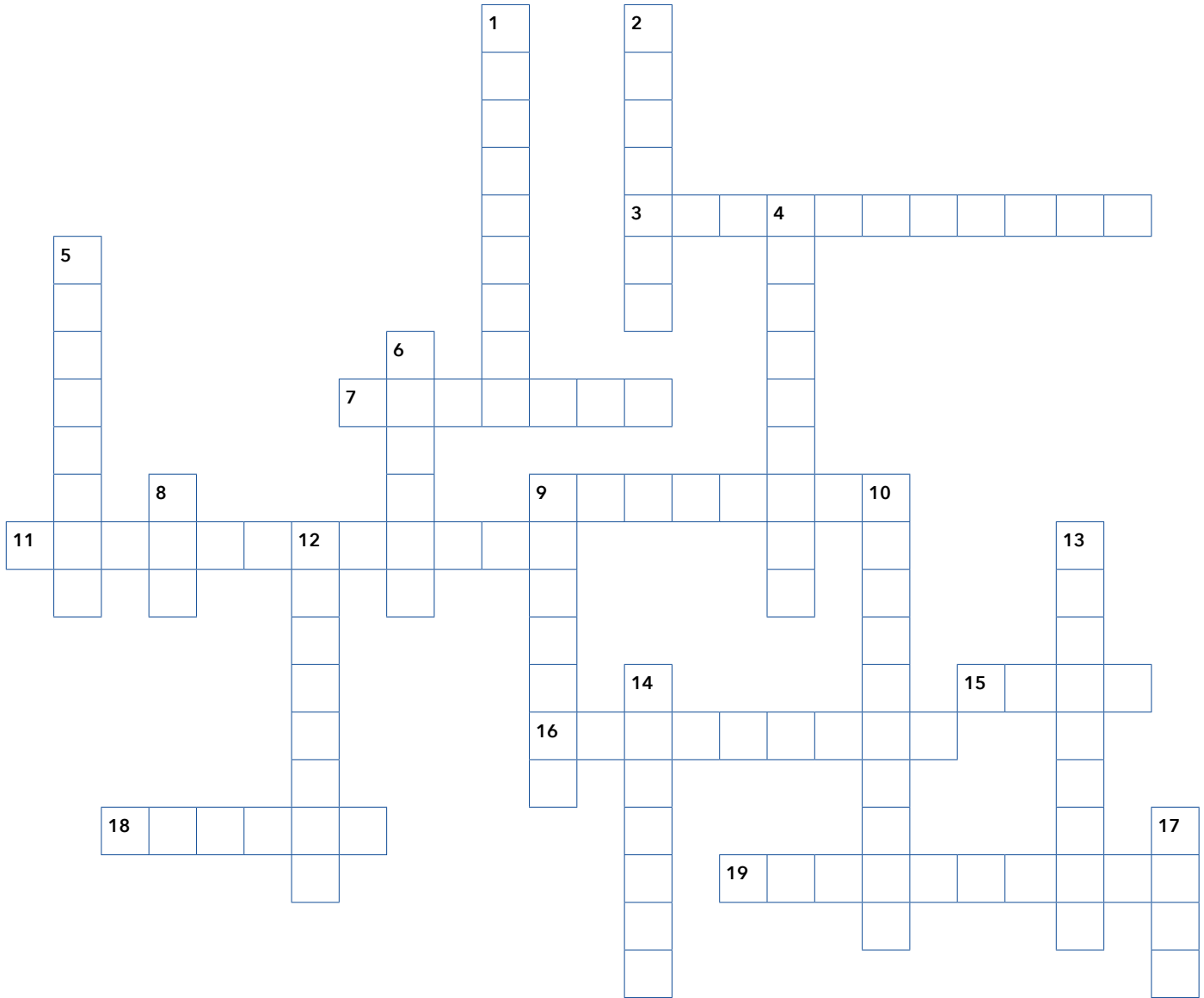
# Test your Brain Power Quiz

1. In 2013 the US government announced an initiative to further neuroscience within the USA, and this then became a global initiative in 2017. What was the name of the initiative?
  - a. BRAIN Initiative
  - b. MIND Initiative
  - c. HEAD Initiative
  - d. THOUGHT Initiative
2. Who was the first neuroscientist to win a Nobel Prize?
  - a. Ivan Petrovich Pavlov
  - b. Josef Breuer
  - c. Joseph Erlanger
  - d. Ewald Hering
3. The most recent neuroscientists to win a Nobel Prize are David Julius and Ardem Patapoutian, but for what research were they awarded their Nobel Prize?
  - a. Discovery of the rosehip neuron
  - b. Discovery of temperature and touch receptors
  - c. Discoveries of molecular mechanisms controlling the circadian rhythm
  - d. Discovery of a new neural pathway
4. The relationship between brain activity and digestive activity is commonly referred to as...
  - a. The bowel-brain axis
  - b. The gut-ganglion axis
  - c. The gastric-brain axis
  - d. The gut-brain axis
5. In 1848, railway worker Phineas Gage survived a severe head injury caused by an accidental detonation of blasting powder. Following the removal of a metal bar from his brain, he lived for another 12 years, but experienced significant personality changes. Which region of his brain was damaged in the accident?
  - a. Hippocampus
  - b. Frontal lobe
  - c. Central cortex
  - d. Amygdala
6. Penfield, Boldrey, and Rasmussen are considered to be the originators of the...
  - a. Cerebral Golem
  - b. Cerebral Hecatoncheiros
  - c. Cerebral Homunculus
  - d. Cerebral Porphyron
7. May-Britt Moser is one of the few women to have been awarded a Nobel Prize in Physiology or Medicine. What was her contribution to science?
  - a. The discovery of how chromosomes are protected by telomeres and the enzyme telomerase
  - b. The discovery of cells that constitute a positioning system in the brain
  - c. The discovery of the function of single ion channels in cells
  - d. Discoveries concerning the organization and elicitation of individual and social behavior patterns
8. Discovered in 2018, the Rosehip Neuron is found in human brains, but is notably absent from the brains of an important human analog often used in animal testing. What animal is this?
  - a. Chimpanzee
  - b. Pig
  - c. Orangutan
  - d. Mouse
9. The rosehip neuron makes up approximately what percentage of the Neocortex?
  - a. 5%
  - b. 10%
  - c. 15%
  - d. 20%
10. Connectomes are comprehensive maps of connections within an organism's nervous system. The study of connectomes is referred to as...
  - a. Connectographics
  - b. Connectics
  - c. Connectonomics
  - d. Connectology

# Test your Brain Power Quiz - *continued*

11. Neuroplasticity refers to the ability of neural networks in the brain to...
  - a. Self-repair in response to damage
  - b. Change through growth and reorganization
  - c. Change in response to external stimuli
  - d. Reorganise to accommodate new information
  
12. The expression of red, green, and blue fluorescent proteins in the brain can be used to create a multicolored map of the brain known as a...
  - a. Brainbow
  - b. Neural Spectrogram
  - c. Prismogram
  - d. Spectral neural map
  
13. Nanotechnology is of particular interest in neuroscience because nanoparticles can...
  - a. Be administered in higher concentrations than microparticles
  - b. Self-replicate in-vivo
  - c. Be less easily detected by the immune system
  - d. Cross the blood-brain barrier
  
14. Alzheimer's disease is thought to account for approximately what percentage of cases of dementia?
  - a. 40-50%
  - b. 50-60%
  - c. 60-70%
  - d. 70-80%
  
15. Alzheimer's disease is caused by an abnormal buildup of...
  - a. Amyloid alpha proteins
  - b. Amyloid beta proteins
  - c. Amyloid gamma proteins
  - d. Amyloid delta proteins

# All about Neuroscience Crossword



## ACROSS

- 3. Stores memories
- 7. Junction between two neurons
- 9. Processes emotional information
- 11. Unusual swelling of the brain
- 15. Supportive cells of the nervous system
- 16. Selective \_\_\_\_\_ reuptake inhibitors
- 18. Disorders affecting balance and speech
- 19. Species with the largest brain

## DOWN

- 1. Connection between the brainstem and spinal cord
- 2. Neuron found in human but not rodent brains
- 4. The master gland
- 5. Neurotransmitter lacking in Parkinson's
- 6. Primary target of immune attacks in ms
- 8. Test for electrical brain activity
- 9. Species with the smallest brain to body ratio
- 10. Most common cause of dementia
- 12. Nervous system that regulates unconscious functions
- 13. Lobe that processes visual information
- 14. Smallest type of neuron
- 17. Largest neurons in the human brain

# Find the **Neuroscience** Connections

Using these neuroscience words, create four groups of four

EPILEPSY	EEG	SPECTROSCOPY	ALZHEIMER'S
MS	ATAXIA	PINEAL	MOTOR
BRAINSTEM	MIDBRAIN	SPINDLE	SENSORY
CEREBRUM	PURKINJE	PET	MRI

Group 1: \_\_\_\_\_

Group 2: \_\_\_\_\_

Group 3: \_\_\_\_\_

Group 4: \_\_\_\_\_

# Unscramble the **Neuroscience** Terms

1. Bein' smart \_\_\_\_\_
2. Princely pout \_\_\_\_\_
3. Secret pro \_\_\_\_\_
4. Mineral taxon \_\_\_\_\_
5. Tournament triers \_\_\_\_\_
6. Baltic sprain \_\_\_\_\_
7. Neutron walkers \_\_\_\_\_
8. Aptly unrealistic \_\_\_\_\_
9. Slimy heathen \_\_\_\_\_
10. Ironstone \_\_\_\_\_
11. A longboat \_\_\_\_\_



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## Neuroscience Research Solutions

Empowering your neuroscience discoveries and powering progression

Navigating the complexities of modern neuroscience research requires more than just determination. To cater to the highly specific needs of neural cells and extract publication-quality data, you need to embed a high degree of accuracy, reliability, and reproducibility into every aspect of your research.

At Bio-Techne, we are committed to empowering neuroscience research and discovery by providing the highest quality materials, reagents, assay solutions, instruments, and technical support. From optimized cell culture media and supplements to automated analysis platforms that can accelerate discoveries and streamline your workflow, we have the solutions to meet your highly specific research needs.

Ready to transform your neuroscience challenges into breakthroughs? Together, we can elevate neuroscience research to the next level of possibility.



[Discover Solutions](#)

## REBUS PUZZLE ANSWERS

1. Neural path
2. Brain stem
3. Hippocampus
4. Central nervous system
5. Closed loop

## TEST YOUR BRAIN POWER QUIZ ANSWERS

1. BRAIN Initiative
2. Ivan Petrovich Pavlov
3. Discovery of temperature and touch receptors
4. The gut-brain axis
5. Frontal lobe
6. Cerebral Homunculus
7. The discovery of cells that constitute a positioning system in the brain
8. Mouse
9. 10%
10. Connectonomics
11. Change through growth and reorganisation
12. Brainbow
13. Cross the blood-brain barrier
14. 60-70%
15. Amyloid beta proteins

## ALL ABOUT NEUROSCIENCE CROSSWORD ANSWERS

### Across

3. Hippocampus
7. Synapse
9. Amydala
11. Encephalitis
15. Glia
16. Serotonin
18. Ataxia
19. Spermwhale

### Down

1. Oblongata
2. Rosehip
4. Pituitary
5. Dopamine
6. Myelin
8. EEG
9. Assfish
10. Alzheimer's
12. Autonomic
13. Occipital
14. Granule
17. Betz

## **FIND THE NEUROSCIENCE CONNECTIONS ANSWERS**

Epilepsy, Alzheimer's, MS, Ataxia (brain diseases)

Pineal, Brainstem, Cerebrum, Midbrain (brain anatomy)

Spindle, Motor, Sensory, Purkinje (types of neurons)

MRI, PET, EEG, Spectroscopy (brain imaging techniques)

## **UNSCRAMBLE THE NEUROSCIENCE TERMS ANSWERS**

1. Brainstem
2. Pluripotency
3. Receptors
4. Axon terminal
5. Neurotransmitter
6. Plastic brain
7. Neural networks
8. Neural plasticity
9. Myelin sheath
10. Serotonin
11. Oblongata

# Where Science Intersects Innovation™

**Bio-Techne®** | R&D Systems™ Novus Biologicals™ Tocris Bioscience™ ProteinSimple™ ACD™ ExosomeDx™ Asuragen®

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