**Review Worksheet ANSWERS: Peripheral NS overview, and Sensory NS**

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1: How any pairs of nerves attach at the base of the brain?

(1 mark)

*12 Cranial Nerves attach at the brain base.*

2: How many pairs of spinal nerves are there?

(1 mark)

*31 pairs of spinal nerves*

3: What are clusters of cell bodies, located outside of the CNS, called?

(1 mark)  
*Ganglia*

4: Where do sensory neurons in spinal nerves enter each segment of the spinal cord?

(1 mark)

*Sensory neurons enter via the dorsal root of the spinal cord.*

5: What type of neurons are sensory neurons, and where are their cell bodies located.

(2 marks)

*Sensory neurons are pseudounipolar (1) and their cell bodies are located in the dorsal root ganglion (1) of the spinal cord segment where they enter the spinal cord.*

6: List the different receptors that are located in the skin:

(6 marks – 1 mark each)

*Light touch, Deep Pressure, Heat, Cold, Pain, Hair movement (touch)*

7: Fill in the following table

|  |  |  |
| --- | --- | --- |
| **Receptor Type** | **Location** | **Function** |
| *Proprioceptors* | *In muscles and joints* | Provide information about body positioning to the brain |
| *Rod and Cone Cells* | *In retina of eye* | Send information about the visual environment to the brain |
| Hair cells and stereocilia | *In the cochlear of the inner ear* | *Send information about sound to the brain* |
| *Olfactory Receptors* | *In the nasal cavity* | Send signals to the brain about smell |
| Specialised cells in the epithelium of the tongue | In the epithelium of the tongue | Send information to the brain about taste |
| *Thermoreceptors* | *In skin and hypothalamus* | Detect surface and core temperature |
| *Osmoreceptors* | *In the hypothalamus* | Detect osmotic pressure |
| *Baroreceptors* | *In the carotid artery and aortic arch* | Detect blood pressure |
| *Chemoreceptors* | *In the carotid artery and aortic arch* | Detect Blood pH and blood gas concentration |
| *Nociceptors* | *Widespread, located all over the body (but not brain)* | Detect risk of tissue damage, painful stimuli |

8: Once sensory stimulation has occurred, describe the resulting changes in membrane potential and how these are propagated as a nerve impulse.

(24 marks)

*Local stimulation opens some Na+ channels in the membrane (1), raising the Resting Membrane Potential (RMP) from -70mV (1). If the membrane potential reaches the threshold of -55mV (1), gated Na+ channels open (1) and Na+ floods into the neuron (1), triggering depolarisation (1) and raising the membrane potential to +30mV (1). At the peak of depolarisation (1), Na+ channels close (1), and K+ channels open (1). K+ floods out of the neuron (1), lowering the membrane potential back to -70mV (1), but with K+ outside of the membrane (1). The membrane potential then drops below -70mV (1). This is called hyperpolarisation (1). The K+ channels then close (1), and the Na+/K+ pump works to reset the RMP (1), pumping 3 Na+ out for every 2 K+ pumped in. (1)*

*The depolarisation of the first section of membrane triggers depolarisation in the next (1), and the depolarisation moves in a wave down the axon.(1) The impulse can only move in one direction (1) because the previous section of membrane is still in the refractory period (1), which is the time between depolarisation and return to RMP (1), when the section of membrane cannot be restimulated (1).*



9: Describe the structures and processes involved in maintaining Ca2+ homeostasis if Ca2+ levels in the blood fall.

(8 marks)

*Falling blood Ca2+ levels (1) are detected by the Parathyroid glands (1) which release Parathyroid Hormone (PTH) (1). PTH stimulates release of Ca2+ from bones (1), increases Ca2+ reabsorption in the kidneys (1), and increases absorption of Ca2+ into the bloodstream by the intestines (1). Once Ca2+ reaches the homeostatic set point (1), negative feedback (1) (the parathyroids no longer detecting low Ca2+) prevents release of further PTH. (1)*