

### HUMAN NERVOUS SYSTEM ANSWERS

1. (a) brain and spinal cord (b) sensory and motor nerves not within the brain and spinal cord, and comprising both voluntary and involuntary nerves (c) involuntary nerves, comprising the sympathetic and parasympathetic nerves
2. (a) touch, pressure, heat, cold, pain (b) light (c) sound and balance (d) smell (e) sweet, bitter, sour and salty tastes (f) positions of joints and muscles in space
3. Dendrites, Cell body with nucleus, Axon, Synapse (gap between neurones)
4. A nervous impulse is not an electric current. It is a moving electrochemical reaction along a series of neurones making up a nerve fibre. Each neurone transmits nerve impulses due to different membrane permeabilities of sodium and potassium ions as the nerve impulse passes along the neurone. At the synapse between neurones, a chemical transmitter substance also transmits nerve impulses by electrochemical reactions.
5. Curare prevents the transmission of impulses from nerve to muscle at the synapse by inhibiting the chemical transmitter substance.
6. In the simple reflex arc example such as placing one's hand on a hot saucepan, the sense receptors in the skin detect heat, and the impulse travels to the spinal cord. At the spinal cord, two impulses travel in two different directions. One impulse travels along motor nerves to the muscle and the hand is removed, and the other impulse travels to the brain where the heat sensation is interpreted. The hand is removed before the person has realised what happened.
7. The action of the sympathetic system is to strengthen and accelerate the heartbeat (e.g. when you've had a fright), and the parasympathetic system weakens and slows the heartbeat (e.g. when you've later calmed down).
8. If a person has a high body temperature after exercise, this is detected by the temperature control centre of the brain. The person then sweats so that the excess body heat can evaporate the sweat causing cooling. However when the brain's temperature control centre detects a normal 37°C body temperature again, sweating ceases.