The Queen's College
Year 1 Biomedical Sciences Body, Brain & Behaviour Collection
Trinity Term 2020
90 minutes

Answer one question from each of the following groups; write your name on each answer.

BODY
1. How can the inotropic state of the heart be altered pharmacologically?
2. How is arterial blood pressure regulated by nerves and hormones?
3. Why is it important to match air ventilation and blood perfusion in the lungs? How can this be achieved?
4. The default arrangement in the kidney is for the nephron to produce large volumes of dilute urine. Describe how this is achieved and the processes that occur when smaller volumes of more concentrated urine are required.

BRAIN
5. Why are there more chemical than electrical synapses in the brain?
6. The human retina has in the order of 100 million photoreceptors, but sends only about 1 million retinal ganglion cell axons to the brain. Discuss.
7. How does the detection of pain compare to that of touch?
8. Frontal cortex appears to form part of loops which run through the basal ganglia to thalamus and back to the cortex. Briefly describe these loops and discuss their presumed function.

BEHAVIOUR
9. What is the benefit of logarithmic coding of sensory dimensions? Describe physiological and psychological evidence for this form of coding.
10. What features of movements are encoded by motor cortex neurons?
11. What is the “binding problem” in vision, and what is the role of attention in solving it?
12. How would you investigate whether an extra Y chromosome increased a person’s susceptibility to criminality?