

Synaptic Transmission - Mark Scheme

Q1.

Question Number	Acceptable Answer	Additional Guidance	Mark
(a)	<p>An explanation that makes a reference to the following:</p> <ul style="list-style-type: none"> • serotonin cannot be broken down faster than produced (1) • therefore activity of the two enzymes that produce serotonin must be similar to the activity of enzyme 3 (1) • one of the enzymes must be rate limiting (1) 		(3)

Question Number	Acceptable Answer	Additional Guidance	Mark
(b)	<p>An explanation that makes a reference to three of the following:</p> <ul style="list-style-type: none"> • SSRIs bind to {channel / reuptake} proteins (1) • serotonin levels remain high in synapse (1) • serotonin binds to receptor proteins in post-synaptic membrane (1) • depolarisation of post-synaptic membrane (1) • {action potentials / impulses / transmission} continues (1) 		(3)

Q2.

Question Number	Answer	Additional Guidance	Mark
	<p>A description that makes reference to the following:</p> <ul style="list-style-type: none"> • (dopamine) released { from presynaptic membrane / from the synaptic knob / into the synaptic cleft } / diffuses across synaptic gap (1) • binds to receptors on post-synaptic membrane (1) • alters permeability of post-synaptic membrane / opens { sodium ion channels / channel proteins } (in the post synaptic membrane) (1) • initiating { depolarisation / action potential } in the post-synaptic neurone (1) 	<p>ALLOW dopamine diffuses across the synapse</p> <p>ALLOW influx of Na⁺</p> <p>ALLOW pd / voltage</p>	(4)

Q3.

Question Number	Answer	Additional Guidance	Mark
	<p>In sensory neurone:</p> <ol style="list-style-type: none"> 1. dendron longer; 2. dendron myelinated ; 3. axon shorter ; 4. {cell body / eq} {not at the end / towards the middle / to the side / eq} ; 5. reference to no {motor end plate / eq} ; 	<p>ALLOW converse for motor neurone</p> <p>4. ACCEPT centron / nucleus for cell body</p>	(3)

Q4.

Question number	Answer	Additional guidance	Mark
(i)	<p>A description that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • MDMA { stimulates release / prevents re-uptake / increases concentration } of serotonin (1) • blocking pre-synaptic receptors / binding to post synaptic receptors (1) • nerve pathways using serotonin are more likely to be stimulated / more action potentials produced (1) 	<p>ALLOW reference to dopamine instead of serotonin</p> <p>ALLOW more impulses generated</p>	(2)

Question number	Answer	Additional guidance	Mark
(ii)	<p>An explanation that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • MDMA use results in depletion of serotonin (1) • post synaptic membrane becomes less responsive to serotonin / loss of receptors on post synaptic membrane (1) • serotonin levels affect mood / lack of serotonin associated with depression (1) 	<p>ALLOW dopamine instead of serotonin for all points</p>	(2)

Q5.

Question Number	Acceptable Answer	Additional Guidance	Mark
(a)	An explanation that makes reference to the following: <ul style="list-style-type: none"> • fraternal twins risk is lower (1) • because fewer alleles in common (1) 	Allow converse	(2)

Question Number	Acceptable Answer	Additional guidance	Mark
(b)(i)	An explanation that makes reference to the following: <ul style="list-style-type: none"> • Identical twins being raised apart allows environmental factors to be investigated separately from genetic factors (1) • therefore may be able to determine relative amount of risk due to genetic variation / relative amount of risk due to environment (1) 		(2)

Question Number	Acceptable Answer	Additional guidance	Mark
(b)(ii)	An answer that makes reference to the following: <ul style="list-style-type: none"> • twins have more in common than shared genetics / shared uterine environment (1) • twins may be raised in similar environments(1) 	Ignore reference to sample size	(2)

Question Number	Acceptable Answer	Additional guidance	Mark
(c)	An explanation that makes reference to the following: <ul style="list-style-type: none"> • Parkinson's symptoms arise due to low dopamine levels (1) • transmission of nerve impulses disrupted causing lack of control of {muscle movements / tremors} (1) • schizophrenia drugs lower {neurotransmitter / dopamine} levels (1) Plus two from: <ul style="list-style-type: none"> • therefore less dopamine in synaptic / knob secreted into cleft / diffuses across cleft (1) • therefore less dopamine available to bind to receptors (1) • therefore no/little change in membrane structure / permeability of post- synaptic cell (1) • therefore fewer sodium ions enter postsynaptic cell (1) • therefore less depolarisation of postsynaptic cell (1) 		(5)