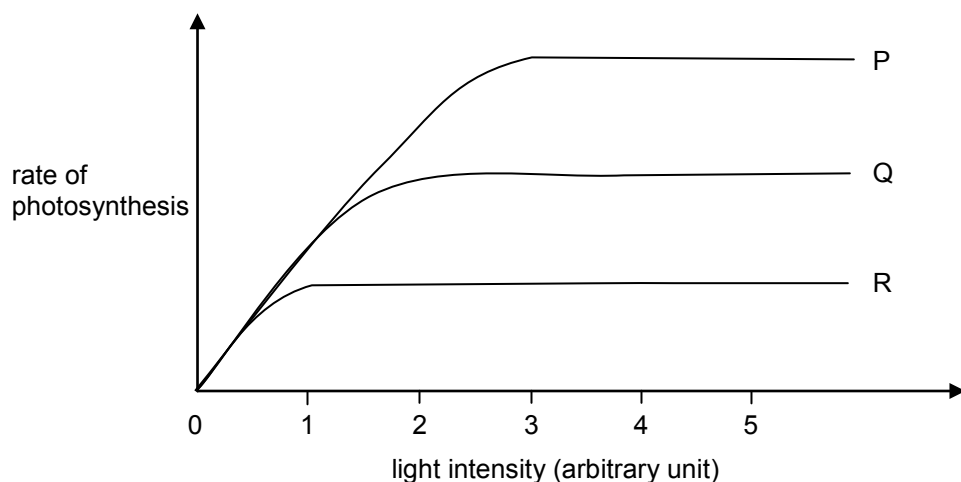


-- Question --

- 5 The graph below shows three curves (P, Q and R), which represent the rates of photosynthesis of a crop under different light intensities at three different carbon dioxide concentrations.



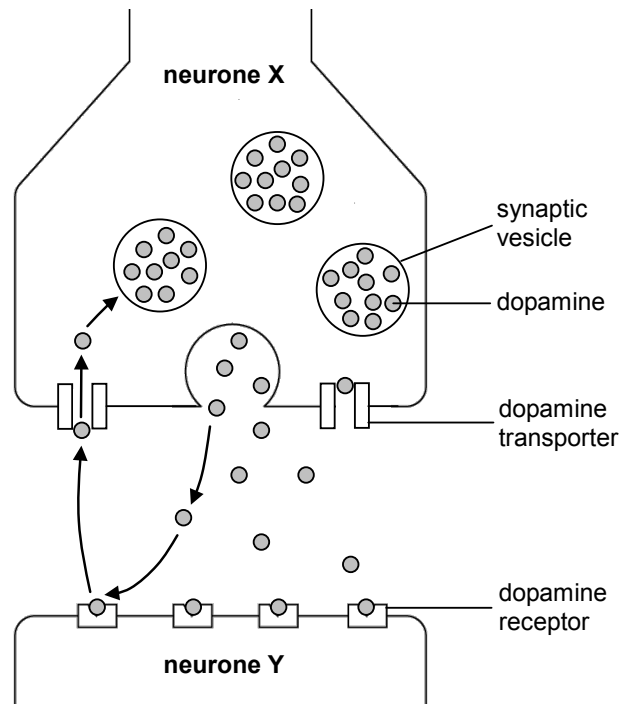
- a Which curve, P, Q or R, represents the rate of photosynthesis at the highest carbon dioxide concentration? Explain briefly. (3 marks)
- b Mark on the above graph a point at which
- i light intensity is limiting the rate of photosynthesis. (1 mark)
 - ii carbon dioxide concentration is limiting the rate of photosynthesis. (1 mark)
- c A farmer grows this crop in a greenhouse. He adjusts the carbon dioxide concentration in the greenhouse to a value same as that of curve P. What intensity of light should he provide to the crop in order to get a maximum yield with the lowest cost? Explain. (3 marks)

-- Answer --

- a** P 1m
P levels off at the highest rate of photosynthesis. 1m
At a higher carbon dioxide concentration, more substrates are supplied to the Calvin cycle. 1m
- b** **i** Any point on the three curves where the rate is increasing 1m
ii Any point on Q and R where the curves become flat 1m
- c** 3 arbitrary units 1m
Light intensity equals the saturation point should be chosen. 1m
It is the lowest light intensity that the crop achieves the highest rate of photosynthesis, thus giving a highest yield with the lowest cost. 1m

-- Question --

- 6 Dopamine is a neurotransmitter. It is released at synapses in parts of the brain where pleasure is perceived. The diagram below shows the movement of dopamine in the synapse between neurones X and Y.



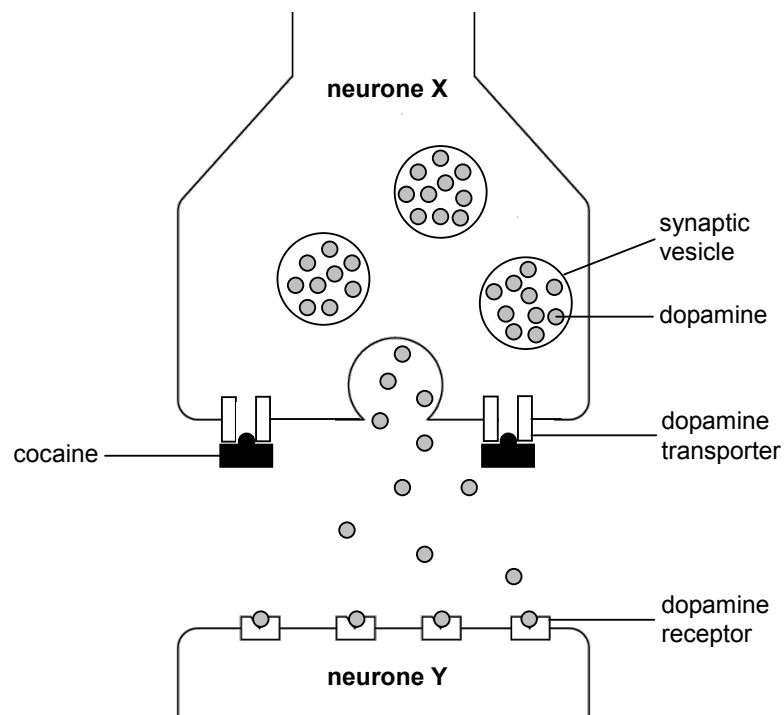
- a Describe how a nerve impulse is transmitted from neurone X to neurone Y.

(4 marks)

- b Why can a nerve impulse be transmitted from neurone X to neurone Y, but not vice versa?

(1 mark)

- c Cocaine is a highly dangerous stimulant of the central nervous system. The diagram below shows how cocaine changes the functioning of the synapse.



Using information in the diagram, explain why the use of cocaine can result in feelings of pleasure. (4 marks)

-- Answer --

- a** When a nerve impulse reaches the synaptic knob of neurone X, it stimulates the release of dopamine from synaptic vesicles. 1m
Dopamine diffuses across the synaptic cleft, 1m
and binds to the dopamine receptors on the cell membrane of neurone Y. 1m
This stimulates the generation of a nerve impulse in neurone Y. 1m
- b** Only neurone Y has dopamine receptors to recognize dopamine. 1m
- c** Cocaine can block the dopamine transporters / block the return of dopamine into neurone X. 1m
A high concentration of dopamine in the synaptic cleft is maintained. 1m
Dopamine continues to bind to the dopamine receptors 1m
and neurone Y is stimulated continuously to generate nerve impulses. 1m