Answers for support worksheet – Option C

1 **a** Diagram A and graph C represent competitive inhibition. Diagram B and graph D represent non-competitive inhibition. (4)

b In graph C, the effect of the inhibitor is reduced as the concentration of the substrate increases.

In graph D, as the concentration of substrate is increased, the rate of reaction increases but does not reach the same level as without an inhibitor. The inhibitor does not compete for active sites so excess substrate does not overcome inhibition. (2)

2 **a** A = chloroplast, B = mitochondrion (2)

b X = oxygen, Y = carbon dioxide (2)

c ATP is used to regenerate RuBP. Reduced NADP (NADPH + H^+) supplies hydrogen ions for the production of triose phosphate. (2)

d Glycolysis occurs in the cytoplasm; the Krebs cycle occurs in the matrix of the mitochondrion. (2)

3 (10)

Process	**Mitochondrion**	**Chloroplast**
Photons excite electrons.	false	true
Electrons pass through carrier molecules.	true	true
Oxidative phosphorylation occurs.	true	false
ATP is produced from ADP and P_i.	true	true
Takes place in both light and darkness.	true	false

4 **a** At the compensation point, uptake and release of carbon dioxide are equal, therefore the rate of photosynthesis and rate of respiration are equal. (2)

b Up until point Q, the rate at which carbon dioxide uptake increases with light intensity is at its greatest, indicating that the rate at which photosynthesis increases with light intensity is also at its greatest up to this point. Beyond point Q, the rate of increase starts to drop (the graph becomes less steep and begins to plateau). (2)

c ATP and reduced NADP (NADPH + H^+) (2)

d This indicates that another factor, other than light intensity, is now limiting the rate of photosynthesis (for example, temperature). (1)

5 **a** Water is required for photosynthesis and this enters the plant through its roots. (1)

b Chlorophyll *a* and chlorophyll *b* are both found in chloroplasts. Chlorophylls absorb mainly **blue** and **red** wavelengths of light. In the process of *cyclic photophosphorylation*, light displaces an electron from a chlorophyll molecule. This electron is returned to the chlorophyll via a series of **electron carriers**, each of which is at a lower energy level. **ATP** is synthesised as the electrons flow. **ATP** is used in the light-independent reactions, which occur in the **grana** of the chloroplast. In the process of *non-cyclic photophosphorylation*, the electrons are combined with **hydrogen ions**, which are produced from the photolysis of **water**. (8)

6 (5 – 1 mark for each correctly filled box)

	Photosynthesis	**Respiration**
Place where H^+ ions accumulate	in thylakoid space in grana	between inner and outer membranes of mitochondria
Source of H^+ ions	photolysis of water molecules	hydrogen acceptors such as NADH + H^+
Source of energy	light from the Sun	glucose
Use of ATP formed	used in the stroma to reduce CO_2 in light-independent reactions	used in metabolic reactions in cytoplasm