Worksheet 5.3: Solutions
Photosynthesis

No.	Answer
1	Chlorophyll, light, carbon dioxide, water
2	$6CO_2(g) + 6H_2O(l) \xrightarrow{\text{light/chlorophyll}} C_6H_{12}O_6(aq) + 6O_2(g)$
3	Organisms that contain chloroplasts (plants and phytoplankton)
4	It reduces the concentration of carbon dioxide in the atmosphere.
5	Phytoplankton
6	Various answers possible. For example, photosynthesis might involve a molecule that cannot function at high temperatures, or enzymes necessary for the process are inactive at high temperatures.
7	It would remain the same (rate is already at the maximum possible).
8	Approximately 4 units of light, 0.14% CO_2 and 35°C (taken from the plateau on each graph).
9	The Broome winter will be brighter and warmer than the Albany winter, so the rate of photosynthesis will be higher in the Broome plant.
10	During the night, only respiration occurs, but not photosynthesis. Carbon dioxide is therefore released into the atmosphere. During the day, when light is available, photosynthesis can occur (as well as respiration), so the CO_2 concentration decreases.
11	45% of the maximum
12	320 µmol mol^{-1}
13	$n(CO_2) = \frac{m}{M} = \frac{3.00 \times 10^{-4}}{44.01} = 6.817 \times 10^{-6}$ mol $n(CO_2) = n(O_2)$ (since the stoichiometric ratio is 6 : 6 = 1 : 1) $m(O_2) = n \times M = 6.817 \times 10^{-6} \times 32.00 = 2.18 \times 10^{-4}$ g
14	Some factor other than carbon dioxide level (light for example) is limiting the rate of photosynthesis, regardless of increased carbon dioxide levels.

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