GCSE and IGCSE Biology: Photosynthesis Worksheet

Year 10-11 · GCSE (AQA 4.4.1) and Cambridge IGCSE 0610 topic 6 · Exam-style questions

Name: ..... **Class:** ..... **Date:** ..... **Score:** / 57

Section A: Photosynthesis and the uses of glucose [18 marks]

1 Define photosynthesis. **[2]**

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2 Photosynthesis can be written as a word equation and as a symbol equation.

(a) Write the word equation for photosynthesis, including the conditions above the arrow. **[2]**

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(b) Write the balanced symbol equation for photosynthesis. **[2]**

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(c) Photosynthesis is an endothermic reaction. Explain what this means. **[1]**

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(d) Name the part of the plant cell where photosynthesis takes place and the pigment that absorbs the light. **[2]**

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3 Plants use the glucose made in photosynthesis in different ways. Complete the table. **[5]**

Use of glucose	Why the plant does this
Respiration	
Converted to starch	
Converted to cellulose	
Converted to amino acids (with nitrate ions)	
Converted to fats and oils	

4 Explain why a plant that lacks magnesium ions has yellow leaves, and why a plant that lacks nitrate ions grows poorly. **[4]**

Section B: Leaf structure and gas exchange [12 marks]

5 Complete the table to describe how each part of a leaf is adapted for photosynthesis. **[7]**

Part of leaf	Adaptation / function
Waxy cuticle	
Upper epidermis	
Palisade mesophyll	
Spongy mesophyll	
Stomata and guard cells	
Xylem	
Phloem	

6 Describe how carbon dioxide gets from the air to the chloroplasts in a palisade cell. **[3]**

7 Explain why most leaves are thin and have a large surface area. **[2]**

Section C: Limiting factors [11 marks]

8 State what is meant by a limiting factor. Name three factors that can limit the rate of photosynthesis. **[3]**

9 The table shows the rate of photosynthesis at different light intensities and carbon dioxide concentrations.

Rate of photosynthesis (arbitrary units):

Light intensity (units)	0	10	20	30	40	50	60
0.03% CO?	0	4	8	11	12	12	12
0.10% CO?	0	4	8	12	16	20	22

(a) State the limiting factor for the 0.03% CO? line between 0 and 20 units. **[1]**

(b) Explain the plateau at 0.03% CO? above 40 units. **[2]**

(c) Suggest one factor that could be limiting the rate at 0.10% CO? above 50 units. **[1]**

(d) The distance of a lamp from a plant is changed from 10 cm to 30 cm. Use the inverse square law to calculate how many times smaller the light intensity becomes. (Higher tier / Extended) **[2]**

(e) A grower heats a greenhouse and adds carbon dioxide. Evaluate this: give one benefit and one cost. **[2]**

Section D: Practical skills [16 marks]

10 A student investigates the effect of light intensity on the rate of photosynthesis of pondweed. A lamp is placed at different distances. The student counts the oxygen bubbles in 3 minutes.

Results:

Distance of lamp (cm)	10	20	30	40
Bubbles in 3 minutes	60	33	18	9
Rate (bubbles per minute)				

(a) Calculate the rate for each distance and write them in the table. **[3]**

(b) State the conclusion from the results. **[2]**

(c) Name the independent variable, the dependent variable and two control variables. **[4]**

(d) Suggest why a beaker of water is placed between the lamp and the pondweed. **[1]**

(e) Suggest one improvement to make the results more accurate. **[1]**

11 Describe how to test a leaf for starch. Include the safety precautions. **[5]**