GCSE Biology Trilogy (F)



Required Practical Answer Book

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**Required Practical 1: Microscopy**

**Use a light microscope to observe, draw and label a selection of plant and animal cells.**

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| Question 1 | (a)     contract / shorten  *ignore relax*  *do****not****allow expand*  **1**  to churn / move / mix food  *accept peristalsis / mechanical digestion*  *ignore movement unqualified*  **1**  (b)     400  *acceptable range 390-410*  *allow 1 mark for answer in range of 39 to 41*  *allow 1 mark for answer in range of 3900 to 4100*  **2**  (c)     to transfer energy for use  *allow to release / give / supply / provide energy*  *do****not****allow to ‘make’ / ‘produce’ / ‘create’ energy*  *allow to make ATP*  *ignore to store energy*  **1**  by (aerobic) respiration **or** from glucose  *do****not****allow anaerobic*  *energy released****for****respiration = max 1 mark*  **1**  (d)     (i)      to make protein / enzyme  *ignore ‘antibody’ or other named protein*  **1**  (ii)     too small / very small  *allow light microscope does not have sufficient magnification / resolution*  *allow ribosomes are smaller than mitochondria*  *ignore not sensitive enough*  *ignore ribosomes are transparent*  **1** |
| Question 2 | (a)      200  *correct answer gains 2 marks with or without working*  *allow 1 mark for 0.1 × 0.1 = 0.01 (mm2)*  **2** |
| Question 3 | (a)     45 (mm)  **1**  45 / 250 **or** 0.18 (mm)  *allow ecf*  **1**  180 (µm)  **1**  *allow 180 (µm) with no working shown for****3****marks*  (b)     0.2 µm  **1** |
| Question 4 | (a)     12500  *if correct answer, ignore working / lack of working*  *https://app.doublestruck.eu/content/AG_BLG/HTML/M/MBB04H14A_files/image001.png for****1****mark*    *ignore any units*  **2** |

**Required Practical 2: Osmosis**

**Investigate the effect of a range of concentrations of salt/sugar solutions on the mass of plant tissue.**

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| Question 1 | (a)     (i)      0  **1**  (ii)     osmosis  **1**  (b)     0.5  **1**            no change in mass / weight  *allow ‘chip / it stays the same’*  **1**  **or**            no (net) osmosis / same amount of water in and out  (c)     repeat / use more chips in each solution  *allow use of other people’s results*  *do****not****allow ‘get more results’ unqualified*  *do****not****allow leave longer / use more concentrations / better instrumentation*  **1**  (d)     0.5  *allow 0.45–0.55*  **1**  (e)     (0.0 to 0.4) water moves into cells  **1**  (0.6 to 0.8) water leaves cells  **1**  by osmosis  **1**  (f)      any **two** from:  •        concentration of solutions  •        drying of chips  •        accuracy of balance  •        evaporation from tubes  **2** |
| Question 2 | (a)     movement of water [1]            from high concentration (of water) to low concentration (of water) **or** from (an area of) dilute solution to an area of concentrated solution [1]            through a differentially **or**partially **or**selectively **or**semi permeable membrane [1]  **3**  (b)     (i)      it will rise  **1**  (ii)     water enters visking tubing [1]           because the concentration of water outside is greater than the concentration inside **or** because the concentration of salt **or**solute is greater inside the tubing than outside [1] **or** to equalise concentration water has to enter visking tubing [2]  **2** |

**Required Practical 3: Enzymes**

**Investigate the effect of pH on the rate of reaction of amylase enzyme.**

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| Question 1 | (a)     to show the experiment was more repeatable  **1**  (b)     (circle) 0.0 at 20 °C  **1**  (c)     ignored it / did not use it  *ignore repeated it*  **1**  (d)     increases the rate of reaction up to 30 °C  **1**  (e)     60 °C  **1**  (f)     do the experiment at 30 °C, 35 °C and 40 °C  **1**  (g)     **Level 2 (3–4 marks):**  A detailed and coherent plan covering all the major steps is provided. The method is set out logically taking into account control variable and appropriate measurements. The plan could be repeated by another person to determine the effect of pH on breakdown of starch by amylase.  **Level 1 (1–2 marks):**  Simple statements relating to relevant apparatus or steps are made but they may not be in a logical order. The plan would not allow another person to determine the effect of pH on breakdown of starch by amylase.  **0 marks:**  No relevant content.  **Indicative content**  •        range of at least 3 pH values / use of buffer solutions  •        control variables / keep amount or concentration of starch and amylase the same  •        keep temperature the same using water bath / electric heater  •        use iodine test to make qualitative observations  •        observe colour changes at different temperatures  •        do repeats at each pH  **4** |
| Question 2 | (a)     (i)      8.6  *accept value in range 8.5 to 8.7*  **1**  (ii)     hydrochloric acid / HCl  *accept HCL*  *accept hydrogen chloride*  *ignore hcl / etc.*  **1**  (iii)    X  **1** |

**Required Practical 4: Food Tests**

**Use qualitative reagents to test for a range of carbohydrates, lipids and proteins.**

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| Question 1 | 1. separate sample for each test;   equal volume of each sample;  **1**  simple sugars :- Benedict’s ;  heat / boil; ignore warm  stays blue is negative  blue to green / yellow / orange / brown / red / AW;  **2**  protein:- biuret or sodium/potassium hydroxide + copper sulphate;  blue to mauve / purple/violet;  **2**  repeat;  **1** |
| Question 2 | 1. starch – iodine solution – turns blue/black if starch present **2** 2. sugar – benedict’s solution – turns orange/red if sugar present **2** 3. lipid – ethanol – turns milky/cloudy if lipids present **2** 4. protein – biuret solution – turns purple if protein present **2** |

**Required Practical 5: Photosynthesis**

**Investigate the effect of light intensity on the rate of photosynthesis using an aquatic organism such as**

**pondweed.**

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| Question 1 | Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also apply a ‘best-fit’ approach to the marking.  **Level 3 (5–6 marks):**  A description of how the apparatus is used to measure the **rate** of photosynthesis at different light **intensities** is given.  For full marks reference must be made to a control variable  **or**  repeats  **Level 2 (3–4 marks):**  A description of how the apparatus is set up  **and**  a description of how photosynthesis can be measured.  **or**  a description of how light intensity is varied  **or**  a control variable **or** any other relevant point  **Level 1 (1–2 marks):**  A partial description of how the apparatus is set up  **or**  a description of how light is supplied  **or**  a simple description of how photosynthesis can be measured.  **or**  a control variable  **0 marks:**  No relevant content.  **examples of the points made in the response:**  •        apparatus set up:  – weed in water in beaker  – light shining on beaker  •        method of varying the light intensity–eg changing distance of lamp from plant  •        method of controlling other variables  – use same pond weed **or** same length of pond weed  – temperature: water bath or heat screen  – CO2  •        leave sufficient time at each new light intensity before measurements taken  •        method of measuring photosynthesis – eg counting bubbles of gas released or collecting gas and measuring volume in a syringe  •        measuring **rate of photosynthesis** by counting bubbles for set period of time  •        repetitions  **extra information:**  *allow information in the form of a diagram*  **[6]** |
| Question 2 | a)     (i)  https://app.doublestruck.eu/content/AG_BLG/HTML/M/M08W2F04_files/image001.gif    *both correct =****2****marks one correct =****1****mark*  *extra line from a statement cancels the mark*  **2**  (ii)     1st space: carbon dioxide  *allow CO2 (ignore superscript)*  *do****not****allow CO alone*  **1**           2nd space: glucose / sugar / starch / carbohydrate  **1**  (b)     (i)      any **one** from:  •        move lamp or change distance between lamp and plant  *ignore measure the distance*  •        change wattage / power of (light) bulb  *do****not****accept just “change bulb”*  •        change voltage / power supply to the (light) bulb  •        change the number of lamps  •        put translucent material between lamp and plant  *accept examples, eg tracing paper / filters*  *do****not****accept coloured filters*  **1**  (ii)     rises  **1**           levels off  *ignore numbers*  **1**  (iii)     idea that it levels off  **or**  does not increase at all light intensities  **or**  it only increases to a certain amount  *answers should relate to photosynthesis and****not****to bubbling*  **1** |

**Required Practical 6: Reaction Time**

**Plan and carry out an investigation into the effect of a factor on human reaction time.**

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| Question 1 | (a)     any **two** from:  •        drop the ruler from the same height  •        use the same / dominant hand each time  •        thumb same distance from ruler at the start  •        use same type / weight of ruler  •        drop the ruler without any force each time  •        keep arm resting on the edge of the table  **2**  (b)     8  *allow 8.0*  **1**  (c)     2 (in test number 2)  **1**  (d)     12  **1**  (e)     (12 + 13 + 13 + 9 + 8 / 5 =) 11  **1**  (f)     0.15 − 0.12 (s)  **1**  0.03 (s)  *allow 0.03 (s) with no working shown for****2****marks*  **1**  (g)     carry out more repeats  **1**  (h)     caffeine speeds up reflex actions  **or**  reduces reaction time  **1** |
| Question 2 | (a)     (i)      receptor cells  **1**  (ii)     eye(s)  *accept retina*  **1**  (b)     (i)      any **one** from:  •        gender / sex  •        quality of eyesight  *eg wearing glasses*  •        eg of factor that might affect reaction times  *eg alcohol consumption / distractions / tiredness / health / time of day / amount of practice (at this test)*  *do not allow time / age*  **1**  (ii)     182  *allow 182.0*  **1**  (iii)     Any anomalies can be identified.  **1**  (iv)     reaction time (too) long **or** reactions (too) slow  **1**  *allow reaction time (too) slow*  *allow examples of data quoted****or****derived from the table, eg (mean) reaction time for 90 year olds is 162 ms longer than for 75 year olds*  (so) more likely to have / cause an accident  **1** |

**Required Practical 7: Field Investigations**

**Measure the population size of a common species in a habitat.**

**Use sampling techniques to investigate the effect of a factor on the distribution of this species.**

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| Question 1 | (a)    place all the quadrats randomly on the lawn  **1**  (b)     (i)      1   4  2   2  3   2  4   0  *all 4 counts correct*  **1**  Total = 15  *total correct for their figures*  **1**  (ii)     1.5  *allow ecf from (b)(i)*  **1**  (iii)    180  *correct answer with or without working*  *if answer incorrect, allow****1****mark for https://app.doublestruck.eu/content/AG_BLG/HTML/M/M13W2F04_files/img01.png x 120****or****15 x 20*  ***or****https://app.doublestruck.eu/content/AG_BLG/HTML/M/M13W2F04_files/img01.png x 12 x 10*  ***or****1.5 x 12 x 10****or****1.5 x 120*  *allow ecf from (b)(ii)*  *allow****1****mark if only 1 error*  **2**  (c)     use a larger sample size / more quadrats  *ignore repeats but allow repeat in different places*  *ignore ‘count them all’*  **or**  use bigger quadrats  **1** |
| Question 2 | (a)     88 000  *correct answer = 2 marks*  *allow 1 mark for 1.1 (in 1 m2)*  ***or***  *allow 1 mark for answer = [candidate’s value in 1m2] × 80 000*  **2**  (b)     Place the quadrat in 100 random positions.  **1**  (c)     any **three** from:  *must include at least one advantage and one disadvantage for full marks*  Advantages:  •        less cost / free  •        less likely to kill other (harmless species of) plants  •        weedkiller may be toxic **or** may cause water pollution  •        weedkiller may accumulate up food chains  *allow uneven distribution of ragwort so much wastage of weedkiller*  Disadvantages:  •        volunteers may mistake other species for ragwort  •        volunteers may miss plants  *allow weeds will grow back*  •        some ragwort left to poison horses  •        time consuming  •        difficulties getting enough volunteers  *if no other disadvantages; allow ref. to issues with volunteers – eg don’t turn up / not careful / don’t finish the job*  **3** |