01. 0610_s19_MS_41 Q: 2

	Answer	Mark	Partial Marks
(a)	carbon dioxide is, raw material / substrate / reactant / AW ; concentration of carbon dioxide is higher outside leaf than inside (so carbon dioxide diffuses into the leaf) ;	2	
(b)	subtract the concentration of carbon dioxide at the end from the concentration at the start / AW ; divide by the time (taken) / per unit time ; ref. to taking (rate of) respiration into account ;	2	
(c)(i)	light intensity ; water (supply) ; humidity ;	1	
(c)(ii)	increases and, reaches a plateau / remains constant / 'levels off' ; increases (between 10 °C) to 30 °C / levels off at 30 °C ; any comparative use of figures for rate with units at least once ;	3	
(c)(iii)	36 ;;	2	
(c)(iv)	temperature is the limiting factor (over whole range) ; increased temperature increases, kinetic energy / KE, (of molecules) ; increases rate of diffusion of carbon dioxide (into leaf) ; temperature, influences / affects, (activity of) enzymes ; *idea of* more (effective) collisions between substrate molecules and enzymes (in plant) / more enzyme-substrate complexes formed ; more carbon dioxide is, fixed / used in photosynthesis / converted into sugar / AW ; carbon dioxide (concentration) is **not** limiting ;	3	
(c)(v)	***B** shows that:* rate of photosynthesis is, higher / continues to increase, if carbon dioxide is increased (at all temperatures / AW) ;	1	
(d)	*prediction:* rate of photosynthesis, remains constant / decreases / slows ; *any explanation one from:* enzymes / active sites, are denatured (at high temperatures) ; stomata close, so, little / no, carbon dioxide can enter leaves ; plant is adapted to survive at high temperatures ;	2	

02. 0610_s19_MS_43 Q: 2

	Answer	Mark	Partial Marks
(a)	carbon dioxide + water ⟶ ; glucose □ oxygen ;	2	
(b)(i)	temperature is a factor that affects the rate of photosynthesis ; *reference to* kinetic energy ; *idea of* effect of temperature, on enzymes / diffusion rate (of carbon dioxide) ; *idea that* temperature is a variable that should be standardised ; AVP ;	2	
(b)(ii)	74 ;;;	3	
(b)(iii)	rate (of photosynthesis) increases and, reaches a plateau / AW ; rate (of photosynthesis) increases until 1750 (a.u) / 25 □mol per m^2 per s ; any comparative use of figures for rate ;	3	
(b)(iv)	light intensity is the limiting factor, at all light intensities used / AW ; because rate of photosynthesis does not level off (even at high light intensities) ; carbon dioxide / temperature / chlorophyll / another factor, was not a limiting factor ; *correct reference* to (light) energy ; light is absorbed by chlorophyll ; AVP ;	4	

03. 0610_s16_MS_41 Q: 6

	Answer	Mark	Partial Marks
(a)	$6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$;;	[2]	one mark for the correct chemical formulae one mark for balancing the equation correctly **R** word equation
(b)	as wavelength increases, rate (of photosynthesis) decreases and increases ; high rates in, blue and violet and red / 400–475 nm and 675 nm ; low(est) rate in, green and yellow / 550–600 nm ; *either* maximum rate = 0.9 cm^3, at 675 nm / red *or* minimum rate = 0.2 cm^3, at 550 nm / green ;	[max 3]	units must be used once in the answer **A** volume of gas for rate
(c)	divide the volumes by, five (minutes) / time ;	[1]	
(d) (i)	to keep the light intensity the same ;	[1]	**R** temperature **I** 'fair test' **A** 'control light intensity' / 'light intensity is a control(led) variable'
(ii)	to provide carbon dioxide / so carbon dioxide is not a limiting factor / so the only limiting factor is wavelength ;	[1]	
(e)	for, respiration / energy ; converted to sucrose ; used to make, nectar / fruits ; used to make, cellulose / lignin ; used in cell walls ; used to make, starch / oils / fats ; storage ; used to make, amino acids ; used to make, chlorophyll ;	[max 3]	**I** protein synthesis / growth / active transport **R** produces energy **I** 'makes food', but **A** 'stores food' for 1 mark
		[Total: 11]	

04. 0610_s17_MS_41 Q: 6

	Answer	Mark	Partial Marks
(a)	**1** variation (in radishes) is not a (confounding) factor ; **2** any differences are due to non-genetic factors ; **3** example of non-genetic factors – environment / mineral ions ; **4** so it was possible to make comparisons ;	**2**	**A** improves validity of investigation
(b)	**1** hhumidity (of air) ; **2** temperature ; **3** llight ; **4** carbon dioxide ; **5** pH (of nutrient solution(s)) ; **6** rate of aeration / oxygen supply / oxygen ; **7** depth of solution / volume of solution ; **8** spacing / density (of radishes / plants) ; **9** AVP ;	**3**	**I** water supply / moisture **A** warmth **I** gravity **R** ref. to soil e.g. wind (speed) e.g. pests / diseases
(c)	**1** less growth than the, control / complete medium / group 1 ; **2** leaf / root, mass per plant is less than, control / group 1 ; **3** comparative use of figures per plant, calculated / stated, from the table with units; **4** (nitrate (ions) / nitrogen) required to make, amino acids / proteins ; **5** any one use of proteins in plants ;	**4**	 **A** polypeptides
(d)	*appearance max 1* **1** yallow(–green) leaves / chlorosis / stunted / short ; *explanation for max 2* **2** magnesium is needed for chlorophyll ; **3** chlorophyll, makes plants *or* chloroplasts green / is a green pigment ; **4** cannot trap, enough / much, light for photosynthesis ; **5** less / no, photosynthesis / sugar production ; **6** less materials for, growth / making (new) cells ; **7** less sugar for respiration ;	**3**	 **R** chloroplast
(e)	**1** less / no, DNA / RNA (is produced) ; **2** (new) DNA is needed for cells to divide (by mitosis) ; **ora** **3** genes / chromosomes, are made of DNA ; **4** mitosis / cell division, is one way in which organisms grow ; **5** DNA / RNA, needed for protein synthesis ; **6** protein is needed for growth ; **7** AVP ;	**2**	 e.g. energy supply in cells needs ATP

	Answer	Mark	Partial Marks
(a)	(branching) veins; **ora** shape / broad (leaves); **ora**	1	**I** petioles
(b)	it is (made of a group of) tissues working together to perform specific function(s);	1	
(c)	$6CO_2 + 6H_2O$ (LHS); $C_6H_{12}O_6 + 6O_2$ (RHS); energy / light / chlorophyll;	3	
(d)(i)	palisade (mesophyll / tissue / cells / parenchyma); tightly packed / contain many chloroplast / stacked upright;	2	 **A** lots of chlorophyll
(d)(ii)	(upper) epidermis / epidermal cells; transparent / allows light to pass through / thin;	2	
(d)(iii)	spongy, mesophyll / tissue / cells / parenchyma / layer; air spaces / loosely packed / gas exchange / diffusion of gases;	2	Mark points are not linked
(e)	nitrates are useable source of nitrogen; needed to make amino acids; (amino acids) to make proteins; protein / DNA, needed for growth; to make DNA / RNA / nucleotides / bases; other suitable named use of organic nitrogenous compounds found in plants;	3	
		Total: 14	