

3(a)(i)	0.95 (no units) ; ;
3(a)(ii)	<i>any two from:</i> 1 B, run for less time / stopped early ; 2 chlorophyll, converted / changed, to phaeophytin ; 3 AVP ;
3(a)(iii)	<i>any one from:</i> 1 different solvents ; 2 different, TLC plate / chromatogram / stationary phase (material) ; 3 different temperatures ;
3(b)	<i>any four from:</i> <i>similarities</i> 1 both absorb, blue / between 400 and 475 nm ; 2 both absorb, little / no, light between 525 and, 600 / 630, nm or both absorb, little / no, green / yellow, light ; 3 AVP ; <i>max three differences</i> 4 chlorophyll <i>a</i> absorbs, at more / a larger range of, wavelengths ; 5 chlorophyll <i>a</i> absorbs, more / better, between 400 and 445 nm ; 6 carotenoids absorb, more / better, between 445 and 525 nm ; 7 chlorophyll <i>a</i> absorbs between, 600 / 640, and, 680 / 690 nm, <u>and</u> carotenoids do not ; 8 chlorophyll <i>a</i> (blue absorption) peak / highest, at 425 / 430 nm <u>and</u> carotenoids (blue absorption) peak / highest, at 460 / 465 nm ; 9 chlorophyll <i>a</i> has blue peak and red peak but carotenoids have two blue peaks and no red peak or chlorophyll <i>a</i> has two peaks but carotenoids have three peaks ;
3(c)	<i>any four from:</i> 1 gibberellin, moves to / acts on / stimulates, <u>aleurone</u> layer ; 2 binds to, (gibberellin) receptor / GID(1) ; 3 breaks down <u>DELLA</u> (protein) ; 4 releases, PIF / transcription factor ; 5 switches on <u>gene</u> for, amylase / maltase / protease ; 6 amylase, breaks down / hydrolyses, starch to maltose ; 7 sugars / glucose, for, respiration / growth, of embryo ;

5(a)	feature	ADH	glucagon	insulin	
	binds to receptors on cell surface membranes	✓	✓	✓	;
	results in molecules moving from cells into the blood	✓	✓	x	;
	is secreted as a result of detection by osmoreceptors	✓	x	x	;
5(b)	any four from: 1 impulses / action potentials / neurotransmitters, in nervous system <u>and</u> hormones in endocrine system ; 2 electrical in nervous system <u>and</u> chemical in endocrine system ; 3 neurones / nerve cells, in nervous system <u>and</u> blood in endocrine system ; 4 effects are / target is, specific / localised, in nervous system <u>and</u> (can be) widespread in endocrine system ; 5 effect / response, happens quickly in nervous system and slowly in endocrine system ; 6 effect / response, lasts a short time in nervous system <u>and</u> long time in endocrine system ; 7 AVP ;				
5(c)(i)	C ;				
5(c)(ii)	B ;				
5(c)(iii)	1 (D / it), shortens / contracts / decreases ; and any three from: 2 calcium ions / Ca^{2+}, bind to troponin ; 3 tropomyosin, moves / shifts position / exposes binding sites on actin ; 4 myosin (head) binds to actin / myosin-actin cross-bridges form ; 5 power stroke / myosin head, pulls actin ; 6 more actin, enters / overlaps with, A band / B or more overlap between actin and myosin ;				

1(a)	any one from: (presence of) juglone (with a concentration of $1.0 \times 10^{-3} \text{ mol dm}^{-3}$) <u>and</u> control (treatment) / absence of juglone ; concentration, of juglone ;				
1(b)(i)	5 cm³ of (original / 0.1 mol dm⁻³) juglone (solution) ; 495 cm³ of the (mixture of) solvents ;				
1(b)(ii)	any one from: use, syringe / graduated pipette / micropipette / burette ; use, volumetric flask ; use larger (stated) volumes (of both juglone and mixture of solvents) ;				
1(c)(i)	1 (mixture of) solvents / solution, with no juglone ; 2 idea that to show that any effects observed (on the, germination / growth, of seeds) are a result of juglone ;				

1(c)(ii)	any seven from: 1 method for standardising the exposure of the seeds to juglone ; 2 <i>ref. to</i> use, same / stated, (cucumber) seeds ; 3 method to maintain a, constant / stated, temperature ; 4 method to maintain a, constant / stated, light intensity ; 5 <i>ref. to</i> standardise another key variable ; 6 <i>idea of</i> reapply juglone (to seedlings) after germination ; 7 count / note / record / AW, number of seeds planted <u>and</u> count number of seeds that germinate, after a, set / stated, time ; 8 method for measuring growth at 10 days (after the appearance of the seedling above the soil) ; 9 for juglone solution and control treatment, use a large number of seeds <u>and</u> calculate the mean (growth) for each group ; 10 safety comment with hazard <u>and</u> risk <u>and</u> precaution ; <table><tr><th>hazard</th><th>risk</th><th>precaution</th></tr><tr><td>juglone</td><td>irritant / toxin / allergy</td><td>gloves / mask / PPE</td></tr><tr><td>solvents</td><td>irritant / toxin / allergy</td><td>gloves / mask / PPE</td></tr><tr><td>cucumber seeds / plants</td><td>irritant / allergy</td><td>gloves / mask / PPE</td></tr><tr><td>soil</td><td>biohazard / pathogens / allergy / irritant</td><td>gloves / mask / PPE</td></tr></table>	hazard	risk	precaution	juglone	irritant / toxin / allergy	gloves / mask / PPE	solvents	irritant / toxin / allergy	gloves / mask / PPE	cucumber seeds / plants	irritant / allergy	gloves / mask / PPE	soil	biohazard / pathogens / allergy / irritant	gloves / mask / PPE
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1(d)(i)	any two from: 1 data is continuous ; 2 comparing means (from the two groups) ; 3 data is (from populations that are) normally distributed ; 4 standard deviations (approximately) the same (between the two groups) ;															
1(d)(ii)	any three from: 1 (the critical value at 18 d.f. and $p = 0.05$ is) 2.101 ; 2 calculated value of $t / 2.090$, is less than, critical value / 2.101 (at $p = 0.05$) ; ora 3 <u>null</u> hypothesis is accepted (at $p = 0.05$) ; 4 there is no <u>significant difference</u> (at $p = 0.05$) ;															