

Question number	Answer	Marks	Guidance
1 (a) (i)	Insulin	1	
1 (a) (ii)	Different 3D shape due to mutation	1	
1 (b)	Increased conversion of glycogen to glucose / glycogenolysis; decreased use of glucose in respiration; increased rate of, gluconeogenesis / described;	3	
1 (c) (i)	Increased; linearly; figures quote;	3	
1 (c) (ii)	(Relatively) constant / minor fluctuations; figures quote; reference to dip at 90 mins;	3	
2 a	correlation because prevalence of diabetes increase as mean body mass increases; cause not explained;	2	
2 b	overall prevalence of diabetes increases as mean body mass increases; increase in prevalence fluctuates; figures quote;	3	
2 c	weight loss – glucose absorbed from diet is lost in urine; as lack of insulin reduces uptake into cells; increased urination – increased glucose concentration in filtrate lowers water potential; less water reabsorbed from filtrate; dehydration – increased water loss from body;	5	
2 d	energy surplus would mean increased ATP present; ATP synthase is enzyme required for ATP synthesis; reduced levels of ATP would mean increased sensitivity;	3	
3 a (i)	Tissue	1	
3 a (ii)	Islets of Langerhans	1	
3 a (iii)	<i>Both</i> regulate blood glucose concentration; detect blood glucose concentration; <i>beta cells</i> release insulin when blood glucose concentration is high; alpha cells release glucagon when blood glucose concentration is low;	4	
3 b	red blood cells transport oxyhaemoglobin; deliver oxygen; oxygen required for respiration; ATP required for, production/release, of, hormone/named;	3 max	
3 (c) (i)	Acinus / acini, cell;	1	
3 (c) (ii)	Release digestive enzymes;	1	
3 (c) (iii)	<i>Cells</i> / A form duct; for secretions; enzymes into small intestines; exocrine gland; alpha / beta, cells secrete into blood;	5	
4 (a) (i)	Repeated; identify anomalies; calculate mean;	3	
4 (a) (ii)	Cotton wool placed on microscope slide; to reduce movement of Daphnia; reduce counting	3	

	errors;		
4 (a) (iii)	Drops of pond water placed on the slide; Daphnia do not dry out; no cover slip; maintain oxygen for Daphnia;	2 max	
4 (b)	Correct axes; correct plots; line of best fit;	3	
4 c	Heart rate decreases as concentration decreases; figures quote; linear;	3	
4 (d)	Spread of data about the mean;	1	
4 (e)	$t = 3.38$; one degree of freedom and $p = 0.05$; less than critical value; no significant difference;	4	