

Question	Answer	Marks	Guidance
1 a	<p>[Level 3] Gives a full explanation that pesticide movement is driven by transpiration and occurs through the xylem and explains why pesticide movement is greater on warm sunny days. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>[Level 2] Gives an explanation that pesticide movement is driven by transpiration and occurs through the xylem. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>[Level 1] Gives a partial explanation explaining that pesticide movement is linked with transpiration or that it occurs through the xylem. Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p>[Level 0] Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	6	<p>This question is targeted at grades up to A</p> <p>Indicative scientific points at level 3 (HD) may include:</p> <p>transpiration is greater when it is warm / sunny because:</p> <ul style="list-style-type: none"> • (higher temperatures) increase rate of evaporation / diffusion • (on sunny days) stomata open (more widely) <p>Indicative scientific points at levels 1 and 2 (SD) may include:</p> <ul style="list-style-type: none"> • pesticide moves by transpiration • transpiration involves evaporation / diffusion • transpiration is greater when it is warm / sunny • movement through xylem <p>if refer to stem/veins/vessels/phloem instead of xylem, limit to 5/3/1 marks if refer to just evaporation/diffusion instead of transpiration, limit to 5/3/1 marks</p> <p>if only give L3 indicative points, limit to L1</p> <p>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</p>
b i	do not break down / can not be excreted (1)	1	allow stays around / can not be removed / keeps working
ii	gets into food chains / passes along food chains / bioaccumulation / idea that may harm other organisms (1)	1	allow builds up /accumulates
	Total	8	

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2 a i	<p>any two from: as mass increases, heart rate decreases / AW / ORA (1)</p> <p>as mass increases, life span increases / AW / ORA (1)</p> <p>as heart rate decreases, life span increases / AW / ORA (1)</p>	2	<p>if get 2 correct and 1 wrong then award 2 marks</p> <p>'as mass increases, heart rate decreases and life span increases' = (2)</p>
ii	<p>(yes) – idea that the life time heart beats are all around 1 or 2 billion (1)</p> <p>(no) – idea that some life time heart beats are more than twice / three times the value of others / AW OR chicken does not fit pattern (1)</p>	2	<p>ignore most are about the same (simply repeating question)</p> <p>allow all between 0.7-2.2 billion / within 1.5 billion</p> <p>(yes) – idea that most are about the 1 billion / within 0.5 billion, but chicken is the odd one out as it's about 2 billion / a lot more = (2)</p> <p>allow additional marking points: sample is not large enough to reach a valid conclusion (1) idea that there is still a large difference between eg 0.7 and 0.8 billion (1)</p>
iii	<p>no (no mark)</p> <p>any two from: for their mass, heart rate is too low (1) for their mass, life span is too high (1) for their mass, life time heart beats are too high (1)</p>	2	<p>if yes, no marks</p> <p>if trend not clear, check table in 13ai to see if/where human placed</p> <p>allow any two other correct comparisons</p>

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b i	<p>idea that can use these findings to target treatment / preventative care (1)</p> <p>idea that results are reliable because they involved many people / involved people from around the world (1)</p>	2	<p>allow can inform / identify patients (with potential risks)</p> <p>allow idea that results are reliable because 4 years is a long time OR idea that results are not reliable because 4 years is not a long time</p> <p>ignore idea that it's not worth treating heart disease patients</p>
ii	<p>idea that the study only included heart disease patients / AW (1)</p> <p>idea that results only show patients with heart beats below 58 and above 78 (beat per min) / do not show results for all heart beats / AW (1)</p>	2	<p>ignore not enough data</p> <p>allow additional marking points: 4 years is not a long time (1) idea that data only shows a correlation and does not prove causation (1) there are (many) other factors affecting heart disease (1)</p>
Total		10	

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3	<p>[Level 3] Describes the results AND gives a detailed explanation of the experiment. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>[Level 2] Describes the results AND gives a limited explanation of the experiment. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>[Level 1] Describes the results of the experiment OR gives a limited explanation of the experiment. Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p>[Level 0] Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	6	<p>This question is targeted at grades up to A*</p> <p>Detailed explanation could include:</p> <ul style="list-style-type: none"> • air movement increases / maintains concentration gradient • air movement increases / maintains diffusion gradient • air movement lowers concentration of water outside plant <p>ignore references to osmosis</p> <p>Limited explanation could include:</p> <ul style="list-style-type: none"> • (increased) air movement / fan causes loss of water • (water is lost by) evaporation / diffusion of water <p>ignore references to osmosis</p> <p>Description:</p> <ul style="list-style-type: none"> • loss of mass/water/readings go down in B / shoot • no change in A (allow small decrease) <p>To get full credit for description there needs to be a comparison between A and B. Description of only A or B limits mark to 1/3/5</p> <p>if no other marks, allow air movement increases transpiration for L1, 1 mark</p> <p>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</p>
	Total	6	

Question	Answer	Marks	Guidance
4 a i	1 (cm) (1)	1	
ii	1727 (2) but $3.14 \times 1 \times 550$ (1)	2	allow answer in range 1727-1728 (2) allow $\pi \times 1 \times 550$ (1) allow ECF from (i) allow correct rounding
iii	any two from: real lining has: villi (1) folds / creases (1) microvilli (1)	2	allow finger-like projections ignore bumps / not smooth / stretched ignore cilia
b	any two ideas from: breast-feeding rats develop more villi/folds/microvilli (in small intestine) (1) breast-feeding rats absorb more food / faster (1) breast-feeding rats need more food to produce milk (1)	2	allow reverse arguments note <i>absorb more food to make milk = 2</i> allow nutrients as alternative to food
	Total	7	