

Question number	Answer	Notes	Marks
7	<p>any six from:</p> <p>MP1. cat X loses more energy by conduction / convection than cat Y;</p> <p>MP2. cat Y loses more energy by radiation than cat X;</p> <p>MP3. fur traps air;</p> <p>MP4. larger surface area increases conduction (losses);</p> <p>MP5. air is a (good) insulator/ poor conductor;</p> <p>MP6. fur is a (good) insulator / poor conductor;</p> <p>MP7. trapped air cannot move around;</p> <p>MP8. trapped air reduces convection;</p> <p>MP9. black surfaces are better emitters / emit radiation faster;</p>	<p>allow RA throughout</p> <p>ignore black surfaces being better absorbers</p>	6

Total for Question 7 = 6 marks

Question number	Answer	Notes	Marks
12 (a) (i)	47 (°);		1
(ii)	$\sin(c) = 1 / n$;		1
(iii)	substitution OR rearrangement; evaluation; e.g. $\sin(47) = 1/n$ OR $n = 1/\sin(c)$ (n =) 1.4	allow ecf from (i) answer is 1.37 to 3sf if (i) is given as 43° then expected answer is 1.5 to 2sf /1.47 to 3 sf	2
(b)	ray is refracting / angle of incidence is less than critical angle; critical angle for water is greater than for acetone; refractive index of water is less than for acetone;	award full marks for a correct calculation of the refractive index of water with correct conclusion e.g. $n_{\text{water}} = 1.33 < n_{\text{acetone}}$ Allow correct conclusion with $n_{\text{water}} = 0.75...$ for 1 mark MAX reject response with otherwise incorrect calculation of n_{water}	3

Total for Question 12 = 7 marks