

Movement in the Air
Question 2 Page 1

Name		School	
Class		Date	

Study the information in the table and answer the questions which follow it.

Insect	speed (m/s)	body mass (mg)	wing surface (mm ²)	mass of wing muscles (% of body mass)	wing beats (beats/s)
housefly	2,0	12	20	10,7	180-330
honeybee	3,0	78	42	13,0	180-250
cabbage white butterfly	2,0	127	1840	7,0	9-12
dragonfly	8,0	530	1380	24,0	20-30
horsefly	8,0	276	184	17,0	96
hornet	6,0	567	260	10,6	110
cockchaffer beetle	2,5	962	642	11,0	46
hummingbird hawkmoth	5,0	345	400	14,0	72-85

QUESTION	SPACE FOR YOUR ANSWER
(a) Which insect flies (i) the fastest?	=
(ii) the slowest?	=

Movement in the Air
Question 2 Page 2

Name		School	
Class		Date	

<p>(b) For each insect, calculate the LOAD carried by its wings as it flies.</p> <p>LOAD =</p> $\frac{\text{BODY MASS in mg}}{\text{WING SURFACE in mm}^2}$ <p>= mg/mm²</p> <p>(The load in mg divided by the wing surface in mm²)</p>	housefly =	mg/mm ²
	honeybee =	mg/mm ²
	cabbage white butterfly =	mg/mm ²
	dragonfly =	mg/mm ²
	horsefly =	mg/mm ²
	hornet =	mg/mm ²
	cockchaffer beetle =	mg/mm ²
	hummingbird hawkmoth =	mg/mm ²
(c) Which insect has		
(i) a heaviest wing loading? =		
(ii) a lightest wing loading? =		

Movement in the Air
Question 2 Page 3

Name		School	
Class		Date	

(d) Compare the data for the cabbage white butterfly and the dragonfly. Which factor do you think allows the dragonfly to fly 4 times faster than the butterfly? Is it its body mass, its wing surface or its flight muscles? Give reasons for your answer.	body mass? = Reasons:
	wing surface? = Reasons
	flight muscles? = Reasons