DEPARTMENT OF BIOLOGY
S.4 BIOLOGY – HOLIDAY WORK

1. During a Mandelian experiment, a cross between pea plants with round and wrinkled seeds produced **F1** with round seeds only.
   (a) Explain the absence wrinkled seed in the **F1.**
   (b) Using suitable symbols, work out the **F2** genotypes and phenotypes.
   (c) Explain how you would determine the genotype of an **F2** plant bearing round seeds.

2. The table 1 below shows the body surface area and volume of two land mammals A and table 2 shows the rate of metabolism in arbitrary units, of the two animals at varying environmental temperatures.

Mammal	Surface area (m^2)	Volume (m^3)
A	1.2	0.92
B	0.6	0.18

Environmental temperature (°C)	Metabolic rate (arbitrary units)	
	Mammal A	Mammal B
16	10.5	12.9
18	8.9	10.9
20	7.5	9.2
22	6.4	7.8
24	5.6	6.7
26	5.0	5.8

(a) From table 1:
   (i) Work out the surface area: Volume ratio of each mammal.
   (ii) State the structural difference between mammal A and B.

(b) Using the graph paper, plot on the same axes a graph of metabolic rate of the two animals against environmental temperature.

(c) From the graph, determine the metabolic rate of each mammal at environmental temperature of 25°C.

(d) (i) How does environmental temperature affect the metabolic rate of the mammals?
   (ii) Explain why variation of temperature affects the metabolic rate of the mammals as stated in d(i) above.

(e) From the information provided, explain why at any environmental temperature, the metabolic rate of mammal B is higher than that of mammal A.

END