

Higher Homework 1 – Exponential functions

1. If $\log_{10} y = 2x$, choose the correct option for y

- A** $y = 20x$ **B** $y = x^{100}$
C $y = 10^{2x}$ **D** $y = (2x)^{10}$ **2**

2. A radioactive substance decays according to the formula $M_t = 120 e^{-0.005t}$, where M_t is the mass (in micrograms) remaining after t years.

- (a) What is the initial mass of the substance **1**
(b) What is the mass of the substance after 7 years **1**
(c) Calculate , **to the nearest year**, how long a sample would take to lose half of its original mass. **4**

3. Carbon dating is used to determine the age of fossil remains, where the formula $N(t) = N_0 e^{kt}$ calculates the amount of carbon ($N(t)$) at any given time.

- (a) This formula is based upon the decay of ^{14}C , a radioactive isotope of carbon with a half-life 5700 years.
Use this information to calculate a value for k (the constant of decay)
Give your answer to 4 significant figures **3**
(b) A museum has a wooden wheel which is claimed to be over 1000 years old. After carbon dating it is found that the wheel contains 88% of the amount of carbon of a living tree.
Does this mean that the claim is true? **4**