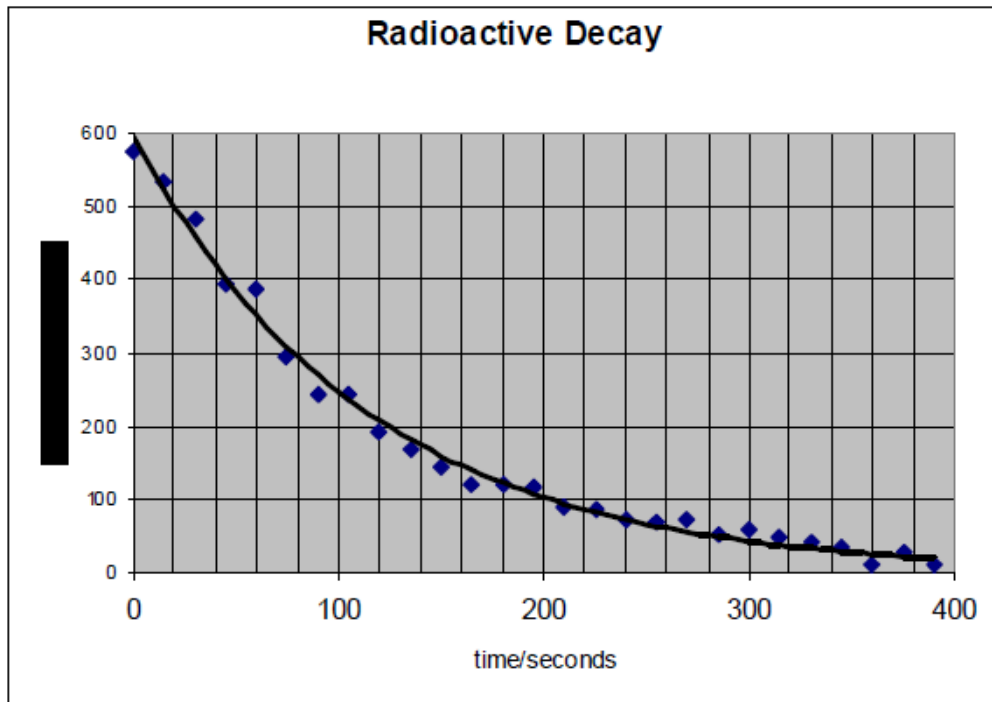


AS-2009 Q10

The graph above plots the measurements of the radioactive decay of an element, along with a line of best fit. Why do some of the data points not lie on the line of best fit, but appear above and below it?



- A Not all of the α or β or γ radiations are measured
- B The source decays in a random manner
- C The background count is not zero
- D Inaccurate measurements by the experimenter

AS-2011 Q2 & Q8

2. A spherical mass m of uniform density has a weight W . If a second mass of similar density but with double the radius of the first is compared, the weight of the second mass is

- A. the same B. $2W$ C. $4W$ D. $8W$

8. A Big Mac from McDonalds has an energy content of 2.3 MJ (McDonalds Nutrition Guide) and a mass of 214 g whilst a tonne of TNT will release 4.7×10^9 J when detonated. Comparisons can be made by calculating the energy density, which is the amount of energy released in a reaction per unit mass.

What is the ratio $\frac{\text{energy density of Big Mac}}{\text{energy density of TNT}}$

$$1 \text{ tonne} = 10^3 \text{ kg}$$

- A. 2.3×10^{-3} B. 0.23 C. 0.44 D. 2.3

AS-2012 Q2

A 600 W microwave oven can cook a 300 g potato in 9 minutes. How long would it take to cook six 200 g potatoes placed in the microwave at the same time?

- A. 9 minutes B. 18 minutes C. 27 minutes D. 36 minutes

AS-2010 Q11

11. An archaeologist at an excavation discovers a crown that looks like gold. It has a mass of 546 g and a volume of 34.6 cm^3 . However, chemical analysis shows that the crown consists of a mixture of gold and silver. Unfortunately the analysis is unable to give the proportions without removing a sample. The problem is to find the mass of gold in the crown. We assume that the volume of the crown is equal to the initial volumes of gold and silver of which it is composed.

Density of gold, $\rho_g = 19.3 \text{ g cm}^{-3}$

Density of silver, $\rho_s = 10.5 \text{ g cm}^{-3}$

- a) Write down an equation relating the masses m_g and m_s of gold and silver in the crown and an equation for the corresponding volumes V_g and V_s .

[2]

- b) Write down an equation for the total mass in terms of the volumes V_g , V_s and densities ρ_g , ρ_s of the gold and silver in the crown.

[1]

- c) In the equation from (b) substitute for V_s and then substitute for V_g to obtain a relation between ρ_g , ρ_s and m_g .

[3]

- d) Determine the value of the mass of gold, m_g .

[1]