

## **INVESTIGATION OF THE VARIATION OF INTENSITY OF GAMMA RADIATION WITH**

### **DISTANCE**

**Specification reference:** A2 Unit 3.5 - Nuclear decay

#### **Theory:**

The relationship between count rate,  $C$ , and distance,  $d$ , follows an inverse square relationship and students can investigate this relationship or use a power relationship to determine the values i.e  $C = kd^n$ . The equation can be rearranged using logs and values for  $n$  and  $k$  determined. Similarly students can verify the relationship  $C = \frac{k}{d^2}$  and determine a value for  $k$  and investigate the effect of background radiation on the equation.

#### **Apparatus:**

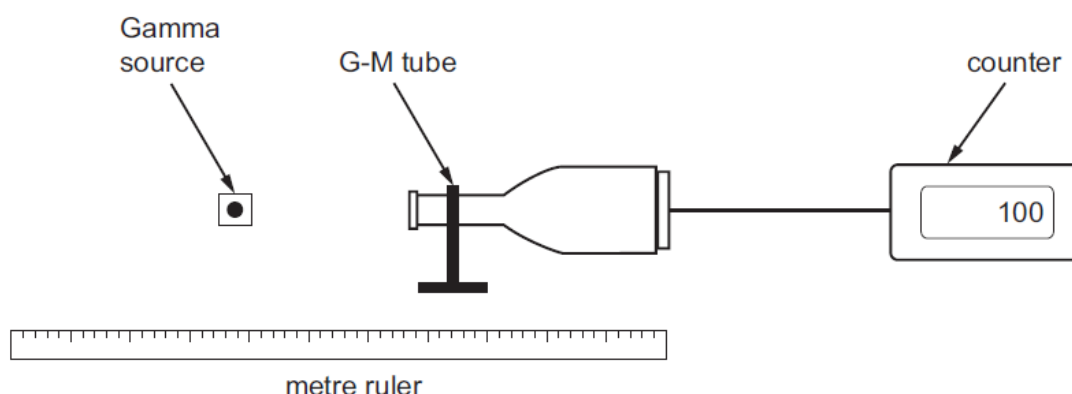
Gamma emitter e.g. 241 Americium  
Metre rule  
Geiger Muller tube and counter

#### **Further guidance for technicians:**

Measurements for the background radiation need to be taken prior to students undertaking the experiment. This will enable students to appreciate whether this should be taken into account when analysing their results.

#### **Experimental Method:**

The apparatus can be set up as follows and the candidates measure the count rate at various distances.



### **Extension**

Different radiation sources can be used to determine whether the inverse square relationship is valid and the factors that affect the value of the constant  $k$  can be investigated.

### **Practical Techniques:**

- Use ICT such as computer modelling, or data logger with a variety of sensors to collect data, or use of software to process data.
- Use ionising radiation, including detectors.

### **Relevant previous practical past papers:**

- PH6 2011 Data analysis task