SMART EXAM RESOURCES
SUBJECT:COORDINATED SCIENCES [PHYSICS]
PAPER 4
TOPIC: MOTION
SUB-TOPIC: DENSITY/MASS/VOLUME
SET 5 QP-MS

1 Describe a method for determining the volume of an irregular object like the stone.

.....

.....

.....

.....

..... [2]

MARK SCHEME:

	immerse in water ; measure volume of displaced water ;	**2**

2 A student investigates the penetrating abilities of ionising radiation.

Fig. 12.1 shows the equipment used by the student.

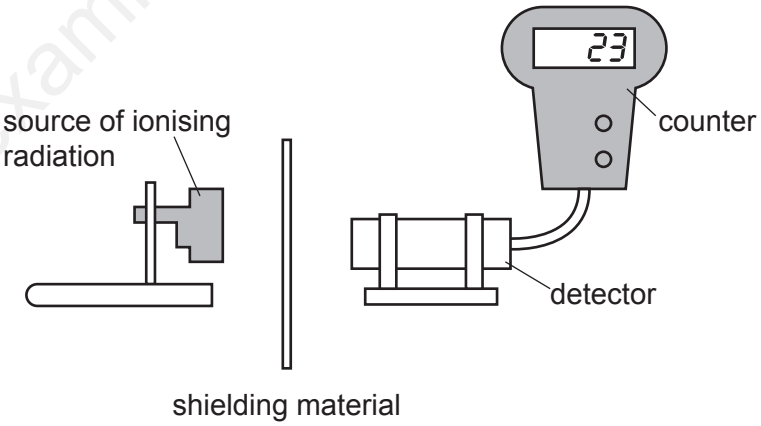

Fig. 12.1

(a) The student places different shielding materials between the source and the detector and uses the counter to record the number of counts in 1 minute.

Table 12.1 shows the student's results.

Table 12.1

shielding material	counts in 1 minute
no material (air only)	2560
paper	2555
thin aluminium	23
thick aluminium	24
thin lead	22
thick lead	17

(i) Use Table 12.1 to state **and** explain which type of ionising radiation is emitted by the source.

type of ionising radiation .....

explanation .....

.....

.....

.....

.....

[3]

(ii) The source used in Fig. 12.1 has a half-life of 29 years.

Calculate the time it will take for the activity of the source to drop to 12.5% of the original value.

time = ... years [2]

(b) The lead used in the student's investigation is a solid.

The melting point of lead is 327 °C. When lead melts, it turns from a solid into a liquid.

Describe the changes in the forces between particles when a solid melts.

.....

..... [1]

(c) The density of liquid lead is 10.6 g / cm^3.

A sample of liquid lead has a mass of 37.1 g.

Calculate the volume of the sample of liquid lead.

volume = ... cm^3 [2]

MARK SCHEME:

Question	Answer	Marks
(a)(i)	beta ; (beta) can penetrate (air and) paper ; (beta) can't penetrate thin aluminium (and thicker materials) ;	3
(a)(ii)	3 half lives ; (t = 3 × 29 =) 87 (years) ;	2
(b)	(forces between particles) decrease ;	1
(c)	d = m / v **or** v = m / d **or** v = 37.1 / 10.6 ; = 3.5 (cm^3) ;	2

3 A student conducts an investigation into how the pressure of the gas changes with volume.

The temperature of the gas remains constant.

Fig. 12.3 shows the results of the student's investigation.

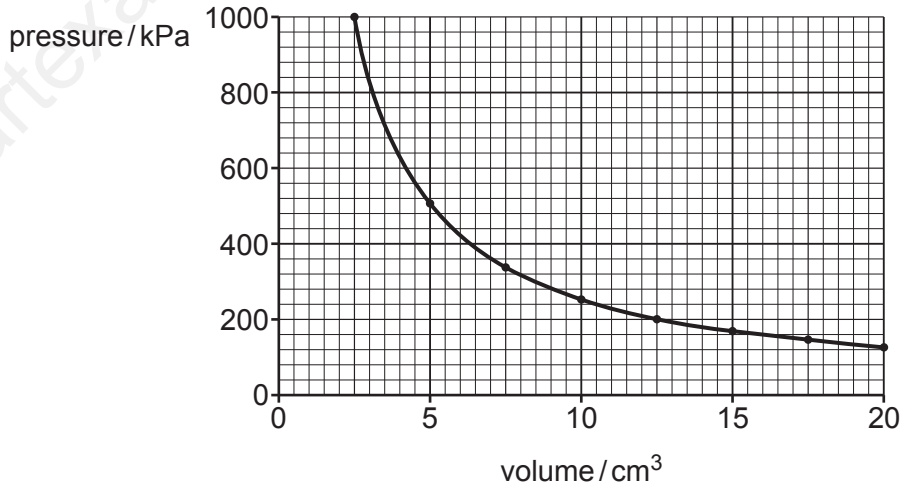

Fig. 12.3

(i) Use Fig. 12.3 to determine the volume of the sample of gas when the pressure is 500 kPa.

volume = ... cm^3 [1]

(ii) The mass of the sample of gas is 2.45 g.

Calculate the density of the sample of gas when the pressure is 500 kPa.

density = ... g/cm^3 [2]

MARK SCHEME:

(i)	5 (cm^3) ;	**1**
(ii)	(density =) m / V **or** 2.45 / 5 ; 0.5 (g / cm^3) ;	**2**

4 Some students are investigating moments and turning effects. Fig. 6.1 shows a beam of uniform density in equilibrium. The beam has a mass of 20 g on one end and a stone on the other.

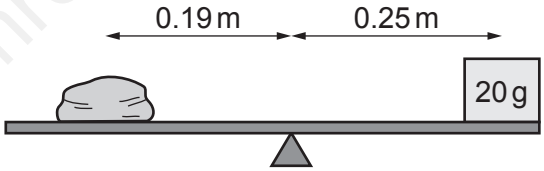

Fig. 6.1

(b) (i) Calculate the weight of the 20 g mass.
gravitational field strength g = 10 N / kg

weight =..... N [3]

(ii) Calculate the mass of the stone.

State the unit for your answer.

mass = ... unit ..... [4]

MARK SCHEME:

(i)	0.02 **or** 20×10^{-3} (kg) ; (W =) mg or 0.02×10 ; 0.2 (N) ;	**3**
(ii)	clockwise moment = force × distance **or** 0.2×0.25 **or** 0.05 ; anti-clockwise moment = clockwise moment ; F = 0.05 ÷ 0.19 **or** 0.263 / m = 0.263 ÷ 10 **or** 0.026 (kg) **or** 26 (g) ; g / kg ;	**4**