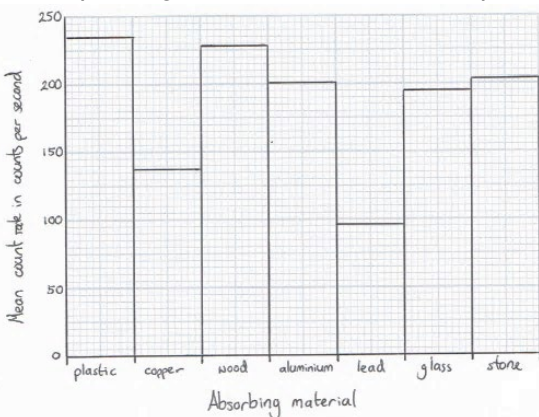


Question number	Answer	Notes	Marks
4	(a) (i) weight = mass \times gravitational field strength;	allow rearrangements and standard symbols e.g. $W = m \times g$ ignore 'gravity' for g	1
	(ii) substitution or rearrangement; evaluation; e.g. $520 = \text{mass} \times 10$ OR $\text{mass} = W / g$ (mass =) 52 (kg)	allow $g = 9.8, 9.81$ allow 53.1, 53.0, 53	2
	(b) (i) evidence of counting squares to find area; number of squares in range 37-42; evaluation of area of one square; evaluation of total area; e.g. dots seen in each square in diagram number of squares = 39 area of one square = $(2 \times 2) = 4 \text{ cm}^2$ total area = $(4 \times 39) = 156 \text{ cm}^2$	allow attempt to find area by splitting into rectangles / triangles allow if 2×2 seen in working allow ecf from incorrect number of squares allow 148-168	4
	(ii) pressure = force / area;	allow standard symbols and rearrangements e.g. $p = F / A$	1
	(iii) dimensionally correct substitution; evidence of doubling area or halving pressure to account for both feet; evaluation with matching unit; e.g. (pressure =) $520 / 156$ area = 156×2 OR pressure = $3.2 \div 2$ (pressure =) 1.7 N/cm^2	allow ecf from (b)(i) allow N/cm^2 , N/m^2 or Pa if no marks awarded for calculation allow 1 mark if valid unit for pressure given allow 1.5-1.8 N/cm^2 allow 15 000-18 000 N/m^2	3

Total for Question 4 = 11 marks

Question number	Answer	Notes	Marks																
9 (a)	Geiger-Muller tube / GM tube;	allow Geiger counter, Geiger meter, GM detector	1																
(b)	(absorbing) material;	allow absorber	1																
(c)	any two from: MP1. idea that thickness also affects the count/results; MP2. idea that thickness is a control variable; MP3. idea of making experiment valid;	allow fair test for valid	2																
(d)	measure count over longer time / take more repeats / measure background count;	allow quoted time longer than 3 seconds	1																
(e) (i)	<p>suitable linear scale chosen (>50% of grid used);</p> <p>axes labelled with quantities and unit;</p> <p><u>all</u> bar plotting correct to nearest half square;</p> 	<p>ignore orientation</p> <p>do not accept multiples of 30 for scale</p> <table><tr><th>Absorbing material</th><th>Mean</th></tr><tr><td>plastic</td><td>235</td></tr><tr><td>copper</td><td>137</td></tr><tr><td>wood</td><td>227</td></tr><tr><td>aluminium</td><td>202</td></tr><tr><td>lead</td><td>97</td></tr><tr><td>glass</td><td>195</td></tr><tr><td>stone</td><td>203</td></tr></table>	Absorbing material	Mean	plastic	235	copper	137	wood	227	aluminium	202	lead	97	glass	195	stone	203	3
Absorbing material	Mean																		
plastic	235																		
copper	137																		
wood	227																		
aluminium	202																		
lead	97																		
glass	195																		
stone	203																		
(ii)	<p>B (absorbing material is not a continuous variable);</p> <p>A is incorrect because absorbing material is not a continuous variable</p> <p>C is incorrect because line graphs are drawn for continuous variables</p> <p>D is incorrect because count rate is a continuous variable</p>		1																
(iii)	<p>idea that the lower the count, the better the absorber;</p> <p>lead is the best absorber;</p>	<p>ignore student is right/wrong</p> <p>allow RA</p> <p>allow that plastic is the worst absorber</p>	2																

Total for Question 9 = 11 marks