9 A teacher investigates the penetrating ability of the gamma rays from a gamma source.

This is the teacher's method.

- place the gamma source at a distance of 25 cm from a radiation detector
- place a 1 cm thick absorbing material between the source and the detector
- measure the radiation count from the source for a time period of 3 s
- calculate the count rate in counts per second
- repeat the measurement two more times

The teacher repeats this method for different absorbing materials.

(a) Name a suitable radiation detector that the teacher could use.

(1)

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(b) State the independent variable in the teacher's investigation.

(1)

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(c) Explain why every absorbing material used in the investigation has a thickness of 1 cm.

(2)

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(d) Suggest one improvement the teacher could make to this method.

(1)

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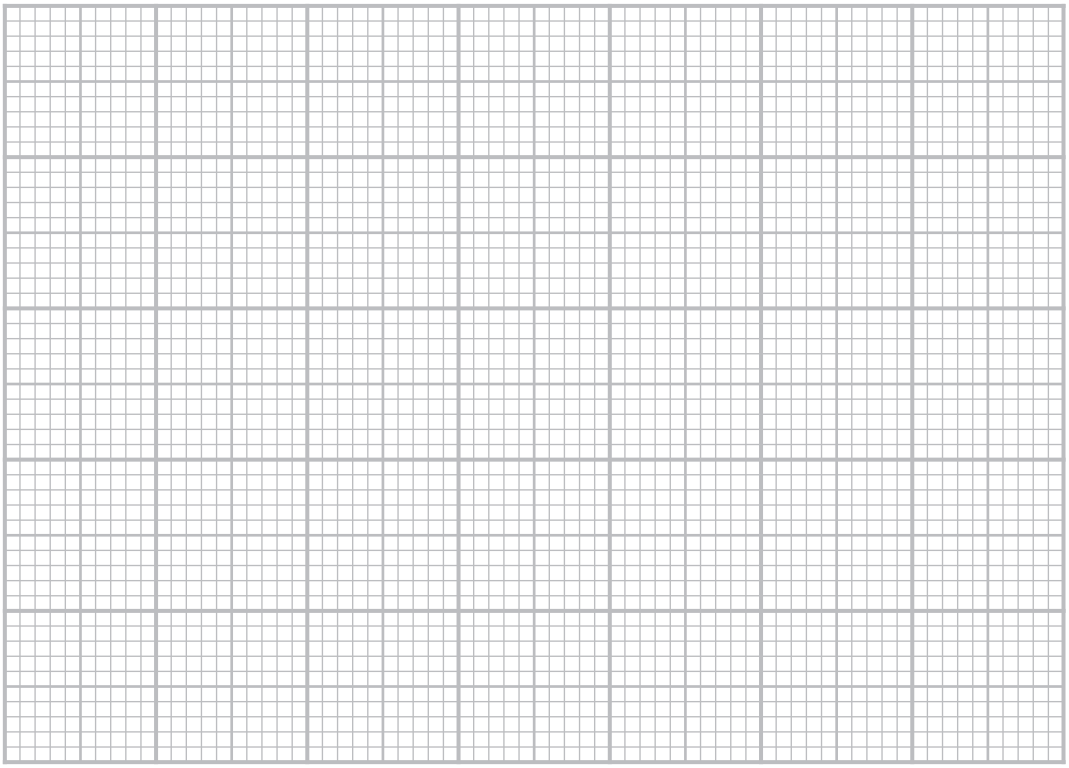
(e) The table shows the teacher's results for seven different absorbing materials.

Absorbing material	Count rate in counts per second			
	Test 1	Test 2	Test 3	Mean
plastic	248	230	226	235
copper	138	127	147	137
wood	226	231	224	227
aluminium	204	211	190	202
lead	96	102	92	97
glass	204	192	190	195
stone	205	200	205	203

(i) On the grid, plot a bar chart of the mean count rate for each absorbing material.

(3)



(ii) Why is a bar chart the correct way to display the results?

(1)

- ☒ **A** absorbing material is a continuous variable
- ☒ **B** absorbing material is not a continuous variable
- ☒ **C** count rate is a continuous variable
- ☒ **D** count rate is not a continuous variable

(iii) A student concludes that plastic is the best absorber of gamma radiation because plastic gives the largest mean count rate.

Evaluate the student's conclusion.

(2)

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(Total for Question 9 = 11 marks)