

- 9 Arun, Beth and Charlie are investigating whether there is any association between death rate per 1000 and physician density per 1000. They each collect a random sample of size 10.

Arun's sample is shown in **Fig. 9.1**.

	death rate per 1000	physician density per 1000
Canberra	7.2	3.62
Dhaka	5.3	0.49
Brasilia	6.8	2.23
Yaounde	9.3	0.08
Zagreb	12.5	3.08
Tehran	5.4	1.16
Rome	10.7	4.14
Tripoli	3.8	2.09
Oslo	7.9	4.51
Abuja	9.7	0.35

Fig. 9.1

- (a) Explain whether or not Arun collected his data from the pre-release material, or whether it is not possible to say.

Beth and Charlie collected their samples from the pre-release material. Each of them drew a scatter diagram for their samples. The samples and scatter diagrams are shown in **Figs. 9.2** and **9.3**.

Beth's sample	death rate per 1000	physician density per 1000
Sudan	6.7	0.41
Cambodia	7.4	0.17
Gabon	6.2	0.36
Seychelles	7	0.95
Mexico	5.4	2.25
Kuwait	2.3	2.58
Haiti	7.5	0.23
Maldives	4	1.04
Nauru	5.9	1.24
Jordan	3.4	2.34

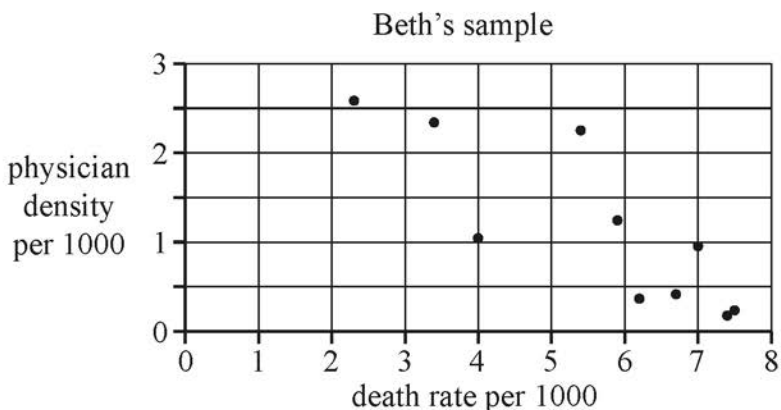


Fig. 9.2

Charlie's sample	death rate per 1000	physician density per 1000
Vanuata	4	0.17
Solomon Islands	3.8	0.2
N. Mariana Islands	4.9	0.36
Nauru	5.9	1.24
United Kingdom	9.4	2.81
Portugal	10.6	3.34
North Macedonia	9.6	2.87
Faroe Islands	8.8	2.62
Bulgaria	14.5	3.99
St. Kitts and Nevis	7.2	2.52

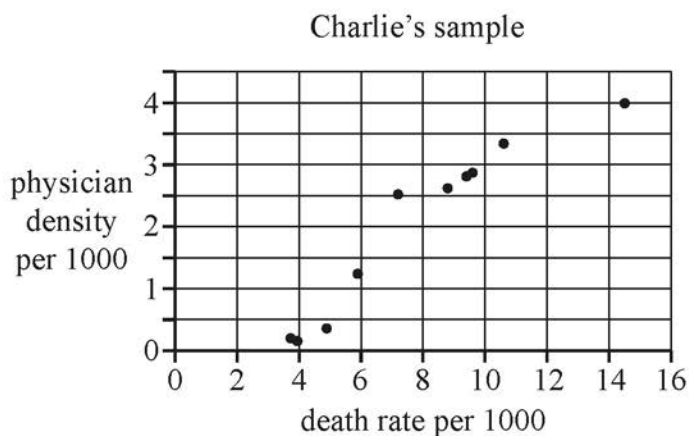


Fig. 9.3

Arun states that Charlie's sample and Beth's sample cannot **both** be random for the following reasons.

- Both samples include Nauru – there should not be any common values.
- Beth's diagram suggests a negative association between death rate and physician density, whereas Charlie's diagram suggests a positive association. If both samples are random the same relationship would be suggested.

(b) • Explain whether Arun's reasons are valid.

- State whether or not Arun is correct, or whether it is not possible to say.

[3]

Kofi collects a sample of 10 African countries and 10 European countries. The scatter diagram for his results is shown in **Fig. 9.4**.

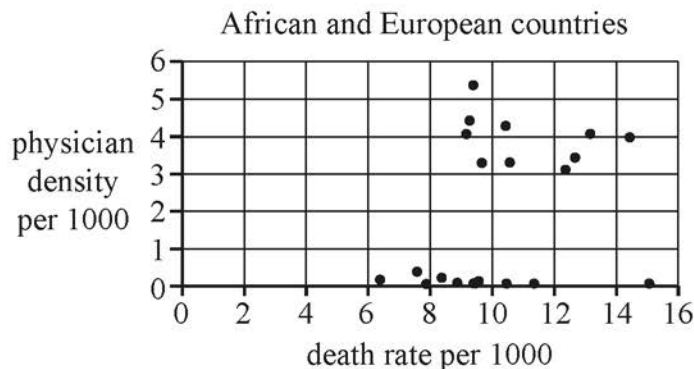


Fig. 9.4

(c) On the copy of **Fig. 9.4** in the Printed Answer Booklet, use your knowledge of the pre-release material to identify the points representing the 10 European countries, justifying your choice.

[1]