Solutions

Marking: **M1** a correct method, **A1** the correct answer, **B1** an independent mark.

Each answer shows the steps, then the **result**.

2.1

A: **recall bias** (information bias)

B: **loss to follow-up** (selection bias)

C: **observer bias** (information bias)

2.2

older age causes grey hair and is linked to it

older age also causes heart disease, so grey hair and heart disease look linked

2.3

heavy vs light smokers: **dose–response**

falls after stopping: **experiment** (reversibility)

smoking starts first: **temporality**

2.4

any two of: randomisation; restriction (e.g. only non-smokers); matching

3.1

(a) smokers: $4/4 = \mathbf{1}$; non-smokers: $0.5/0.5 = \mathbf{1}$

(b) drinkers are more often smokers, and smoking causes lung cancer

(c) no link once smoking is taken into account: the crude link was confounding

(d) it is linked to the exposure and it is a cause of the outcome, not on the causal path

3.2

(a) some non-drinkers stopped because they were already ill, so the illness caused the not-drinking, not the other way round

(b) confounding (e.g. non-drinkers differ in income or health), or chance

(c) an RCT; it is hard to randomise people to drink alcohol for years, ethically and in practice

3.3

(a) **dose–response**

(b) $1.6 \div 0.1 = \mathbf{16}$

(c) **strength**

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(d) any two, each with a reason: consistency, seen in many studies in many countries; temporality, smoking starts years before cancer; plausibility, carcinogens in smoke damage DNA; experiment, risk falls after quitting

(e) **temporality**