

Exercise walk-through

Dose Response Curve ■ 8.13

eXercise

You must be able to

- read a **dose-response curve** 剂量反应曲线
- identify the **threshold** 阈值 dose
- explain the difference between threshold and linear (no-threshold) responses

Method — The dose-response curve

A **dose-response curve** plots the **effect (response)** against the **dose**. Usually a higher dose gives a larger response.

Method — Threshold

Many substances have a **threshold** dose — below it there is **no observable effect**; above it, the response rises. This is common for nutrients and many toxins.

Method — No-threshold (linear)

Some agents (like certain **carcinogens** and radiation) are assumed to have **no safe threshold** — any dose carries some risk, and response rises roughly linearly from zero.

Method — A worked reading

If a curve stays flat until dose 5, then rises, the **threshold is 5** — below it there is no effect. A curve rising straight from zero has **no threshold**.

Practice 2.1 ■ 1 mark

What does a dose-response curve plot?

Solution 2.1

Method: The dose-response curve

Worked steps

The effect (response) against the dose **B1**.

Practice 2.2 ■ 1 mark

What is a threshold dose?

Solution 2.2

Worked steps

A dose below which there is no observable effect **B1**.

Practice 2.3 ■ 1 mark

What is assumed about a no-threshold agent?

Solution 2.3

Method: No-threshold (linear)

Worked steps

Any dose carries some risk (no safe level) **B1**.

Exam-style 3.1 ■ 1 mark

A substance with a threshold dose has

- A** an effect at any dose
- B** no effect below a certain dose
- C** the same effect at all doses
- D** no effect ever

Solution 3.1

- A** an effect at any dose
- B** no effect below a certain dose 
- C** the same effect at all doses
- D** no effect ever

Worked steps

B — no effect below a certain dose.

Exam-style 3.2 ■ 1 mark

A dose-response curve is flat up to a dose of 20 mg, then rises.

- (a) State the threshold dose.
- (b) Explain what happens below and above it.

Solution 3.2

Method: A worked reading

Worked steps

(a) 20 mg **B1**. (b) Below 20 mg there is no observable effect; above it, the response increases with dose **M1** **A1**.

Exam-style 3.3 ■ 2 marks

Explain why some carcinogens are treated as having no safe threshold.

Solution 3.3

Method: No-threshold (linear)

Worked steps

Even a single exposure could damage DNA and start a cancer, so any dose is assumed to carry some risk — there is no dose considered completely safe **M1** **A1**.