

Exercise walk-through

Simulations ■ 3.16

eXercise

You must be able to

- explain how a **simulation** 模拟 models a real-world **phenomenon** 现象
- describe how simulations use **abstraction** to simplify reality
- identify benefits such as lower cost and reduced **risk** 风险
- recognize the **limitations** 局限性 of a simulation

Method — What a simulation is

A **simulation** is a program that **models a real-world phenomenon**, using **abstraction** to simplify and represent reality.

Method — Benefits

It can be **cheaper** and **safer** than a real trial, and **randomness** can make it more realistic.

Method — Limitations

A simulation leaves out detail through its assumptions, so its results may not perfectly match reality.

Practice 2.1 ■ 1 mark

Define a simulation.

Solution 2.1

Worked steps

a program that models a real-world phenomenon **B1**.

Practice 2.2 ■ 1 mark

State one benefit of a simulation over a real trial.

Solution 2.2

Worked steps

it is cheaper or safer than a real trial **B1**.

Practice 2.3 ■ 1 mark

State one limitation of a simulation.

Solution 2.3

Worked steps

it simplifies reality through its assumptions, so it may miss real details **B1**.

Exam-style 3.1 ■ 1 mark

A simulation is a program that

- A** stores data
- B** models a real-world phenomenon
- C** compresses files
- D** sorts a list

Solution 3.1

Method: What a simulation is

- A stores data
- B models a real-world phenomenon
- C compresses files
- D sorts a list



Worked steps

B.

Exam-style 3.2 ■ 1 mark

One benefit of a simulation is

- A** more risk
- B** lower cost and reduced risk
- C** guaranteed perfect accuracy
- D** having no assumptions

Solution 3.2

- A more risk
- B lower cost and reduced risk
- C guaranteed perfect accuracy
- D having no assumptions



Worked steps

B.

Exam-style 3.3 ■ 1 mark

Engineers simulate a bridge design before building it.

- (a) State one benefit of doing this.
- (b) State how randomness could make the simulation more realistic.
- (c) State one limitation of the simulation.

Solution 3.3

Method: Benefits

Worked steps

(a) lower cost or less risk than building and testing a real bridge **B1**. (b) it could model varied loads or weather conditions **B1**. (c) its simplifying assumptions may leave out real-world factors **B1**.