

Solutions

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

2.1

- yeast: **glucose** → **alcohol** + **carbon dioxide**

2.2

- hard exercise builds up **lactic acid** in muscles

3.1 B

- anaerobic respiration releases **much less energy**
- A is the opposite; C and D are false

3.2

(a)

- muscle: **glucose** → **lactic acid**

(b)

- the **extra oxygen needed after exercise**
- to **break down the lactic acid** that built up

3.3

- heart rate and breathing stay high, bringing **extra oxygen**
- the **liver** uses it to break down the lactic acid

3.4

(a)

- muscle: glucose → **lactic acid**
- yeast: glucose → **alcohol** + **carbon dioxide**

(b)

- muscles need energy **very quickly**
- the heart and lungs cannot deliver oxygen **fast enough**
- so muscles respire **without oxygen**, releasing far less energy per glucose

(c)

- oxygen debt: extra oxygen taken in **after** exercise
- to **break down lactic acid**
- lactic acid is oxidised in the **liver**
- she keeps breathing hard until enough oxygen has been taken in

(d)

- it releases **far less energy** per glucose, so it cannot last
- lactic acid **lowers pH**, causes cramp, and would damage cells