Solutions

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

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

2.1

$9 - 7.5 - 1.4 = \mathbf{0.1}$ L

$7.5/9 \approx \mathbf{83}\%$

2.2

gastrin: G cells of the stomach; more acid

CCK: I cells of the duodenum; gallbladder squeezes and pancreas releases enzymes

secretin: S cells of the duodenum; pancreas releases bicarbonate

2.3

iron: **duodenum**

B12: **terminal ileum**

2.4

the SGLT1 carrier still takes in Na^+ together with glucose

water follows the absorbed salt and sugar by osmosis

3.1

(a) the toxin keeps cAMP high in gut cells, so CFTR stays open and Cl^-, then water, pour into the gut

(b) the toxin changes how cells work but does not damage them

(c) $0.10 \times 20 = \mathbf{2}$ L

(d) in severe dehydration or shock, or if the child is vomiting or too drowsy to drink

3.2

(a) B12 is absorbed only in the terminal ileum; the liver stores enough for several years

(b) bile salts are not taken back, so the pool shrinks; without enough bile salts, fat is not emulsified and absorbed

(c) bile acids reaching the colon make it secrete water

3.3

(a) **lactase**, on the brush border of the small intestine

(b) lactose stays in the gut and holds water there by osmosis

(c) colon bacteria ferment the lactose, making gas

(d) bacteria make hydrogen from the lactose, which is absorbed and breathed out, so breath hydrogen rises after a lactose drink

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(e) $290 - 2(30 + 30) = \mathbf{170}$, above 125: osmotic