Solutions

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

2.1

(a)

- cartilage holds the airway open / stops it collapsing

(b)

- goblet cells make mucus that traps dust and microbes

2.2

- any three: large surface area; thin (one-cell) walls / short diffusion distance; rich/good blood supply; moist surface

3.1 A

- Cartilage holds the trachea open

3.2 B

- Oxygen diffuses down its concentration gradient from high (air) to low (blood)

3.3

- goblet cells secrete mucus that traps dust and microbes; the cilia beat to sweep the mucus up towards the throat; it is swallowed, keeping the airways clear of pathogens

3.4

(a)

- 20 mm = 20 000 µm; magnification = $\dfrac{20\,000}{250} = \times 80$

(b)

- a thin wall gives a short diffusion distance, so gases cross faster

3.5

(a)

	cartilage	**smooth muscle**	**elastic fibres**
trachea	✓	✓	✓
bronchiole	×	✓	✓
alveolus	×	×	✓

- one mark per correct row

(b)

- it supports the trachea and keeps it open, so it does not collapse when air pressure inside falls during inspiration

(c)

- they stretch as the alveoli fill with air during inspiration
- they recoil during expiration, helping to push air out

(d)

- in the walls of the trachea and bronchi; they secrete mucus