

Answers to Workbook exercises

Chapter 7

Exercise 7.1 Diet

- a They all come from plants.
- b Scrambled egg contains a large quantity of fat, which contains more energy per gram than any other nutrient.
- c Spinach, because the total mass of the listed nutrients in 100 g of food is least, and therefore the remaining mass, which is mostly water, is greatest.
- d Egg and spinach, as these have the highest concentrations of iron. Iron is needed to make haemoglobin. Anaemia is caused by a lack of haemoglobin.

Exercise 7.2 Functions of the digestive system

- ◆ Pepsin ... in stomach
- ◆ Mastication ... in mouth
- ◆ Gastric juice ... in stomach
- ◆ Amylase ... in mouth and in duodenum
- ◆ Pancreatic juice ... in duodenum
- ◆ Lipase ... in duodenum
- ◆ Bile salts ... in duodenum
- ◆ Sodium hydrogencarbonate ... in duodenum
- ◆ Saliva ... in mouth.

Exercise 7.3 Tooth decay data analysis

- a The incidence of tooth decay increases as standard of living decreases. Where the standard of living was highest, five-year-olds had a mean tooth decay score of 1.0 (that is, on average each child had one

decayed tooth), but where standard of living was lowest they had a mean score of 4.0 (on average, each child had four decayed teeth).

- b Perhaps children who have a low standard of living do not have as much calcium in their diet. Perhaps they do not clean their teeth or use fluoride toothpaste. Perhaps they eat more sweets or drink more carbonated drinks.
- c This decreases the number of decayed teeth. We can see the difference between the results for town A and town B, where fluoride was added to the water. This roughly halved the number of decayed teeth in five-year-olds at any particular standard of living.
- d Perhaps there is more fluoride in the naturally fluoridated water than was added to the water in town B. Perhaps the fluoride in town B has only been added recently, so the children didn't have fluoride in the water when they were younger.

Exercise 7.4 Cholera patterns in Bangladesh

- a The incidence fluctuates greatly. There are peaks approximately every year, generally towards the end of the year. In some years, e.g. 1987 and 1988, there are several peaks and troughs in just one year.
- b There seems to be a correlation between peaks in sea surface temperature and especially high peaks in cholera incidence. For example, in 1983, sea surface temperature peaked at more than 40°C, and this coincided with a peak in cholera cases at just under 40%. This happened again in 1987–1988, when the surface sea water temperature was about 35°C, and cholera incidence rose to over 40%. (*Other points on the graphs could be chosen to illustrate this.*)

- c Cholera is caused by a bacterium. It leaves the body in faeces, and is transmitted to another person if they drink water or eat food that has been contaminated by these faeces.
- d Bacteria reproduce more rapidly in warm temperatures, so the populations of bacteria in contaminated food or water might be larger than when it is cooler. People drink more when it is warm, so may be more likely to drink contaminated water. They may swim more, to try to keep cool, increasing the likelihood of bacteria getting from an infected person into the water, or from the water into an uninfected person. (*There are other possible answers that you might think of.*)

Exercise 7.5 Vitamin D absorption

- a It rose very rapidly over the first 12 hours, from 0 to just over 140 arbitrary units. After peaking at 12 hours, it fell less rapidly, reaching 60 a.u. at 48 hours. It then continued to fall but now very slowly, reaching 56 a.u. at 72 hours.
- b Small intestine / ileum.
- c glucose, amino acids, fatty acids, glycerol, water, any other vitamin, any mineral (e.g. calcium)
- d It is long, so food is in contact with its walls for a long time. It is covered with villi, which increase its surface area. It is folded, which also increases surface area. The walls of the villi are thin, and there is a good blood supply, so it is easy for digested nutrients to diffuse through the walls and into the blood.
- e Its molecules are already small enough to be absorbed.
- f Vitamin D is made in the skin when sun shines onto it. If this had happened, we would not know how much of the vitamin D in the blood had come from this source, and how much from the vitamin D that was ingested.