# Answers to Workbook exercises Chapter 17

## Exercise 17.1 Gametes

a Black or blue labels: cell membrane, cytoplasm, nucleus.

b Red or other colour labels: look for about five labels altogether, each of which includes an explanation of the function of the feature. For example:
egg cell: haploid nucleus that will become a diploid nucleus when it fuses with the sperm nucleus
sperm cell: long tail to help it to swim to the egg.

## Exercise 17.2 Gas exchange in the placenta and lungs

a The lungs are made up of millions of tiny alveoli. Although each of these is very small, there are so many of them that their total surface area is huge.

b i From the air spaces inside the alveoli, to the interior of the red blood cells in the capillaries.

ii There is a lower concentration of oxygen in the red blood cells than in the alveoli, because the blood has travelled past respiring cells that have taken oxygen from it and made it deoxygenated. There is a high concentration of air in the alveoli because fresh air is drawn in by breathing movements. Oxygen therefore moves by diffusion, down its diffusion gradient.

c The lungs have a surface area that is more than three times greater than the placenta, so more oxygen can diffuse across at any one moment in time.

The lungs have a thinner barrier than the placenta, so the diffusion distance is much smaller, and diffusion takes less time.

The rate of blood flow in the lungs is 10 times that in the placenta, so the oxygen is quickly taken away, maintaining a steeper diffusion gradient down which oxygen will diffuse more rapidly.

d i Active transport moves substances up their concentration gradient, whereas in diffusion substances move down their concentration gradient. Active transport requires input of energy from the cell, whereas diffusion does not require the cell to use energy.

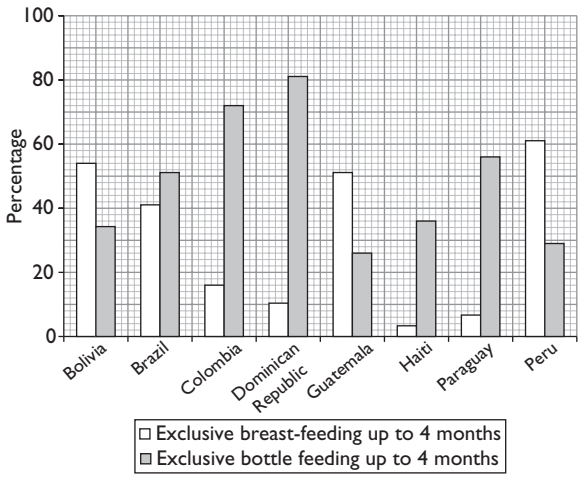
ii The energy required for active transport is released from glucose molecules by respiration. Aerobic respiration requires oxygen.

## Exercise 17.3 Breast-feeding statistics

a Look for:

- country on the *x*-axis and percentage on the *y*-axis
- suitable scale on the *y*-axis, with even intervals ranging from 0 to at least 72 (probably 75)
- bars drawn correctly and neatly
- bars not touching
- key to identify the bars for exclusive breast-feeding and exclusive bottle feeding.

The bar chart could look like this:



**b** This means that the baby was being only breast-fed – it was not bottle fed at all.

**c** Some babies were partly breast-fed and partly bottle fed.

**d** Peru

**e** Breast-feeding has many advantages, including the following:

- it provides the right nutrients for a growing baby
- it contains antibodies that help the baby to fight infectious diseases
- it is unlikely to contain infectious microorganisms, which may contaminate bottle milk
- it is free
- it helps the mother and baby to form an emotional bond.

## Exercise 17.4 Birth control data

**a** There are various ways in which these data could usefully be displayed, for example a bar chart or a pie chart. Some students may think of more original methods. Give credit for anything that is easy to understand and correct. Note that a line graph is not correct, because the different methods are discrete, and not a continuous variable.

**b** Of women who used a diaphragm, 40% became pregnant, compared with only 14% of women whose partner used a condom. Perhaps the diaphragm was not correctly fitted, so that sperm could get around the edge of it and swim to the oviducts. Perhaps the women did not remember to put the diaphragm into place before having sex. Perhaps they took the diaphragm out too early, while there were still sperm in the vagina.

**c** The pill prevents eggs being released from the ovaries. If taken regularly, this works very well, so there are no eggs present to be fertilised.

**d** Of women who used the diaphragm, 42% continued for more than one year, compared with 86% of women who used the pill. This could be because women did not like using the diaphragm, which requires them to remember to insert it before having sex, whereas taking a pill is much easier – you simply take it once a day. It could be because they became pregnant when using the diaphragm, so stopped using it. Students may think of other reasons.