CHAPTER 1

1) Should include clinical genetics, cancer, and regenerative medicine.
2) Preformation: idea that the embryo was already pre-formed (in the sperm - homunculus). Epigenesis: idea that structures develop progressively–development is like origami in that it consists of a series of instructions of how to make the embryo rather than there being a descriptive blueprint. Epigenesis better describes our current view of development.
3) Need to describe Weismann's concept and the results of Roux's experiments. The hypothesis would be that determinants are unequally distributed to the two cells formed by the first cleavage in the frog egg and that these determinants control the development of each half of the embryo.
4) Laying down the body plan, development of the limb, and arrangement of neurons in the nervous system. You should be able to give more details as you progress through the book. Could also include the French flag model.
5) These are the fundamental cell activities employed during development.
   Intercellular signaling is cell-cell signaling as in induction (be sure to distinguish from intracellular signaling – see glossary).
   Cell proliferation: see glossary; important activity in growth.
   Cell movement: see cell migration and cell motility in glossary; important activities in morphogenesis.
   Changes in cell shape – also important in morphogenesis; may lead to cells becoming motile as in gastrulation or to the generation of physical forces that cause folding of cell sheets.
   Changes in gene expression: see glossary; important for cells becoming different culminating in fully differentiated cells.
   Cell death: see apoptosis in glossary; important in morphogenesis.
6) The proteins encoded by housekeeping genes are required by all cells to keep them alive and functioning whereas proteins encoded by tissue specific genes are those which make cells different. You should give examples of each type of protein. Development is largely concerned with tissue-specific proteins. You should mention some examples.
7) The control of gene expression is central to development as the genes that a cell expresses determine the proteins that it makes. Differentiated cells express different subsets of genes and therefore make different proteins that enable them to carry out their specialized functions.
8) For definitions of a transcription factor and a DNA control region, see the glossary. You might also want to mention other gene regulatory proteins that act as cofactors by acting in a complex with DNA-binding transcription factors: see co-activator and co-repressor in the glossary. You should mention some examples.
9) Cell fate and cell determination: see definitions of fate and determination in the glossary. Transplantation of cells in isolation in culture or to different parts of the embryo tests whether cells are specified or determined respectively.
10) Via secreted molecules – usually proteins that bind to receptors on responding cells, via direct cell-cell contact, via passage of small molecules through gap junctions – see Figure 1.25. For morphogen: see definition in glossary.
11) For definitions of positional information and pattern formation see the glossary. According to the concept of positional information, pattern formation is a two-step process. You need to outline these two steps. You may find it helpful to use the analogy with the formation of the pattern of the French flag.