CHAPTER 9

1) See also definitions in the glossary. Need to include function of germ cells in giving rise to the next generation.
2) Include experiments testing the effects of destroying activity of germ plasm by UV irradiation and also experiments transplanting germ plasm. No evidence for germ plasm in mouse and other mammals or in chick.
3) Remember that *Oskar* is one of the maternal genes involved in pole-plasm formation in *Drosophila*.
4) What type of molecules are SDF1 and CXCR4? Include migration of primordial germ cells, involvement of SDF1/CXCR4 in guiding migration. Review evidence for this function in both mouse and zebrafish.
5) See glossary for definition of meiosis. Refer to Fig.9.8 showing the process of meiosis and Fig.9.9 showing oogenesis and spermatogenesis in mammals. (1) Generation of haploid gametes (2) Source of genetic diversity (3) Polar bodies- see also Box 10A.
6) See Fig. 9.9 for formation of primary oocytes in mammals, maturation and point in meiosis when fertilization occurs. Also include discussion about this how process limits the numbers of eggs that a woman can produce. What are the implications for women?
7) See also definition in glossary. Include genetic experiments in mice that provided evidence for imprinting – androgenetic and gynogenetic embryos, examples of imprinted genes, human developmental disorders associated with imprinted genes, DNA methylation and activity of non-coding RNAs in maintaining imprinting.
8) See Fig. 9.15 for summary of the process. Include Izumo, Juno and acrosome enzymes mentioned in the question.
9) Calcium released from stores within the egg – see also oscillations in calcium concentrations following fertilization in mammalian eggs. To identify two consequences, review the events in egg activation.
10) Maturation promoting factor. See Fig. 9.19 for its activity in early *Xenopus* development.
11) For answers to parts (1) and (3) consider Klinefleter and Turner syndromes. For answers to (2) and (4) consider evidence from genetic mosaics. (5) Explain how rare cases in which XY individuals are female and XX individuals who are phenotypically male helped to identify the *SRY* gene. Could also mention key experiment in transgenic mice that showed that the presence of *SRY* is sufficient to specify maleness.
12) The main points to include in your answer are indicated in the question. See also Fig. 9.22 for involvement of Wnt and FGF signaling.
13) See definitions of Wolffian and Mullerian ducts in Glossary. For their contributions to the structures of the reproductive system see Fig.9.23. Include differences in development in male and female.
14) You will need to think about how best to do this. One approach would be to incorporate the information from Fig. 9.27 into a framework based on Fig. 9.26.
15) In *C.elegans,* sex is determined simply by the number of XX chromosomes. What are the two sexes and what is the number of X chromosomes in each sex? Consider both hermaphrodites (see also glossary) and males. Explain how this mechanism of sex determination differs from that in mammals and in *Drosophila*.
16) See summary diagram at end of chapter. Chromosomal complement in both cases is the primary determining factor but in *C.elegans* both sperm and eggs develop in the hermaphrodite. Could also include a comparison of dosage compensation mechanisms.
17) See also glossary for X-inactivation. Only one X chromosome is active in somatic cells of diploid individuals with the genotypes listed. Outline a current hypothesis about how this achieved. Need to consider what is known about how cells count and choose X chromosomes to inactivate.
18) Include X-inactivation center, the nature of the product of the *Xist* gene, how level of *Xist* expression changes during X-inactivation and function of the *Xist* transcripts. A clue about Tsix is that it is Xist backwards.