

## Sexual and Asexual Reproduction

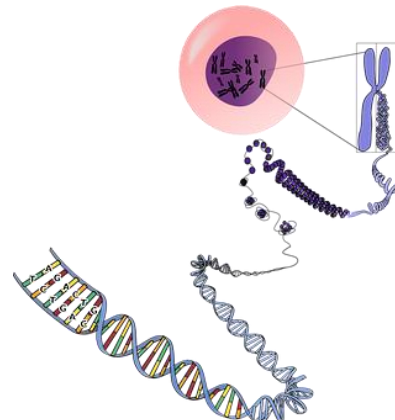
1. Organisms use either sexual or asexual reproduction to reproduce.
2. Sexual reproduction involves the joining (fusion) of male and female gametes:
  - sperm and egg cells in animals
  - pollen and egg cells in flowering plants.

## (HT Only) Sexual and Asexual Reproduction

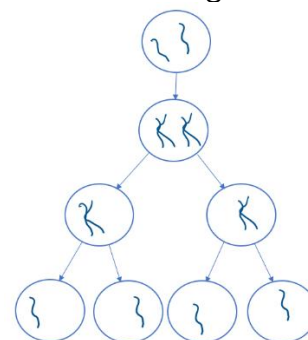
3. In sexual reproduction there is mixing of genetic information which leads to variety in the offspring.
4. Asexual reproduction involves only one parent and no fusion of gametes.
5. There is no mixing of genetic information. This leads to genetically identical offspring (clones). Only mitosis is involved.
6. Advantages of sexual reproduction: It produces variation in the offspring, if the environment changes variation gives a survival advantage by natural selection,
7. Advantages of asexual reproduction: only one parent needed, more time and energy efficient as do not need to find a mate, faster than sexual reproduction, and many identical offspring can be produced when conditions are favourable.
8. Some organisms reproduce by both methods depending on the circumstances.
9. Malarial parasites reproduce asexually in the human host, but sexually in the mosquito.
10. Many fungi reproduce asexually by spores but also reproduce sexually to give variation.
11. Many plants produce seeds sexually, but also reproduce asexually by runners such as strawberry plants, or bulb division such as daffodils.

## Mitosis and Meiosis

12. Characteristics are controlled by genes, which are stored in the nucleus as DNA.



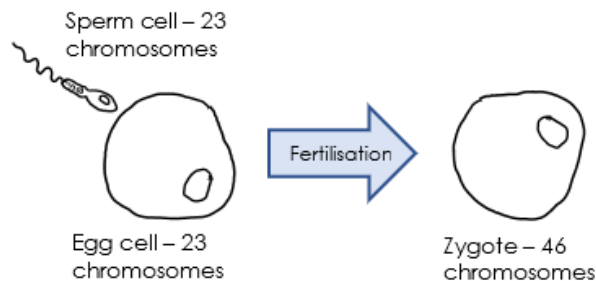
13. Mitosis leads to identical cells being formed
14. During mitosis DNA (arranged into chromosomes) is pulled to separate ends of the cell ready for division
15. The final part of the cell cycle is when the cell membrane splits to produce two identical cells
16. Mitosis is used by multicellular organisms to grow and repair
17. Mitosis is used by organisms that asexually reproduce
18. The genetic material in the nucleus of a cell is composed of a chemical called DNA.
19. Cells in reproductive organs divide by meiosis to form gametes.



20. Meiosis halves the number of chromosomes in gametes
21. When a cell divides to form gametes: copies of the genetic information are made and the cell then divides twice to form four gametes, each with a single set of chromosomes.



22. All gametes are genetically different from each other
23. Gametes join at fertilisation to form a zygote with the normal number of chromosomes.



24. After fertilisation, the new cell divides by mitosis and the number of cells increases.
25. As the embryo develops, cells differentiate.

## Sex Determination

26. 23 pairs of chromosomes. 22 pairs control characteristics only, but one of the pairs carries the genes that determine sex.
27. In females the sex chromosomes are the same (XX).
28. In males the chromosomes are different (XY).

Birth sex:	Male	Female
Chromosomes:	XY	XX
Gametes:	(X) (Y)	(X) (X)
Cross:		
XY = Male		
XX = Female		
	X	Y
	X	XY
	X	XY
		Probability: 1 in 2 or 50%

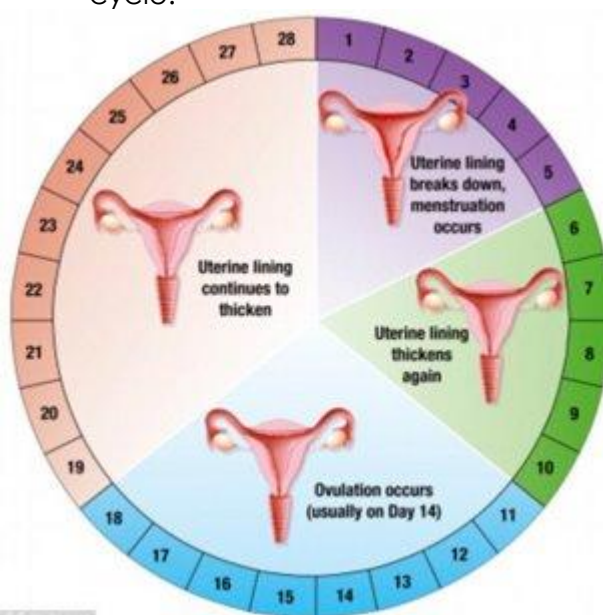
29. A Punnett square can be used to demonstrate that there is a 1:1 ratio of offspring being male or female. The probability of this remains the same, regardless of the number of previous children of a particular sex a couple has had.

## Hormones in Human Reproduction, Puberty and the Reproductive Systems

30. Ordinary human body cells contain
31. "Hormones have a number of roles in human reproduction, including the menstrual cycle.
32. During puberty reproductive hormones cause secondary sex characteristics to develop.
33. Testosterone is the main male reproductive hormone produced by the testes and it stimulates sperm production.

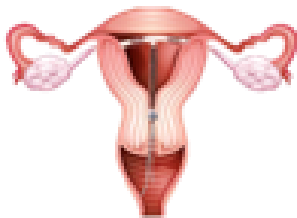
## (HT Only) Hormonal Control of the Menstrual Cycle

34. Several hormones are involved in the menstrual cycle of a woman.
35. Follicle stimulating hormone (FSH) causes maturation of an egg in the ovary.
36. Luteinising hormone (LH) stimulates the release of the egg.
37. Oestrogen and progesterone are involved in maintaining the uterus lining.
38. FSH, oestrogen, LH and progesterone interact in the control of the menstrual cycle.



### Contraception

39. Fertility can be controlled by a variety of hormonal and non-hormonal methods of contraception.
40. Oral contraceptives contain hormones to inhibit FSH production so that no eggs mature.
41. Injection, implant or skin patch of slow release progesterone inhibit the maturation and release of eggs for a number of months or years.
42. Barrier methods such as condoms and diaphragms prevent the sperm reaching an egg.
43. Intrauterine devices prevent the implantation of an embryo or release a hormone.



44. Spermicidal agents kill or disable sperm.
45. Abstaining from intercourse may prevent pregnancy when an egg may be in the oviduct.
46. Surgical methods of male and female sterilisation are also available.

### (HT Only) Fertility Treatment

47. Hormones are used in modern reproductive technologies to treat infertility.
48. This includes giving FSH and LH in a 'fertility drug' to a woman. She may then become pregnant in the normal way.
49. In Vitro Fertilisation (IVF) treatment involves:
  - giving a mother FSH and LH to stimulate the maturation of several eggs.
  - The eggs are collected from the mother and fertilised by sperm from the father in the laboratory.

- The fertilised eggs develop into embryos.
  - At the stage when they are tiny balls of cells, one or two embryos are inserted into the mother's uterus (womb).
50. Developments of microscopy techniques have enabled IVF treatments to develop.



### (HT Only) Evaluating the Use of IVF

51. Although fertility treatment gives a woman the chance to have a baby of her own, it is very emotionally and physically stressful, the success rates are not high, and it can lead to multiple births which are a risk to both the babies and the mother.

