

How do Organisms Reproduce?

Class 10 - CBSE Science | Chapter 7 | Worksheet & Test Paper

15 MCQs | 8 board questions | 7 practice problems

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SECTION A - Multiple Choice Questions (1 mark each)

1. Which of the following organisms reproduces by MULTIPLE fission?

- (a) Amoeba
- (b) Plasmodium
- (c) Leishmania
- (d) Spirogyra

2. Leishmania differs from Amoeba in that its binary fission:

- (a) produces four daughter cells at a time instead of just two
- (b) happens without the DNA being copied beforehand at all
- (c) occurs in a definite plane set by its whip-like structure
- (d) can take place only while inside the human liver

3. Regeneration in Planaria is NOT considered the same as reproduction because:

- (a) the pieces produced turn out to be genetically different from the parent
- (b) no DNA copying takes place at any stage during regeneration
- (c) regeneration takes very much longer than ordinary reproduction
- (d) an organism does not normally depend on being cut up to multiply

4. In Rhizopus, the structure that contains the spores is the:

- (a) Sporangium
- (b) Hypha
- (c) Bud
- (d) Rhizoid

5. Buds developing in the notches along the leaf margin are characteristic of:

- (a) Hydra
- (b) Yeast
- (c) Bryophyllum
- (d) Rhizopus

6. Which of these is NOT an advantage of vegetative propagation?

- (a) Plants that cannot produce viable seeds can still be grown
- (b) The new plants flower and bear fruit earlier
- (c) It produces greater variation among the offspring
- (d) All the plants produced are genetically identical to the parent

7. The male reproductive part of a flower is the stamen, which consists of:

- (a) Stigma and style
- (b) Anther and filament
- (c) Ovary and ovule
- (d) Sepal and petal

8. Pollen grains land on the stigma but the ovules are in the ovary. How does the male germ cell reach the egg?

- (a) The stigma absorbs the pollen and passes it downwards in the sap
- (b) The ovule grows upwards through the style to meet the pollen grain
- (c) Insects carry the pollen grain right down into the ovary itself
- (d) The pollen grain grows a tube down the style to the ovule

9. After fertilisation in a flowering plant, the ovary develops into the:

- (a) Fruit
- (b) Seed
- (c) Embryo
- (d) Endosperm

10. The testes are located in the scrotum, outside the abdominal cavity, because:

- (a) there is simply not enough space for them inside the abdomen
- (b) sperm formation needs a temperature below body temperature
- (c) it lets testosterone reach the bloodstream a good deal faster
- (d) the sperms need direct contact with the air in order to mature

11. The secretions of the seminal vesicles and the prostate gland serve to:

- (a) produce the sperms themselves inside the gland
- (b) determine whether the child will be a boy or a girl
- (c) nourish the sperms and make their transport easier
- (d) block the entry of the egg into the uterus wall

12. In human beings, fertilisation normally takes place in the:

- (a) Uterus (womb)
- (b) Ovary
- (c) Cervix
- (d) Fallopian tube

13. The villi of the placenta are important because they:

- (a) anchor the embryo firmly so that it cannot move about
- (b) provide a large surface area for exchanging materials
- (c) produce the hormones oestrogen and progesterone for the mother
- (d) supply the embryo directly with the mother's own blood cells

14. Menstruation occurs when:

- (a) the egg released from the ovary is not fertilised
- (b) the zygote implants itself in the uterus lining
- (c) the placenta begins to form around the embryo
- (d) the ovary stops producing oestrogen at puberty

15. Which contraceptive method works by blocking the vas deferens?

- (a) Tubectomy
- (b) Copper-T
- (c) Vasectomy
- (d) Oral contraceptive pills

SECTION B - Board-style Questions

1. (a) What is meant by DNA copying? (b) Why is variation beneficial to a species but not necessarily to the individual? [3 marks]

2. Describe, with one named example each, any four modes of asexual reproduction. [5 marks]

3. Draw a labelled diagram of a longitudinal section of a flower and name the male and female reproductive parts along with their components. [5 marks]

4. Distinguish between pollination and fertilisation. Describe what happens in a flower after the pollen grain lands on the stigma. [5 marks]

5. Draw a labelled diagram of the human male reproductive system and state the functions of the testes. Why are the testes located outside the abdominal cavity? [5 marks]

6. Draw a labelled diagram of the human female reproductive system. Where does fertilisation take place, and what is the role of the placenta? [5 marks]

7. What is contraception? Explain any three contraceptive methods, one from each of three different categories. [5 marks]

8. (a) List two sexually transmitted diseases caused by bacteria and two caused by viruses. (b) Why is prenatal sex determination prohibited by law in India? [3 marks]

SECTION C - Practice Problems

1. A gardener wants to grow a large number of rose plants that all bear exactly the same colour of flower as a prized parent plant, and he wants them to flower as early as possible. Which method of reproduction should he choose, and give two reasons why sexual reproduction would fail to meet his requirement.

Hint: What kind of offspring does each mode of reproduction produce?

2. In an experiment, all the anthers are carefully removed from a bisexual flower before its buds open, and the flower is then covered with a paper bag. No fruit develops. Explain what has been prevented and what would need to be done for a fruit to form.

Hint: Trace the sequence: pollination -> fertilisation -> fruit.

3. Amoeba and Plasmodium are both single-celled and both reproduce by fission, yet the outcome is different. Compare the two, and explain why the plane of division matters in Leishmania but not in Amoeba.

Hint: Count the daughter cells in each case; then think about body shape.

4. A woman has had her fallopian tubes blocked surgically. Explain why she cannot become pregnant, and name the equivalent procedure in males, stating exactly what is blocked in each case.

Hint: Where in the female body does fertilisation actually occur?

5. The villi of the placenta, the villi of the small intestine and the alveoli of the lungs all follow the same design principle. State the principle and explain how it applies in the placenta.

Hint: What do all three structures have to do, and what limits how fast it can happen?

6. Explain why a condom is recommended even to couples who are already using oral contraceptive pills.

Hint: Pregnancy is not the only thing being prevented.

7. Bryophyllum can be grown from a leaf, but a mango tree is grown from a seed. Identify the type of reproduction in each case, and state one advantage and one disadvantage of the Bryophyllum method.

Hint: How many parents are involved in each, and what does that mean for the offspring?

ANSWER KEY

How do Organisms Reproduce? - Class 10 CBSE Science

Section A - MCQ answers

1. (b) Plasmodium

In multiple fission the parent cell divides into many daughter cells at once - Plasmodium, the malarial parasite, does this. Amoeba and Leishmania show binary fission (splitting into two), and Spirogyra reproduces by fragmentation.

2. (c) occurs in a definite plane set by its whip-like structure

Amoeba has no fixed shape, so it can split along any plane. Leishmania has a whip-like structure at one end, and division always occurs in a definite plane with respect to it. Both still produce two daughter cells and both must copy their DNA first.

3. (d) an organism does not normally depend on being cut up to multiply

Regeneration is carried out by specialised cells and can produce a whole organism from a piece, but it is not a normal means of multiplying - a Planaria does not routinely fragment itself to reproduce. DNA copying does occur, and the pieces are genetically identical.

4. (a) Sporangium

The knob-like heads on the thread-like hyphae of bread mould are sporangia, and the spores develop inside them. Each spore has a thick wall that protects it until it reaches a moist surface.

5. (c) Bryophyllum

Bryophyllum reproduces vegetatively from buds that grow in the notches of its leaf margin; each bud can grow into a new plant. Hydra and yeast reproduce by budding, but those are buds on the parent body, not on a leaf.

6. (c) It produces greater variation among the offspring

Vegetative propagation produces clones, so it gives LESS variation, not more - that is precisely its limitation. Greater variation comes from sexual reproduction. The other three are its standard advantages.

7. (b) Anther and filament

The stamen has an anther (which produces pollen grains containing the male germ cells) on a stalk called the filament. Stigma, style and ovary are the three regions of the pistil, the female part.

8. (d) The pollen grain grows a tube down the style to the ovule

After landing on the stigma, the pollen grain grows a pollen tube that travels down through the style and reaches an ovule in the ovary. The male germ cell moves down this tube and fuses with the egg to form the zygote.

9. (a) Fruit

Learn the set together: the zygote becomes the embryo, the OVULE becomes the SEED, and the OVARY becomes the FRUIT. Mixing up ovule and ovary is the commonest error in this question.

10. (b) sperm formation needs a temperature below body temperature

The scrotum keeps the testes at a temperature lower than the rest of the body, which is necessary for sperm formation. Testosterone is released into the blood from the testes wherever they lie, and sperms never contact air.

11. (c) nourish the sperms and make their transport easier

The sperms are made in the testes. As they pass along the vas deferens, the seminal vesicles and prostate add fluid that nourishes them and makes them easier to transport.

12. (d) Fallopian tube

The egg released by the ovary passes into the fallopian tube (oviduct), and it is here that a sperm fuses with it. The zygote then travels to the uterus, where it implants - but implantation and fertilisation are different events.

13. (b) provide a large surface area for exchanging materials

The villi on the embryo's side of the placenta greatly increase the surface area, so glucose and oxygen pass efficiently from the mother to the embryo and wastes pass back. This is the same surface-area principle as villi in the small intestine and alveoli in the lungs.

14. (a) the egg released from the ovary is not fertilised

The uterus lining thickens each month to receive a fertilised egg. If fertilisation does not happen, the lining is not needed, so it breaks down and is shed as blood and mucus over about 2-8 days.

15. (c) Vasectomy

Vasectomy is the surgical method in MALES, in which the vas deferens is blocked so sperms cannot pass. Tubectomy is the corresponding female method, blocking the fallopian tube. The copper-T is an IUCD and pills are hormonal.

Section B - Model answers

1. (a) What is meant by DNA copying? (b) Why is variation beneficial to a species but not necessarily to the individual?

(a) DNA copying means that before a cell reproduces, it makes a copy of the DNA in its chromosomes, so that the offspring receives the information needed to build and maintain the body. (b) Variation arises because DNA copying is never perfectly accurate. It is not necessarily useful to the individual - a particular variation may be harmless or even harmful to the organism that carries it. But for the SPECIES it is essential: if the environment changes drastically (for example a sharp rise in temperature or a new disease), a population of identical individuals could be wiped out entirely, whereas in a varied population some individuals may possess a variation that lets them survive and continue the species. Variation is therefore the basis of evolution.

2. Describe, with one named example each, any four modes of asexual reproduction.

(1) BINARY FISSION - the parent cell splits into two daughter cells, as in AMOEBA (which splits in any plane) or LEISHMANIA (which splits in a definite plane). (2) FRAGMENTATION - the body breaks into pieces and each piece grows into a new individual, as in SPIROGYRA. (3) BUDDING - a bud grows as an outgrowth on the parent, then detaches and lives independently, as in HYDRA or YEAST. (4) SPORE FORMATION - the organism forms sporangia containing thick-walled spores which germinate on a moist surface, as in RHIZOPUS (bread mould). (Vegetative propagation, in which new plants grow from the roots, stems or leaves of the parent - as in BRYOPHYLLUM - and multiple fission, as in PLASMODIUM, are also acceptable.)

3. Draw a labelled diagram of a longitudinal section of a flower and name the male and female reproductive parts along with their components.

The diagram should label: SEPAL, PETAL, STAMEN (with ANTHER and FILAMENT), and PISTIL (with STIGMA, STYLE, OVARY and OVULE). The MALE reproductive part is the STAMEN, made up of the ANTHER, which produces the pollen grains containing the male germ cells, and the FILAMENT, the stalk that supports it. The FEMALE reproductive part is the PISTIL (carpel), which has three regions: the STIGMA at the top, which receives the pollen; the STYLE, the tube in the middle; and the OVARY at the base, which contains the OVULES, each holding the female germ cell (egg).

4. Distinguish between pollination and fertilisation. Describe what happens in a flower after the pollen grain lands on the stigma.

POLLINATION is the TRANSFER of pollen grains from the anther to the stigma; it may be self-pollination (same flower or the same plant) or cross-pollination (a different plant of the same kind, carried by wind, water, insects or birds). FERTILISATION is the FUSION of the male germ cell with the female germ cell to form a zygote. So pollination is only the transfer, while fertilisation is the fusion, and pollination must occur before fertilisation can. AFTER POLLINATION: the pollen grain on the stigma grows a POLLEN TUBE, which travels down through the style and reaches an ovule inside the ovary. The male germ cell moves down this tube and fuses with the egg inside the ovule - this is fertilisation - producing a ZYGOTE. The zygote then develops into the embryo, the ovule becomes the seed, and the ovary develops into the fruit, while the petals, sepals, stamens and style usually dry up and fall off.

5. Draw a labelled diagram of the human male reproductive system and state the functions of the testes. Why are the testes located outside the abdominal cavity?

The diagram should label: TESTIS, SCROTUM, VAS DEFERENS, SEMINAL VESICLE, PROSTATE GLAND, URETHRA and PENIS. FUNCTIONS OF THE TESTES: they produce the SPERMS (the male germ cells) and they secrete the male hormone TESTOSTERONE, which controls the changes at puberty and regulates sperm production. The testes lie in the SCROTUM, a pouch outside the abdominal cavity, because the formation of sperms requires a temperature LOWER than the normal temperature of the body; the scrotum provides this cooler environment.

6. Draw a labelled diagram of the human female reproductive system. Where does fertilisation take place, and what is the role of the placenta?

The diagram should label: OVARY, FALLOPIAN TUBE (oviduct), UTERUS, CERVIX and VAGINA. FERTILISATION takes place in the FALLOPIAN TUBE (oviduct) - the egg released by the ovary enters the oviduct and a sperm fuses with it there. The fertilised egg (zygote) then travels to the uterus and embeds itself in its lining (implantation). ROLE OF THE PLACENTA: it is a disc-like special tissue embedded in the uterine wall that connects the developing embryo to the mother. It bears VILLI on the embryo's side, which provide a LARGE SURFACE AREA for exchange; through it GLUCOSE and OXYGEN pass from the mother's blood to the embryo, and the waste products generated by the embryo are transferred into the mother's blood for removal.

7. What is contraception? Explain any three contraceptive methods, one from each of three different categories.

CONTRACEPTION is the deliberate use of methods to prevent pregnancy, so that a couple can decide whether and when to have children. (1) BARRIER METHOD - a CONDOM is used to cover the penis (or the vagina); it physically prevents the sperms from reaching the egg. It has the added advantage of also preventing sexually transmitted diseases. (2) HORMONAL METHOD - ORAL CONTRACEPTIVE PILLS are taken by the woman; they change the hormonal balance of the body so that eggs are not released, and therefore fertilisation cannot occur. They may, however, have side effects. (3) SURGICAL METHOD - in males, VASECTOMY blocks the

vas deferens so that sperms cannot be transferred; in females, TUBECTOMY blocks the fallopian tube so that the egg cannot reach the site of fertilisation. (An IUCD such as the copper-T, placed in the uterus, is also acceptable as a fourth category.)

8. (a) List two sexually transmitted diseases caused by bacteria and two caused by viruses. (b) Why is prenatal sex determination prohibited by law in India?

(a) BACTERIAL sexually transmitted diseases: GONORRHOEA and SYPHILIS. VIRAL sexually transmitted diseases: WARTS and HIV-AIDS. The use of a condom during sexual intercourse prevents the transmission of these infections to a large extent. (b) Determining the sex of an unborn child before birth is prohibited by law in India because the technique was widely MISUSED for sex-selective abortion - female foeticide. This has seriously disturbed the SEX RATIO, that is, the number of girls per 1000 boys in the population, and the law exists to prevent this social harm.

Section C - Solutions

1. A gardener wants to grow a large number of rose plants that all bear exactly the same colour of flower as a prized parent plant, and he wants them to flower as early as possible. Which method of reproduction should he choose, and give two reasons why sexual reproduction would fail to meet his requirement.

He should use VEGETATIVE PROPAGATION (for example by stem cuttings, layering or grafting). REASON 1: vegetative propagation produces CLONES - plants genetically identical to the parent - so every plant will bear exactly the same flower colour. Sexual reproduction combines DNA from two parents, so the offspring would show VARIATION and the flower colour could differ from the parent's. REASON 2: plants raised by vegetative propagation reach FLOWERING and FRUITING EARLIER than plants grown from seed, so he gets flowers sooner.

2. In an experiment, all the anthers are carefully removed from a bisexual flower before its buds open, and the flower is then covered with a paper bag. No fruit develops. Explain what has been prevented and what would need to be done for a fruit to form.

Removing the anthers removes the source of POLLEN, and bagging the flower prevents pollen from any other plant reaching its stigma. So POLLINATION cannot occur. Without pollination, no pollen grain lands on the stigma, no pollen tube grows down the style, and therefore FERTILISATION - the fusion of the male germ cell with the egg in the ovule - cannot take place. Since the ovary develops into the fruit only after fertilisation, no fruit forms. To obtain a fruit, pollen from another flower of the same kind would have to be dusted onto the stigma (artificial cross-pollination) before re-bagging the flower.

3. Amoeba and Plasmodium are both single-celled and both reproduce by fission, yet the outcome is different. Compare the two, and explain why the plane of division matters in Leishmania but not in Amoeba.

AMOEBA shows BINARY fission - the parent divides into TWO daughter cells. PLASMODIUM shows MULTIPLE fission - the parent divides into MANY daughter cells at one time, which is how the malarial parasite multiplies so rapidly. As for the plane of division: AMOEBA has no definite shape, so whichever plane it splits along, each daughter is a viable Amoeba - the plane is irrelevant. LEISHMANIA, however, has a definite body shape with a whip-like structure at one end; the daughter cells must each receive the correct structures, so division always occurs in a DEFINITE plane with respect to that whip-like structure.

4. A woman has had her fallopian tubes blocked surgically. Explain why she cannot become pregnant, and name the equivalent procedure in males, stating exactly what is blocked in each case.

Fertilisation in humans takes place in the FALLOPIAN TUBE (oviduct). If the tubes are blocked, the egg released from the ovary cannot travel down to meet the sperms, and the sperms cannot reach the egg, so fusion of the germ cells - fertilisation - cannot occur and no zygote is formed. This surgical method is called TUBECTOMY. The equivalent procedure in males is VASECTOMY, in which the VAS DEFERENS is blocked so that sperms cannot pass from the testes into the urethra. Note the difference: tubectomy blocks the FALLOPIAN TUBE in the female; vasectomy blocks the VAS DEFERENS in the male.

5. The villi of the placenta, the villi of the small intestine and the alveoli of the lungs all follow the same design principle. State the principle and explain how it applies in the placenta.

The principle is that a surface across which materials must be EXCHANGED should have the LARGEST POSSIBLE SURFACE AREA and the SHORTEST possible diffusion distance, with a good blood supply to maintain the concentration gradient. In the PLACENTA, the embryo's side bears numerous finger-like VILLI that project into the mother's uterine tissue. These give a large surface area, so GLUCOSE and OXYGEN can pass efficiently from the mother's blood into the embryo's blood, while the embryo's WASTE products pass in the opposite direction into the mother's blood to be removed by her body. Without this large surface, the embryo could not be supplied fast enough to grow over the nine months of development.

6. Explain why a condom is recommended even to couples who are already using oral contraceptive pills.

Oral contraceptive pills prevent PREGNANCY only - they act by changing the hormonal balance so that eggs are not released. They give NO protection against infection. A CONDOM is a barrier method, and because it physically prevents contact and the transfer of body fluids, it prevents the transmission of SEXUALLY

TRANSMITTED DISEASES as well - bacterial ones such as gonorrhoea and syphilis, and viral ones such as warts and HIV-AIDS. So using a condom protects reproductive health in a way that pills cannot, in addition to acting as a second safeguard against pregnancy.

7. Bryophyllum can be grown from a leaf, but a mango tree is grown from a seed. Identify the type of reproduction in each case, and state one advantage and one disadvantage of the Bryophyllum method.

The Bryophyllum leaf shows ASEXUAL reproduction - specifically VEGETATIVE PROPAGATION, since buds in the notches of the leaf margin grow into new plants from a single parent. The mango grown from a seed shows SEXUAL reproduction, because the seed formed from an ovule after fertilisation, which combined DNA from two parents. ADVANTAGE of the Bryophyllum method: the new plants are genetically identical CLONES of the parent, so a desirable variety is preserved exactly, and they flower and fruit earlier than seed-grown plants.

DISADVANTAGE: because all the offspring are identical, there is NO VARIATION, so if a disease or a change in the environment affects one plant, the whole population is equally vulnerable and could be wiped out.

