



Answers

Reproduction

Year 8 Science

Chapter 4

p89

- 1 Asexual reproduction is a method of reproduction by which a single parent produces offspring. The offspring is a clone of the parent (The offspring have exactly the same genes as the single parent).
- 2 Clones have exactly the same genes.
- 3 Briefly describe each of the following methods of asexual reproduction:
 - a) **Vegetative reproduction** can happen when plants form bulbs or tubers and these bulbs/tubers grow into new plants (tulips, potatoes). Plants can also form rhizomes which then grow into new individuals (strawberries).
 - b) **Fragmentation reproduction** can happen where a fragment of the parent can grow into a new organism. A fragment of many plants can grow into a new plant - this is called budding. Fragments of some worms, and sea stars can grow into new individuals.
 - c) **Parthogenesis** can happen when an unfertilised egg develops into a new individual. Parthenogenesis happens in many plants, and some animals (water fleas, some ants, bees, some wasps, aphids, stick insects, some reptiles, some amphibians, some sharks).
 - d) **Budding** happens when the new individual grows on the body of the parent (jellyfishes, echinoderms, corals). With corals, the new individuals stay attached to the parent and form colonies of corals.
- 4 Advantages of asexual reproduction:
 - Numerous offspring can be produced quickly and with little energy by a single parent to take advantage of ideal conditions.
 - Asexual reproduction also means that every member of the population is able to produce offspring. In comparison to sexual reproduction, where only females are producing offspring.
 - Organisms are able to reproduce without a mate. A single asexual reproducing organism is able to colonise a habitat.
- 5 Disadvantages of asexual reproduction:
 - Population explosions can cause a struggle for existence.
 - All offspring have identical genes and thus no variation. A change in the environment may destroy the entire population.

p91

- 1 **Sexual reproduction** happens when a female sex cell called an ovum joins with a male sex cell called a sperm. This is called fertilisation. Sexual reproduction produces offspring that have a mix of genes from their two parents. The offspring are similar to their parents but are not identical to their parents.
- 2 The name of a female sex cell is the ovum.
- 3 The name of a male sex cell is the sperm.
- 4 The zygote is the fertilised egg.
- 5 Sexual reproduction in a flowering plant. The sperm from the pollen grains find their way to the ovum in the ovary of the flower. The fertilised egg, zygote, develops into a seed. The seed, with dispersal and the right growing conditions, grows into a new plant.
- 6 Sexual reproduction in humans happens when a female sex cell called an ovum joins with a male sex cell called a sperm. This is called fertilisation. Sexual reproduction produces offspring that have a mix of genes from their two parents. The offspring are similar to their parents but are not identical to their parents.

<p>p91</p>	<p>7 The number of chromosomes in an ovum and in a sperm are half the number of chromosomes in a normal body cell so that the union of the two sex cells produces an individual with the normal number of chromosomes (Not twice the number).</p> <p>8 Advantages of sexual reproduction: Because sexual reproduction is a mix of the genetic material of two parents, the offspring can show genetic variety. The genetic variety allows some individuals to better cope with unstable environments. This can help lower the chance of extinction.</p> <p>9 The disadvantage of sexual reproduction is a slower reproduction rate when compared to asexual reproduction. In a population of 50 females and 50 males, sexual reproduction means that only half the population is producing offspring. Asexual reproduction suggests that all of the population is producing offspring.</p>
<p>p92</p>	<p>1 Fertilisation in sexual reproduction happens when the the female sex cells (eggs or ova) are merges with the male sex cells (sperm).</p> <p>2 Fertilisation may happen either externally or internally. With many aquatic animals, the sperm swims through the water to fertilise the egg (or ovum). This is called external fertilisation because the fertilisation happens outside the body of the parents.</p> <p>3 On land, the sperm and eggs are kept moist through internal fertilisation. Usually, the sperm swims through the reproductive tract of the female to fertilise the egg. The fertilised egg then develops within a shell or develops internally.</p> <p>4 Indicate whether each of the following is likely to be external fertilisation or internal fertilisation:</p> <ol style="list-style-type: none"> Very large numbers of female sex eggs are produced - external fertilisation. Fewer ovum are produced - internal fertilisation. The sperm swims along an oviduct to reach the ova - internal fertilisation. When hatched, the young are generally left to fend for themselves - external fertilisation. The chances of fertilisation are higher - internal fertilisation.
<p>p93</p>	<p>1 Sexual reproduction in birds happens when the female bird (hen) receives male sex cells (sperm) from the male bird. The sperm travels through the oviduct to fertilise the female sex cells (ova). This is called fertilisation. After fertilisation, the egg albumen, shell membranes, and shell are formed. The hen lays the egg about 24 hours after ovulation. The hen lays one egg each 24 hours. The hen then stops laying eggs and begins to incubate the eggs by constantly sitting on them so that the temperature of her eggs are around her body temperature.</p> <p>2 The hen lays one egg every 24 hours rather than lay all eggs at once because each egg travels, one at a time, along the oviduct.</p> <p>3 Hens sit on their eggs for 21 days before they are hatched to incubate the eggs.</p>
<p>p94</p>	<p>1 Sexual reproduction in flowering plants happens when male sex cells in the pollen joins with the female sex cells (ovules) in the ovary. This is called fertilisation. Pollination is the transfer of pollen grains from the anther to the stigma. There are two types of pollination. Self-pollination happens when the pollen from the anther of the stamen fertilises the ovule of the ovary of the same flower. Cross pollination happens when the pollen grains from the anther of another flower fertilises the ovule of the ovary.</p> <p>2 Labelled sketch of a flower:</p>

<p>p94</p>	<p>3 Self-pollination happens when the pollen from the anther of the stamen fertilises the ovule of the ovary of the same flower.</p> <p>4 Cross pollination happens when the pollen grains from the anther of another flower fertilises the ovule of the ovary.</p> <p>5 The petals are often large, colourful, scented, and have nectar to attract insects, such as bees, to help with pollination.</p> <p>6 The stigma is sometimes sticky to help collect pollen from insects.</p> <p>7 Some flowers only have female sex parts (carpellate), some flowers only have male sex parts (staminate), some flowers have both female and male sex parts (hermaphrodite). The flower in the activity on the right has both female and male sex parts (hermaphrodite).</p>
<p>p95</p>	<p>1 Sexual reproduction in flowering plants happens when male sex cells in the pollen joins with the female sex cells (ovules) in the ovary.</p> <p>2 Sexual reproduction in mammals happens when the female mammal receives male sex cells (sperm) from the male mammal. The sperm travels through the oviduct to fertilise the female sex cell (egg or ovum) high in the fallopian tube.</p> <p>3 Most mammals are placental mammals. The placenta provides a way of providing nutrients to the developing embryo and removing wastes.</p> <p>4 The mammalian placenta allows the developing embryo to spend longer in the mother's womb. Placental young are then much more developed and ready to survive when they are born.</p>
<p>p96</p>	<p>1 A plant hybrid is a cross between two varieties of plant to produce a single offspring (hybrid) with desired characteristics.</p> <p>2 Hybrids are produced by artificial pollination.</p> <ul style="list-style-type: none"> • The anthers are removed from one flower to avoid self-pollination. • The pollen from another flower is transferred to the stigma of the flower. • The flower is covered to prevent unwanted pollination. • The seeds from the flower will grow into the hybrid. <p>3 A flower is covered after cross-pollination to avoid contamination by other pollens.</p> <p>4 Many people spend much time producing hybrids to produce an offspring with desired characteristics.</p> <p>5 A tall plant is cross-pollinated with a short plant. Will a medium sized hybrid be produced? Not necessarily. It depends on the genetics of the parent plants.</p>
<p>p97</p>	<p>1 Cloning is the creation of an individual that is an exact genetic copy of another individual.</p> <p>2 Asexual reproduction produces individuals that are exact genetic copies of each other.</p> <p>3 Somatic cell nuclear transfer: The nucleus of an ovum is removed and replaced by the nucleus of an animal cell to be cloned. The ovum is then placed in a surrogate mother.</p> <p>4 Write a couple of sentences indicating what you think of cloning extinct animals and bringing them back to life (Dinosaurs etc). For example opinions search 'cloning debate'.</p>

- 1 Asexual reproduction is a method of reproduction by which a single parent produces offspring. The offspring is a clone of the parent (The offspring have exactly the same genes as the single parent).
- 2 Clones have exactly the same genes.
- 3 Briefly describe each of the following methods of asexual reproduction:
 - a) **Vegetative reproduction** can happen when plants form bulbs or tubers and these bulbs/tubers grow into new plants (tulips, potatoes). Plants can also form rhizomes which then grow into new individuals (strawberries).
 - b) **Fragmentation reproduction** can happen where a fragment of the parent can grow into a new organism. A fragment of many plants can grow into a new plant - this is called budding. Fragments of some worms, and sea stars can grow into new individuals.
 - c) **Parthogenesis** can happen when an unfertilised egg develops into a new individual. Parthenogenesis happens in many plants, and some animals (water fleas, some ants, bees, some wasps, aphids, stick insects, some reptiles, some amphibians, some sharks).
 - d) **Budding** happens when the new individual grows on the body of the parent (jellyfishes, echinoderms, corals). With corals, the new individuals stay attached to the parent and form colonies of corals.
- 4 Advantages of asexual reproduction:
 - Numerous offspring can be produced quickly and with little energy by a single parent to take advantage of ideal conditions.
 - Asexual reproduction also means that every member of the population is able to produce offspring. In comparison to sexual reproduction, where only females are producing offspring.
 - Organisms are able to reproduce without a mate. A single asexual reproducing organism is able to colonise a habitat.
- 5 Disadvantages of asexual reproduction:
 - Population explosions can cause a struggle for existence.
 - All offspring have identical genes and thus no variation. A change in the environment may destroy the entire population.
- 6 Sexual reproduction happens when a female sex cell called an ovum joins with a male sex cell called a sperm. This is called fertilisation. Sexual reproduction produces offspring that have a mix of genes from their two parents. The offspring are similar to their parents but are not identical to their parents.
- 7 The name of a female sex cell is the ovum.
- 8 The name of a male sex cell is the sperm.
- 9 The zygote is the fertilised egg.
- 10 Sexual reproduction in a flowering plant. The sperm from the pollen grains find their way to the ovum in the ovary of the flower. The fertilised egg, zygote, develops into a seed. The seed, with dispersal and the right growing conditions, grows into a new plant.
- 11 Sexual reproduction in humans happens when a female sex cell called an ovum joins with a male sex cell called a sperm. This is called fertilisation. Sexual reproduction produces offspring that have a mix of genes from their two parents. The offspring are similar to their parents but are not identical to their parents.
- 12 The number of chromosomes in an ovum and in a sperm are half the number of chromosomes in a normal body cell so that the union of the two sex cells produces an individual with the normal number of chromosomes (Not twice the number).
- 13 Advantages of sexual reproduction: Because sexual reproduction is a mix of the genetic material of two parents, the offspring can show genetic variety. The genetic variety allows some individuals to better cope with unstable environments. This can help lower the chance of extinction.
- 14 The disadvantage of sexual reproduction is a slower reproduction rate when compared to asexual reproduction. In a population of 50 females and 50 males, sexual reproduction means that only half the population is producing offspring. Asexual reproduction suggests that all of the population is producing offspring.

3	1	2	4
4	2	1	3
2	4	3	1
1	3	4	2

2 Circumference = $\pi \times$ diameter

$$40\,000 \text{ km} = \pi \times \text{diameter}$$

$$40\,000 \div \pi = \text{diameter (in kilometres)}$$

$$\text{New diameter} = \text{original diameter} + 2 \times 0.001 \text{ km} \quad \{1 \text{ m} = 0.001 \text{ km}\}$$

$$\text{New diameter} = 40\,000 \div \pi + 0.002 \text{ km}$$

$$\text{New circumference} = \pi \times \text{new diameter}$$

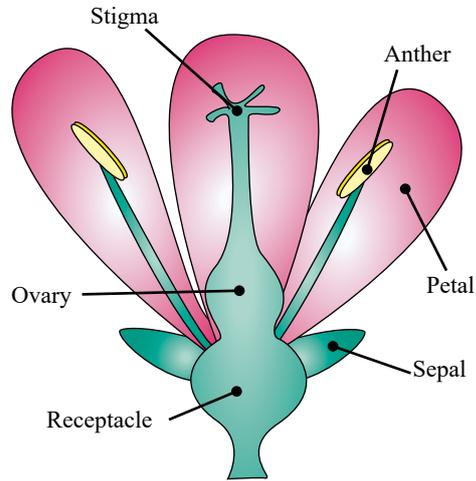
$$\text{New circumference} = \pi \times (40\,000 \div \pi + 0.002)$$

$$\text{New circumference} = 40\,000.006 \text{ km} \quad \{\text{ie just 6 m extra}\}$$

- Fertilisation in sexual reproduction happens when the the female sex cells (eggs or ova) are merges with the male sex cells (sperm).
- Fertilisation may happen either externally or internally. With many aquatic animals, the sperm swims through the water to fertilise the egg (or ovum). This is called external fertilisation because the fertilisation happens outside the body of the parents.
- On land, the sperm and eggs are kept moist through internal fertilisation. Usually, the sperm swims through the reproductive tract of the female to fertilise the egg. The fertilised egg then develops within a shell or develops internally.
- Indicate whether each of the following is likely to be external fertilisation or internal fertilisation:
 - Very large numbers of female sex eggs are produced - external fertilisation.
 - The sperm swims along an oviduct to reach the ova - internal fertilisation.
- Sexual reproduction** in birds happens when the female bird (hen) receives male sex cells (**sperm**) from the male bird. The sperm travels through the oviduct to fertilise the female sex cells (**ova**). This is called fertilisation. After fertilisation, the egg albumen, shell membranes, and shell are formed. The hen lays the egg about 24 hours after ovulation. The hen lays one egg each 24 hours. The hen then stops laying eggs and begins to incubate the eggs by constantly sitting on them so that the temperature of her eggs are around her body temperature.
- The hen lays one egg every 24 hours rather than lay all eggs at once because each egg travels, one at a time, along the oviduct.
- Sexual reproduction** in flowering plants happens when male sex cells in the pollen joins with the female sex cells (ovules) in the ovary. This is called fertilisation. **Pollination** is the transfer of pollen grains from the anther to the stigma. There are two types of pollination. **Self-pollination** happens when the pollen from the anther of the stamen fertilises the ovule of the ovary of the same flower. **Cross pollination** happens when the pollen grains from the anther of another flower fertilises the ovule of the ovary.

p100

8 Labelled sketch of a flower:



- 9 Self-pollination happens when the pollen from the anther of the stamen fertilises the ovule of the ovary of the same flower. Cross pollination happens when the pollen grains from the anther of another flower fertilises the ovule of the ovary.
- 10 The petals are often large, colourful, scented, and have nectar to attract insects, such as bees, to help with pollination.
- 11 Sexual reproduction in mammals happens when the female mammal receives male sex cells (sperm) from the male mammal. The sperm travels through the oviduct to fertilise the female sex cell (egg or ovum) high in the fallopian tube.
- 12 Most mammals are placental mammals. The placenta provides a way of providing nutrients to the developing embryo and removing wastes.
- 13 The mammalian placenta allows the developing embryo to spend longer in the mother's womb. Placental young are then much more developed and ready to survive when they are born.

p101

- 1 b)
- 2 d)
- 3 All graphs suggest the use of a pesticide (sudden drop in population).

p102

- 1 Male sex cells, sperm, have tails while female sex cells, eggs or ovum, don't have tails because:
b) the eggs stay in the one place while the sperm use their tails to move to the eggs.
- 2 Many more female eggs, ovum, are produced in external fertilisation compared to internal fertilisation because:
c) the chances of fertilisation externally is much lower and more eggs are needed to ensure fertilisation.
- 3 Just one sperm fertilises an ovum (egg) despite the male usually releasing millions of sperm.
Only one sperm fertilises an ovum because it needs just one sperm and one ovum to make a complete egg with the correct number of hormones.
- 4 Strawberry plants are able to reproduce sexually and asexually. The strawberry plant can reproduce asexually by sending out runners, and each runner able to develop into an individual strawberry plant.
List as many advantages as you can of asexual reproduction of strawberry plants.
 - Using runners allows the mass production of strawberry plants (difficult to grow from seed).
 - All the plants are genetically identical to a parent with desired characteristics.
 - Using runners produces a mature plant with strawberries faster than growing from seed.
- 5 While the bee is harvesting the pollen, some of the sperm from the pollen is rubbed against the top of the stigma. The sperm is then able to move to the ovum in the ovary of the flower. The fertilised egg, zygote, develops into a seed.
- 6 A cob of corn in which most of the ovules haven't been fertilised would have few kernels of corn.