Reproduction in plants

Lesson plan and teacher's notes · Form 2 Biology · 1 period of 40 minutes

School	(write school name)	**Teacher**	(write name)
Date	(date)	**Class**	Form 2
Subject	Biology	**Enrolment**	Boys ___ Girls ___ Total ___
Time	40 minutes	**Topic**	Reproduction in plants

Learners say what sexual and asexual reproduction are in plants, name the parts of a flower and what each does, describe pollination, fertilisation and seed dispersal, and name ways of propagating plants without seeds. Examples come from banana shoots, a mango tree and cassava stems in the community, and a school garden project.

Specific outcomes

By the end of the lesson, learners should be able to:

1. Say what sexual and asexual reproduction are in plants
2. Name the parts of a flower and what each part does
3. Describe pollination, fertilisation and seed dispersal
4. Name ways of propagating plants without seeds and give examples

Prior knowledge

- Plants have roots, stems, leaves and flowers
- Living things reproduce to continue their species
- The idea of a gamete as a sex cell

Teaching and learning materials

- a flower such as hibiscus if available
- a cassava stem cutting or a banana sucker if available
- chalk and board
- exercise books

References

Ministry of Education (CDC) Form 2 Biology syllabus and module; 25Schools learners' note: Reproduction in plants.

Lesson development

Stage and time	Teacher activities	Learner activities
Introduction 5 min	Ask how a banana plant sends up new shoots and how a mango tree spreads its seeds. Tell learners that plants have two ways of reproducing.	Suggest examples from home and copy the lesson title.
Development: sexual and asexual reproduction 8 min	Define reproduction in plants. Explain that sexual reproduction uses gametes and produces seeds, while asexual reproduction does not use gametes and gives offspring identical to the parent.	Copy the two definitions and sort examples into the two types.
Development: the flower 12 min	Draw a flower and label the stamen with anther and filament, and the carpel with stigma, style and ovary. Teach pollination, fertilisation, the ovary becoming the fruit, and seed dispersal.	Copy and label the flower and write one line for each process.
Development: propagating without seeds 12 min	Teach vegetative propagation and the techniques grafting, budding and layering. Name the natural structures: runners, suckers, stems, corms, stem tubers, root tubers, bulbs and rhizomes. Suggest a school garden project.	List three natural structures and say how a new plant grows from each.
Conclusion 3 min	Ask which type of reproduction gives plants identical to the parent. Set the homework.	Answer orally and copy the homework.

Teacher's content notes

Read these before the lesson. They are what you need to know, not what to copy onto the board.

Sexual and asexual reproduction

Reproduction in plants is the process by which plants produce new individuals to continue their species. It can be sexual or asexual. Sexual reproduction involves the fusion of male and female gametes, usually in flowers, and produces seeds. Asexual reproduction does not use gametes. New plants grow from parts of the parent, such as stems, roots or leaves, so the offspring are genetically identical to the parent.

The flower and sexual reproduction

The flower is the reproductive organ of the plant. The stamen is the male part. It has an anther, which makes pollen grains, held up by a filament. The carpel, or pistil, is the female part. It has a stigma, a style and an ovary. The stigma is the sticky tip that receives pollen, the style is the tube joining the stigma to the ovary, and the ovary holds the ovules.

Pollination, fertilisation and dispersal

Pollination is the transfer of pollen grains from the anther to the stigma. Fertilisation follows when the male gamete from the pollen fuses with the ovule to form a zygote. The fertilised ovule develops into a seed, and the ovary becomes the fruit that protects the seeds. Seeds are then spread by wind, water, animals or mechanical means. This is called seed dispersal, and it lets plants grow in different places.

Propagating plants without seeds

Vegetative propagation produces new plants from parts of a parent plant. There are special techniques, such as grafting (joining the stem of one plant onto the rootstock of another), budding and layering. There are also natural vegetative structures: runners, suckers (shoots from the roots, as in banana), stems, corms, stem tubers, root tubers, bulbs and rhizomes. Several of these store food that helps the new plant to grow. Gardeners use these methods to grow plants quickly, and the new plants are identical to the parent. Learners can try them in a school garden project using materials around

Questions to ask during the lesson

Question	Expected answer
A farmer sees a banana plant send up new shoots, and a mango tree drop fruit full of seeds in the same village. (a) What is reproduction in plants. (b) Which of the two is sexual reproduction. (c) Which of the two is asexual reproduction.	(a) The process by which plants produce new individuals to continue their species. (b) The mango tree, which produces seeds. (c) The banana plant, which sends up new shoots.
A teacher holds up a flower in a class in Luangwa and asks about its parts. (a) Which part is the male part. (b) What does the anther make. (c) Name the female part.	(a) The stamen. (b) Pollen grains. (c) The carpel, or pistil.
A learner reads that pollen grains reach the sticky tip of a flower. (a) What is pollination. (b) What is fertilisation. (c) What does the fertilised ovule become.	(a) The transfer of pollen grains from the anther to the stigma. (b) The fusion of the male gamete from the pollen with the ovule to form a zygote. (c) A seed.
A farmer plants pieces of cassava stem and notices that the new plants look the same as the old one. (a) What type of reproduction is this. (b) Why are the new plants identical to the parent. (c) Name two natural vegetative structures.	(a) Asexual reproduction (vegetative propagation). (b) No gametes are involved, so they are genetically identical. (c) Any two of runners, suckers, stems, corms, stem tubers, root tubers, bulbs, rhizomes.

Worked examples for the board

Example 1: banana suckers

A banana plant sends up new shoots from its roots. These shoots are called suckers. They grow from a part of the parent, so no gametes are involved. This is asexual reproduction, and the new plants are genetically identical to the parent.

Example 2: from pollination to fruit

Pollen grains move from the anther to the stigma, which is pollination. The male gamete from the pollen fuses with the ovule to form a zygote, which is fertilisation. The fertilised ovule develops into a seed, and the ovary becomes the fruit that protects the seeds.

Example 3: grafting

Grafting is joining the stem of one plant onto the rootstock of another. It is one of the special techniques of vegetative propagation, so the new plant comes from parts of parent plants and not from seeds.

Board plan

Write the title and key words. Left: a labelled drawing of a flower. Centre: the sequence pollination, fertilisation, seed and fruit, dispersal. Right: a table comparing sexual and asexual reproduction.

Feature	Sexual reproduction	Asexual reproduction
Gametes	Male and female gametes fuse	No gametes are used
Where it happens	Usually in flowers	Parts of the parent such as stems, roots or leaves
What grows	Seeds	New plants from parts of the parent
Offspring	Grow from the seeds	Genetically identical to the parent

Two ways plants reproduce

Mistakes to expect

Learners often think	Put it right
Pollination and fertilisation are the same thing.	Pollination is the transfer of pollen grains from the anther to the stigma. Fertilisation follows when the male gamete from the pollen fuses with the ovule to form a zygote.
The male part of a flower is the carpel.	The stamen is the male part, and the anther makes the pollen. The carpel, or pistil, is the female part.
Banana shoots grow from seeds.	Suckers are shoots from the roots, as in banana. This is asexual reproduction, so no gametes are involved.
The ovary disappears after fertilisation.	The fertilised ovule develops into a seed, and the ovary becomes the fruit that protects the seeds.

Differentiation

Learners who struggle

Give learners a labelled outline of a flower with a word bank of stamen, anther, filament, carpel, stigma, style and ovary. Let them match each word to its part and say what it does.

Learners who finish early

Ask learners who finish early to explain why gardeners use vegetative propagation to grow plants quickly, and to name the techniques grafting, budding and layering.

Hearing or visual impairment

For learners with visual impairment, let them feel a large flower and name each part as they touch it, and describe the diagram aloud. For learners with hearing impairment, write each key word on the board and point to the part on the flower as you say it.

No projector, no printing

Draw the flower and the two ways of reproducing on the board. Use any local flower, a cassava cutting or a banana sucker to show the parts.

If time is short

Teach the two types of reproduction and the parts of the flower with pollination and fertilisation. Leave seed dispersal and vegetative propagation for the next lesson.

Evaluation

Question or task	A correct answer shows
A farmer near Feira finds new banana shoots growing from the roots of her old banana plant. (a) Which type of reproduction is this. (b) What name is given to these shoots. (c) Say how the new plants compare with the parent and explain why.	(a) Asexual reproduction (vegetative propagation). (b) Suckers. (c) They are genetically identical to the parent because no gametes are involved.
A school garden group wants to grow a new plant from seed and another plant from a stem cutting. (a) Which method is sexual and which is asexual. (b) Name the process that must happen to the flower before seeds form. (c) Explain which method gives plants identical to the parent.	(a) Seed is sexual and the cutting is asexual. (b) Pollination followed by fertilisation. (c) The cutting, because the new plant grows from part of the parent with no gametes.
A learner in Lusaka looks at a flower and wants to name the parts that make and receive pollen. (a) Name the male part of a flower. (b) Name the part that makes pollen. (c) Name the sticky tip that receives pollen.	(a) The stamen. (b) The anther. (c) The stigma.

Homework

A girl in a village sees a mango tree drop fruit full of seeds, while her father plants pieces of cassava stem in the field. (a) Which of these is sexual reproduction and which is asexual. (b) What does the ovary become after fertilisation. (c) Give two ways in which seeds can be dispersed.

Extra practice with answers

Question	Answer

1. A farmer near Feira finds new banana shoots growing from the roots of her old banana plant. (a) Which type of reproduction is this. (b) What name is given to these shoots. (c) Say how the new plants compare with the parent and explain why.	(a) Asexual reproduction (vegetative propagation). (b) Suckers. (c) They are genetically identical to the parent because no gametes are involved.
2. A school garden group wants to grow a new plant from seed and another plant from a stem cutting. (a) Which method is sexual and which is asexual. (b) Name the process that must happen to the flower before seeds form. (c) Explain which method gives plants identical to the parent.	(a) Seed is sexual and the cutting is asexual. (b) Pollination followed by fertilisation. (c) The cutting, because the new plant grows from part of the parent with no gametes.
3. A learner at a school in Luangwa watches seeds being carried away from a tree by the wind and by animals. (a) What is this called. (b) Give two ways in which seeds are spread. (c) Say why this is useful to plants.	(a) Seed dispersal. (b) Any two of wind, water, animals, mechanical means. (c) It lets plants grow in different places.
4. A teacher draws the inside of a flower on the board and asks about the parts of the carpel. (a) Name the three parts of the carpel. (b) What joins the stigma to the ovary. (c) What does the ovary hold.	(a) The stigma, the style and the ovary. (b) The style. (c) The ovules.

Answers to the learners' check-yourself questions

1. What is pollination?
   The transfer of pollen grains from the anther to the stigma.
2. Name the male part of a flower and the part that makes pollen.
   The stamen; the anther makes the pollen.
3. What does the ovary become after fertilisation?
   The fruit, which protects the seeds.
4. Give two ways seeds can be dispersed.
   Any two of wind, water, animals, mechanical means.
5. Name two natural vegetative structures used to propagate plants.
   Any two of runners, suckers, stems, corms, stem tubers, root tubers, bulbs, rhizomes.
6. A farmer near Feira finds new banana shoots growing from the roots of her old banana plant. (a) Which type of reproduction is this? (b) What name is given to these shoots? (c) Say how the new plants compare with the parent and explain why.
   (a) Asexual reproduction (vegetative propagation). (b) Suckers. (c) They are genetically identical to the parent because no gametes are involved.
7. A school garden group wants to grow a new plant from seed and another plant from a stem cutting. (a) Which method is sexual and which is asexual? (b) Name the process that must happen to the flower before seeds form. (c) Explain which method gives plants identical to the parent.
   (a) Seed is sexual; the cutting is asexual. (b) Pollination followed by

fertilisation. (c) The cutting, because the new plant grows from part of the parent with no gametes.

Teacher's reflection

What went well:

What I will change next time:

Learners who need follow-up: