🌱 Lesson Plan: Plants with and without seeds

Grade Level: 5
Subject: Life Science
Duration: 45–60
NGSS 5-LS1-1: Support an argument that plants get the materials they need for growth chiefly from air and water.

🎯 Learning Objectives

By the end of this lesson, students will be able to:

- **Classify** plants as seed plants (gymnosperms and angiosperms) or non-seed plants (ferns, mosses, liverworts).
- **Describe** how gymnosperms and angiosperms differ in seed production and structure.

leaves, and usually a fibrous root system. Examples include grasses and corn.

- **Dicot:** A plant that has two cotyledons (seed leaves) in its seed, veins that branch out in its leaves, and usually a taproot system. Examples include beans and roses.
- **Cotyledon:** A leaf of the embryo of a seed plant. In some species it forms the first green leaf after germination and provides stored food for the developing seedling.
- **Liverwort:** A small, non-vascular plant that can be found in shady, moist areas. Liverworts do not have true roots but use rhizoids to anchor to the ground.

💼 Materials Needed: (all links are included in this PDF)

- Printed copies of the Study Guide (https://newpathworksheets.com/api/guide/study-guide-science-grade-5-plants-with-and-without-seeds.pdf)
- Vocabulary matching worksheet (https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-5-plants-with-and-without-seeds-1.pdf)
- Practice Worksheet 0 (https://newpathworksheets.com/api/worksheet/worksheet-science-grade-5-plants-with-and-without-seeds-0.pdf)
- Practice Worksheet 1 (https://newpathworksheets.com/api/worksheet/worksheet-science-grade-5-plants-with-and-without-seeds-1.pdf)
- Pine cone (female cone with seeds visible)
- Bean seed (soaked overnight and split to show two cotyledons)
- Corn kernel (to show single cotyledon)
- Fern frond with visible spore cases on underside

without-seeds.pdf)

- Pass around the pine cone and explain that gymnosperms like conifers produce seeds on the scales of cones, with no protective fruit covering.
- Discuss angiosperms and their two subgroups: monocots (one cotyledon, parallel veins, fibrous roots) and dicots (two cotyledons, branching veins, taproot). Show the split bean seed (dicot with two cotyledons) and corn kernel (monocot with one cotyledon).
- Introduce non-seed plants such as ferns, mosses, and liverworts. Explain that these plants reproduce using spores or asexual methods like runners and budding. (https://newpathworksheets.com/api/guide/study-guide-science-grade-5-plants-with-and-without-seeds.pdf)

Step 3: Guided Practice (15 minutes)

- Distribute the vocabulary matching worksheet and work through the first two terms as a class, reinforcing definitions. (https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-5-plants-with-and-without-seeds-1.pdf)
- Have students complete the remaining vocabulary matches in pairs, then review answers together.
- Display images from the Study Guide showing monocot versus dicot leaf veins and root systems. Ask students to identify which is which and explain their reasoning. (https://newpathworksheets.com/api/guide/study-guide-science-grade-5-plants-with-and-without-seeds.pdf)

Step 4: Independent Practice (15 minutes)

- Provide students with Practice Worksheet 1, which includes questions on gymnosperms, angiosperms, monocots, dicots, and asexual reproduction methods. (https://newpathworksheets.com/api/worksheet/worksheet-science-grade-5-plants-with-

Differentiation Strategies

For advanced learners:

- Challenge advanced learners to research and present on a specific plant group such as cycads or ginkgoes, explaining their unique reproductive features and evolutionary history.
- Have students create a dichotomous key to classify a set of plant images as gymnosperm, angiosperm monocot, angiosperm dicot, or non-seed plant.

For learners needing support:

- Provide pre-labeled diagrams of monocot and dicot structures with a simplified two-column comparison chart for students needing extra support.
- Offer one-on-one or small-group review of vocabulary terms using physical plant samples and picture cards to reinforce visual and tactile learning.

Extension Activities

- Have students plant bean seeds and corn kernels, observe their germination, and document the differences in cotyledon number and root structure in a science journal.
- Assign a research project where students investigate a plant of their choice, classify it as seed or non-seed, and present their findings with images and key facts.
- Create a classroom plant diversity poster gallery where students illustrate and label examples of gymnosperms, angiosperms (monocots and dicots), and non-seed plants.

- Vocabulary Set 2 (https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-5-plants-with-and-without-seeds-2.pdf)

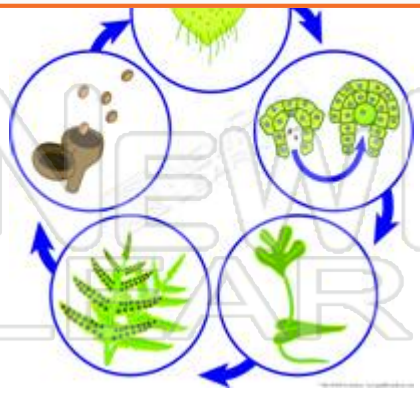
PLANT REPRODUCTION

There are MANY plants in the world. Some are plants that you know of and many you have never heard of before!

Simple Plants

Have you ever heard of a liverwort plant? Sounds like a plant that would be found in an enchanted forest. **Liverworts** are small plants that can be found in shady, moist areas. They are truly a very simple plant. They are not vascular and do not have true roots like most plants do; instead, they have **rhizoids** that anchor them to the ground.

Lesson Checkpoint:
What anchors liverworts to the ground?



The Life Cycle of Moss

First moss produces egg and sperm cells, then fertilization occurs, then a spore stalk is developed. The spore stalk grows from the parent plant; spores are inside of the stalk all closed up in a spore case for safe keeping. Spores are finally released into the air around the parent plant and a new moss plant grows from the released spores.

Spores vs. Seeds

	SEEDS	SPORES
produced by flowering plant?	yes	no
multi-cellular embryo?	yes	no
store food?	yes	yes

Lesson Checkpoint: How do ferns and moss reproduce if they

Lesson Checkpoint:
What is the difference between sexual and asexual reproduction?

There are also plants that do not flower BUT still produce seeds….(ahhh, so many kinds of plants – isn't it fascinating!)

Gymnosperms are vascular plants that produce seeds, but do not produce flowers.
Coniferous trees, such as pine trees, are examples of gymnosperms.

Look at the seed of a pine tree below:

Lesson Checkpoint: What are gymnosperms?

Flowers from Seeds

Now, as you most likely know, MANY plants produce flowers and develop fruit around their seeds….these plants are known as **angiosperms**.

Monocots vs. Dicots….what are these?

Monocots are plants that only have one cotyledon in its seed. What's a cotyledon, you ask? Let's refresh your memory…a **cotyledon** is a leaf of the embryo of a seed plant. Like a corn plant.

Monocots have two distinct characteristics:

1. Monocot leaves have parallel veins

2. Monocots usually have a fibrous root system.

So monocots and dicots are different in their types of roots and types of leaves.

Lesson Checkpoint:
What are two differences between a monocot and a dicot?

Plants with and without seeds

Sci E

Name_____ Class_____ Date_____

1 Liverworts are a type of moss that do not have **vascular tubes**. Where are **liverworts** most likely to be found?

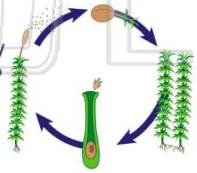
A hot, dry areas
B shady, moist areas
C sunny areas
D flooded areas

2 Liverworts **do not have true roots** like most plants do, they have _____ instead that anchor the plant to the ground, or to whatever it may be growing upon.

A fibrous roots
B tubers
C rhizoids
D runners

3 How do mosses and ferns **reproduce** if they do not produce seeds?

A They produce spores instead.



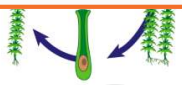
4 _____ is a small, **nonvascular** plant that does not flower or produce seeds, but produces **spores** instead.

A A gymnosperm
B An angiosperm
C Moss

5

7

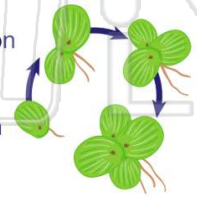
A before 1
B after 2
C after 3
D after 4



C only egg cells
D sperm and egg cells

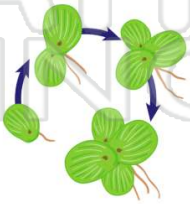
9 What only involves **one parent** and occurs **without** sperm and egg cells?

A asexual reproduction
B gymnosperm reproduction
C sexual reproduction
D fertilization



10 What method of **asexual reproduction** is shown in the picture below?

A fusion
B grafting
C budding
D regeneration



Plants with and without seeds

Sci E

Name_____ Class_____ Date_____

1 Liverworts are a type of moss that do not have **vascular tubes**. Where are **liverworts** most likely to be found?

A hot, dry areas
B shady, moist areas
C sunny areas
D flooded areas

B

2 Liverworts **do not have true roots** like most plants do, they have _____ instead that anchor the plant to the ground, or to whatever it may be growing upon.

A fibrous roots
B tubers
C rhizoids
D runners

C

3 How do mosses and ferns **reproduce** if they do not produce seeds?

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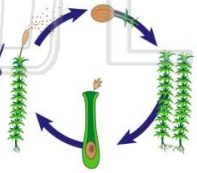


A

4 _____ is a small, **nonvascular** plant that does not flower or produce seeds, but produces **spores** instead.

A A gymnosperm
B An angiosperm
C Moss

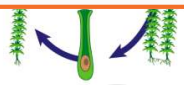
C

5

C

7

A before 1 **C** after 3
B after 2 **D** after 4



C only egg cells
D sperm and egg cells

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9 What only involves **one parent** and occurs **without** sperm and egg cells?

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B gymnosperm reproduction
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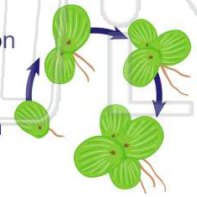

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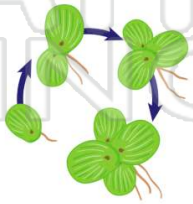


C

Plants with and without seeds

Sci E

Name_____ Class_____ Date_____

1 **Spider plants** send out _____, from which new spider plants grow.

A bulbs
B rhizoids
C tubers
D runners

2 _____ are vascular plants that produce pollen and seeds, but do not produce **flowers or fruit**.

A Gymnosperms
B Angiosperms
C Mosses
D Ferns

3 The plant shown here is a(n) _____.

A angiosperm
B gymnosperm
C moss

4 How would this seed **benefit** from its **"wing"**?

A seed can fall to the ground very quickly
B seed can be dispersed

5

7

D unicellular plant

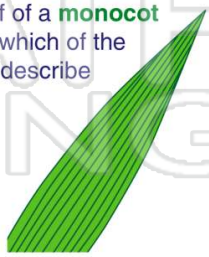
D four

9 What is a **cotyledon**?

A the male part of a flower
B the hairs of a root
C the female part of a flower
D a leaf of the embryo of a seed plant

10 By observing the leaf of a **monocot plant** in this picture, which of the following would best describe its **veins**?

A veins branch out
B has no veins
C veins are parallel
D veins are circular



Plants with and without seeds

Sci E

Name_____ Class_____ Date_____

1 **Spider plants** send out _____, from which new spider plants grow.

A bulbs
B rhizoids
C tubers
D runners

D

2 _____ are vascular plants that produce pollen and seeds, but do not produce **flowers or fruit**.

A Gymnosperms
B Angiosperms
C Mosses
D Ferns

A

3 The plant shown here is a(n) _____.

A angiosperm
B gymnosperm
C moss

B

4 How would this seed **benefit** from its **"wing"**?

A seed can fall to the ground very quickly
B seed can be dispersed farther using wind

B

5

D

7

D unicellular plant

D four

A

9 What is a **cotyledon**?

A the male part of a flower
B the hairs of a root
C the female part of a flower
D a leaf of the embryo of a seed plant

D

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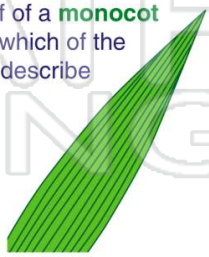


C

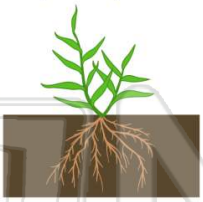
Plants with and without seeds

Sci E

Name_____ Class_____ Date_____

1 What type of root system do **monocot plants**, such as grasses, usually have?

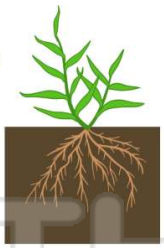
A fibrous system
B taproot system
C short root system
D no root system



2 Grass has fibrous roots and parallel veins, so it is an example of a **dicot**.

True or false?

A true
B false



3 What type of plant has **two** cotyledons in its seed?

A monocot
B dicot
C gymnosperm

4 Which of the two plants is an example of a **dicot**?

A both plants
B neither plant
C plant A

PREVIEW

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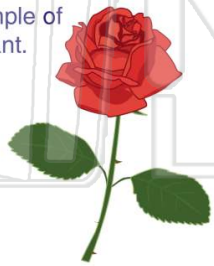
C neither
D both

D no

9 A **rose** is an example of a _____ plant.

A gymnosperm
B nonvascular
C monocot
D dicot



10 What **type of plant** is pictured below?

A gymnosperm
B nonvascular
C monocot
D dicot

Plants with and without seeds

Sci E

Name_____ Class_____ Date_____

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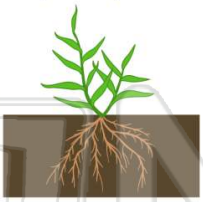
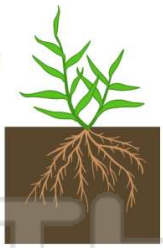


A

2 Grass has fibrous roots and parallel veins, so it is an example of a **dicot**.

True or false?

A true
B false



B

3 What type of plant has **two** cotyledons in its seed?

A monocot
B dicot
C gymnosperm

B

4 Which of the two plants is an example of a **dicot**?

A both plants
B neither plant
C plant A

D

C

7

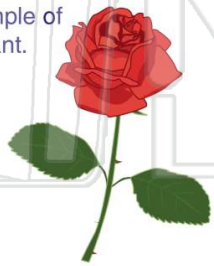
C neither
D both

B

D no

9 A **rose** is an example of a _____ plant.

A gymnosperm
B nonvascular
C monocot
D dicot



D

10 What **type of plant** is pictured below?

A gymnosperm
B nonvascular
C monocot
D dicot

D

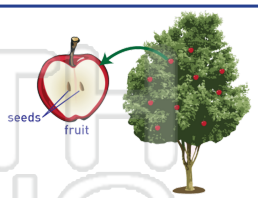
Plants with and without seeds

Name_____ Class_____ Date_____

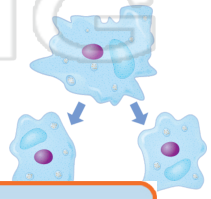
Match each of the following terms to its definition:

Liverworts	Cotyledon	Angiosperm	Dicot
Asexual reproduction	Gymnosperm	Runner	Monocots

1. - a plant that produces flowers and develops fruit around its seeds



2. - a type of reproduction in which only one parent is involved to produce a new organism



3. specie

4. (seed

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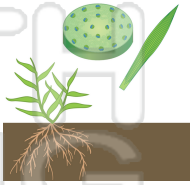
6. areas

7. - plants that only have one cotyledon in its seed, parallel veins, and a fibrous root system; angiosperms that only have one seed leaf



8. - a form of asexual reproduction: new plants that form on the end of a parent plant's long stem or leaf

Plants with and without seeds

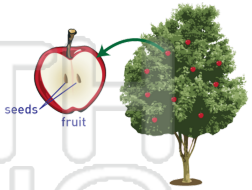
Sci E

Name_____ Class_____ Date_____

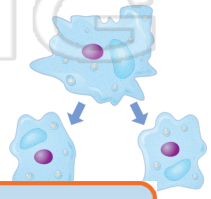
Match each of the following terms to its definition:

Liverworts	Cotyledon	Angiosperm	Dicot
Asexual reproduction	Gymnosperm	Runner	Monocots

1. angiosperm - a plant that produces flowers and develops fruit around its seeds



2. asexual reproduction - a type of reproduction in which only one parent is involved to produce a new organism



3. cot
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4. dic
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PREVIEW

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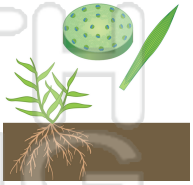
5. gym
protec

6. live

7. monocots - plants that only have one cotyledon in its seed, parallel veins, and a fibrous root system; angiosperms that only have one seed leaf



8. runner - a form of asexual reproduction: new plants that form on the end of a parent plant's long stem or leaf