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STEMPACTWV

PLANTS



SCIENCE QUEST™

NAME: _____

PLANTQUEST



Session 1- Plant Parts & Functions

Session 2- Photosynthesis & Plant Energy

Session 3- Plant Adaptations

Session 4- DIY Mini Greenhouse

YOUR MISSION

The town of Green Valley needs your help!



Its school garden has plants that are not growing well.Some have weak roots. Others need more light. A few must survive
hot, dry days. You are a Plant Detective. In three missions, you will test ideas, gather clues, and help the garden grow.

YOUR ROLE

you have been selected to join the green valley plant rescue team!

something is wrong in the green valley high school garden! plants are wilting, leaves are turning yellow, and some plants have stopped growing. the school needs your help to save its garden!

over the next three missions, you will investigate how plants grow, discover what they need to survive, and explore how plants are adapted to different environments. you will conduct experiments, grow your own bean plant, collect evidence, and use what you discover to help bring the school garden back to life!

your mission is to discover:

- the different parts of a plant and what they do
- how flowers help plants make seeds
- what plants need to grow and stay healthy
- how plants use sunlight to make their own food through photosynthesis
- how plants are adapted to survive in different environments
- how to care for a growing plant from seed to seedling

for your final diy challenge, you will build a mini greenhouse and discover how it can help plants grow and thrive!

PLANT RESCUE TEAM

GREEN VALLEY IS COUNTING ON YOU!

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SESSION 1- PLANT PARTS & FUNCTIONS

MISSION 1 — WHAT'S WRONG WITH GREEN VALLEY'S PLANTS?

MISSION BRIEFING

SOMETHING IS WRONG IN THE GREEN VALLEY HIGH SCHOOL GARDEN! SOME PLANTS HAVE DROOPING LEAVES, YELLOW SPOTS, AND WEAK STEMS. OTHER PLANTS ARE NOT GROWING AT ALL.

THE SCHOOL NEEDS THE PLANT RESCUE TEAM TO INVESTIGATE WHAT EACH PART OF A PLANT DOES AND DISCOVER WHAT MIGHT BE MAKING THE GARDEN PLANTS UNHEALTHY. BEFORE THE TEAM CAN SAVE THE GARDEN, THEY MUST LEARN HOW HEALTHY PLANTS WORK!

YOUR MISSION

INVESTIGATE THE DIFFERENT PARTS OF PLANTS AND DISCOVER HOW THEY WORK TOGETHER TO HELP PLANTS GROW AND SURVIVE. DISSECT A FLOWER TO EXPLORE ITS PARTS, LEARN HOW FLOWERS HELP PLANTS MAKE SEEDS, AND BEGIN GROWING YOUR OWN BEAN PLANT. USE YOUR DISCOVERIES TO HELP EXPLAIN WHAT MIGHT BE WRONG WITH GREEN VALLEY'S GARDEN.

MISSION OBJECTIVES

- IDENTIFY THE MAIN PARTS OF A PLANT AND EXPLAIN THEIR JOBS
- DISCOVER HOW ROOTS ABSORB WATER AND HOLD PLANTS IN PLACE
- EXPLAIN HOW STEMS MOVE WATER THROUGH A PLANT
- INVESTIGATE THE PARTS OF A FLOWER THROUGH DISSECTION
- LEARN HOW POLLEN AND POLLINATION HELP PLANTS MAKE SEEDS
- BEGIN SPROUTING BEAN SEEDS AND RECORD OBSERVATIONS
- USE EVIDENCE TO IDENTIFY POSSIBLE PROBLEMS IN THE SCHOOL GARDEN

KEY VOCABULARY

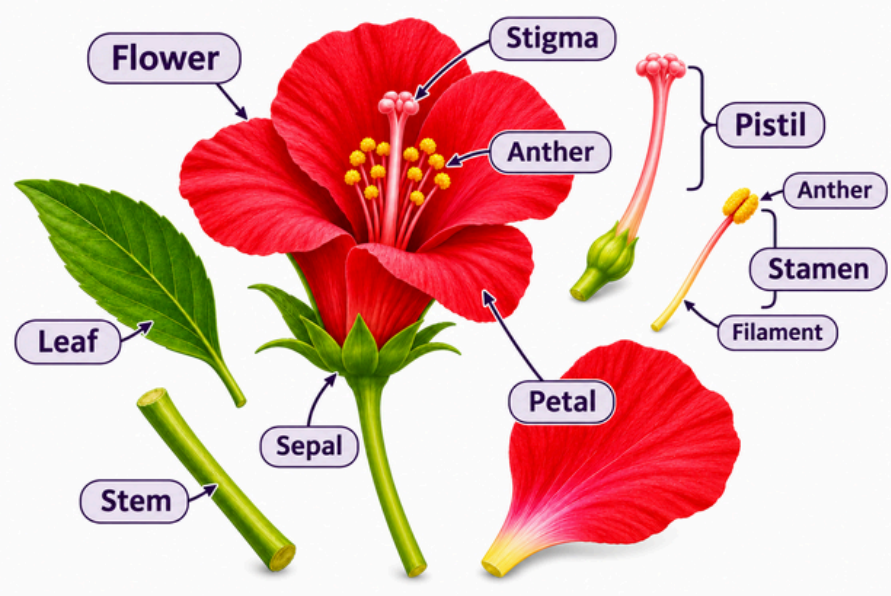
ROOTS · STEM · LEAVES · FLOWER · PETALS · SEPALS · STAMEN · ANTHER · POLLEN · STIGMA · POLLINATION · SEED · GERMINATION

LAB #1 - FLOWER DISSECTION

MISSION: Explore a leaf, stem, and flower to learn their jobs.

MATERIALS:

- A large flower
- tray
- hand lens
- tweezers
- paper
- colored pencils
- plastic knife



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PROCEDURE

PART 1 — INVESTIGATE THE LEAF

1. Carefully examine a leaf on your flower.
2. Look at its shape, color, and texture.
3. Use your hand lens to look for tiny lines called veins.
4. Gently bend the leaf. Is it soft, stiff, smooth, or rough?

OBSERVE:

- What color is your leaf?

  _____

- What does your leaf feel like?

  □ Smooth □ Rough □ Waxy □ Fuzzy

- Can you see veins in your leaf?

  □ Yes □ No

PART 2 — INVESTIGATE THE STEM

1. Examine the stem of your flower.
2. Gently bend it. Is it flexible or stiff?
3. Notice how the stem holds up the flower and leaves.
4. With your instructor's help, carefully cut across a small piece of the stem.
5. Use your hand lens to examine the cut end.

OBSERVE:

- My stem is:

  □ Thick □ Thin

  □ Flexible □ Stiff

- What do you notice inside the stem?

  _____

PART 3 — DISSECT THE FLOWER

1. Look closely at your flower before taking it apart.
2. Count the petals. Gently remove one petal and examine it.
3. Find the stamen. There may be several!
4. Look for pollen on the anther at the tip of each stamen.
5. Find the pistil near the center of the flower.
6. Look for the stigma at the top of the pistil.
7. Carefully separate the flower parts to see how they fit together.

DRAW YOUR DISCOVERY!

Draw your flower and label at least FOUR parts you discovered.

FLOWER DETECTIVE CHECKLIST

- Check each part when you find it!

  □ Petal □ Anther

  □ Sepal □ Pistil

  □ Stamen □ Stigma

OBSERVE:

- How many petals did you count? _____
- How many stamens did you find? _____
- Did you notice pollen?

  □ Yes □ No □ Not sure

THINK LIKE A SCIENTIST!

1. Which part of the flower makes pollen?
   A. Petal
   B. Anther
   C. Stem

2. What is the job of flower petals?
   A. Help attract pollinators
   B. Absorb water from the soil
   C. Hold the plant in place

3. Why do scientists dissect flowers?
   A. To make flowers grow faster
   B. To discover how their parts work
   C. To change their color

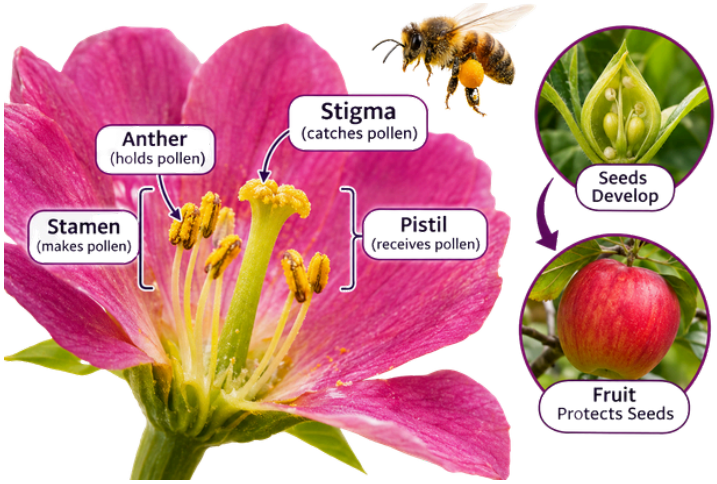
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📖 MINI READING — HOW DO FLOWERS MAKE SEEDS?

Flowers do more than make plants beautiful! They help many plants reproduce, or make new plants. The stamen is the part of the flower that makes pollen. The anther, found at the tip of the stamen, holds the pollen. The pistil is another important flower part. The stigma is at the top of the pistil. It can catch pollen.

When pollen moves from an anther to a stigma of the same kind of plant, it is called pollination. Bees, butterflies, birds, and even the wind can help move pollen between flowers!

Pollination is important because it helps many flowering plants make seeds. After pollination and fertilization, seeds can develop and grow into new plants. Many flowers also develop into fruits that protect their seeds. Without pollination, many plants would not be able to produce seeds or fruits!



CHECK YOUR UNDERSTANDING

1. What is pollination?
   - A. When roots take in water
   - B. When pollen moves to a flower's stigma
   - C. When leaves collect sunlight
2. Which part of the flower catches pollen?
   - A. Stigma
   - B. Stem
   - C. Leaf
3. Which animal can help pollinate flowers?
   - A. Butterfly
   - B. Earthworm
   - C. Fish
4. Why are flowers important to many plants?
   - A. They help plants make seeds.
   - B. They help roots grow underground.
   - C. They make soil.

🌱 PLANT RESCUE CLUE #1

Green Valley's garden needs healthy flowers and pollinators to help many plants produce seeds and fruits!

LAB #2 - COLOR-CHANGING STEMS

MISSION: Discover how water travels through a plant's stem.

MATERIALS:

- Celery stalk with leaves
- Clear cup
- Water
- Food coloring
- Spoon
- Hand lens

THE CHALLENGE

Some plants in Green Valley's garden are drooping, even though their leaves are still green. Could the problem involve how water moves through the plant?

MAKE A PREDICTION!

What do you think will happen when celery sits in colored water?

- A. The leaves or stem may change color.
- B. The celery will turn into a flower.
- C. Nothing will happen because stems cannot move water.

PROCEDURE

1. Fill a clear cup about halfway with water.
2. Add several drops of food coloring.
3. Stir the water with a spoon.
4. Place your celery stalk into the colored water.
5. Put the cup in a safe location.
6. Observe the celery later in the day or during the next session.

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OBSERVE YOUR EXPERIMENT!



BEFORE:

- What color are the celery leaves? _____
- What color is the water? _____

AFTER:

- Did you notice any color changes?
  - □ Yes □ No
- Where did you notice the color?_____
- What does this tell you about the stem?_____

_____

DRAW YOUR RESULTS!

BEFORE THE EXPERIMENT

AFTER THE EXPERIMENT

THINK LIKE A SCIENTIST!

1. How did the colored water reach the celery leaves?

A. It moved through the stem.
B. It jumped through the air.
C. The leaves made colored water.

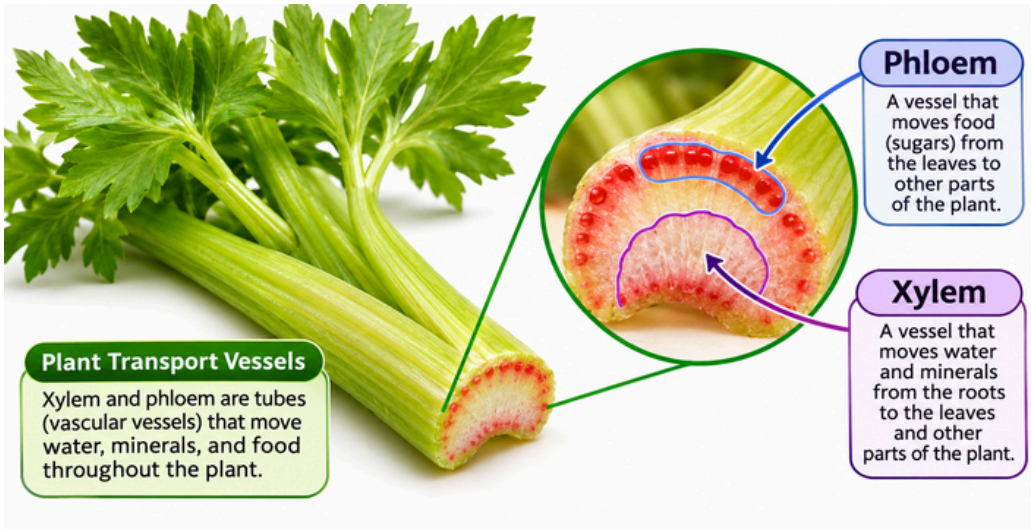
2. What might happen if a plant cannot move enough water to its leaves?

A. It may wilt.
B. It will grow faster.
C. It will no longer need roots.

🌱 PLANT RESCUE CLUE #2

Stems contain tiny tubes that help move water and nutrients through a plant.

If a plant cannot get or move enough water, its leaves may wilt!

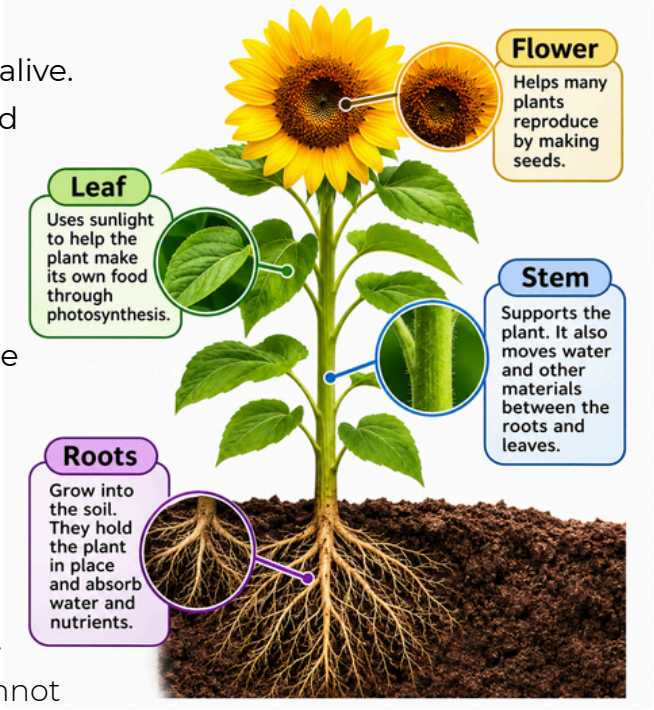


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📖 MINI READING — THE JOBS OF PLANT PARTS

Plants have different parts that work together to keep them alive.

- **ROOTS** grow into the soil. They hold the plant in place and absorb water and nutrients.
- **STEMS** support the plant and hold its leaves and flowers upright. Inside the stem are tiny tubes called transport vessels:
  - ***Xylem*** carries water and minerals from the roots to the leaves and other parts of the plant.
  - ***Phloem*** carries food (sugars) made in the leaves to other parts of the plant.
- **LEAVES** use sunlight to help the plant make its own food through a process called photosynthesis.
- **FLOWERS** help many plants reproduce by making seeds.



Every part has an important job! If one part is damaged or cannot do its job, the whole plant may struggle.

CHECK YOUR UNDERSTANDING

1. Which part absorbs water from the soil?
   A. Roots
   B. Petals
   C. Leaves

2. What is one job of the stem?
   A. Move water through the plant
   B. Make soil
   C. Catch insects

3. Which plant part uses sunlight to help make food?
   A. Leaves
   B. Roots
   C. Flowers

4. Why do plants need healthy roots, stems, and leaves?
   A. The parts work together to keep the plant alive.
   B. The parts all do the same job.
   C. Plants only need flowers to survive.

LAB #3 - THE GREAT BEAN SPROUT EXPERIMENT

MISSION: Begin growing a bean seed and observe how a new plant develops!

MATERIALS:

- 2–3 dried bean seeds
- Clear zip-top bag
- Paper towel
- Water
- Marker
- Tape

THE CHALLENGE

Green Valley's garden needs new, healthy plants!
Your team will begin growing bean seeds today. You will check on them during future missions to discover how plants grow and change.

MAKE A PREDICTION!

What do you think will appear first when your bean begins to grow?

A. Roots
B. Flowers
C. Fruit

PROCEDURE

1. Write your name on your bag.
2. Fold a paper towel and dampen it with water.
3. Place the paper towel inside the bag.
4. Put 2–3 beans between the towel and the clear side of the bag.
5. Close the bag as directed by your instructor.
6. Place the bag where you can observe it.
7. Check that the towel stays damp, but not soaked.

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RECORD YOUR STARTING OBSERVATIONS

- Date: _____
- What color is your bean? _____
- What shape is your bean? _____
- Does your bean have roots yet?

  ◻ Yes ◻ No

DRAW YOUR BEAN!

THINK LIKE A SCIENTIST!

1. What does a seed need to begin germination?
   A. Water and the right conditions.
   B. A flower already growing
   C. Colorful petals

2. What do you think will happen to your bean over the next few days?

_____

_____

🌱 PLANT RESCUE CLUE #3

A seed contains a tiny developing plant! When conditions are right, it can begin to grow. This process is called germination.

YOUR NEXT ASSIGNMENT!

Your bean investigation isn't finished! Keep your paper towel damp and watch for changes.

When you return for Session 2, be ready to investigate:

- Has your bean changed in size or shape?
- Do you see any new plant parts?
- What appeared first?

DON'T FORGET: Scientists make observations over time to discover how living things grow and change!



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📖 MINI READING — FROM FLOWERS TO NEW PLANTS

Flowers play an important role in helping plants reproduce, or make new plants. Many flowers need pollination to produce seeds. Pollination happens when pollen moves from the anther of one flower to the stigma of another flower of the same kind of plant. Bees, butterflies, birds, and even the wind can help carry pollen!

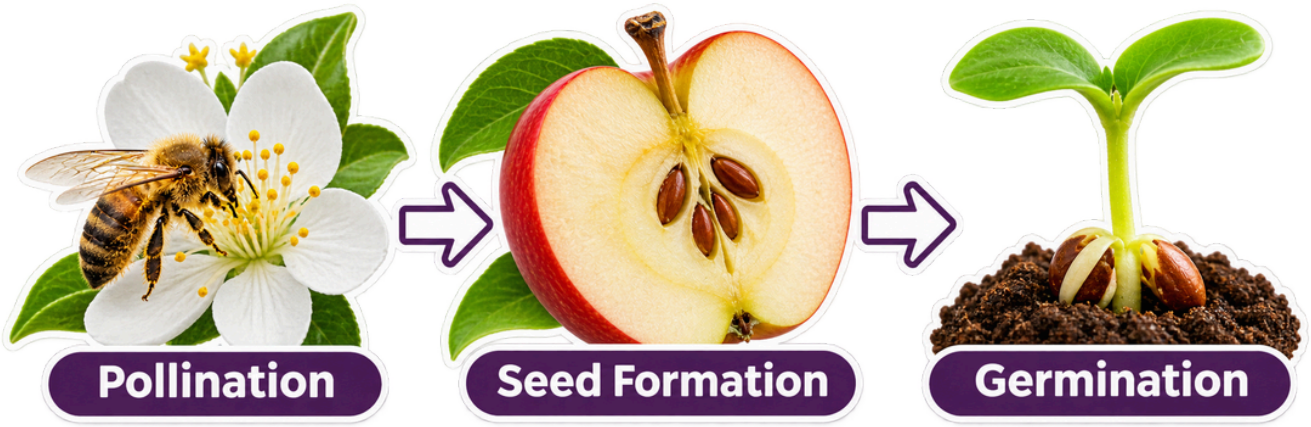
After pollination, pollen can help fertilize an egg inside the flower. The fertilized egg can then develop into a seed. In many plants, part of the flower also develops into a fruit that protects the seeds.

But how does a tiny seed become a new plant?

Inside every seed is a tiny developing plant. When a seed gets the right conditions, it can begin to grow. This process is called germination.

Most seeds need three important things to germinate: water, oxygen (air), and the right temperature. The seed absorbs water and begins to swell. Its outer covering, called the seed coat, may split open. A root usually grows first, followed by a shoot that grows upward and eventually develops leaves.

Germination is the beginning of a new plant's growth!



CHECK YOUR UNDERSTANDING

1. What is pollination?
   - A. When a seed begins to grow
   - B. When pollen moves from an anther to a stigma
   - C. When roots absorb water

2. What can happen after pollination and fertilization?
   - A. Seeds begin to develop
   - B. The flower turns into a root
   - C. The plant stops growing

3. What is germination?
   - A. The process of making pollen
   - B. The process by which a seed begins to grow
   - C. The process of moving water through a stem

4. Which three things do most seeds need to germinate?
   - A. Water, oxygen, and the right temperature
   - B. Sunlight, flowers, and soil
   - C. Pollen, petals, and leaves

5. Why is pollination important for many flowering plants?

_____

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Career Connection: People Who Study Plants






Did you know that people use plant science in many different careers?

BOTANIST: A scientist who studies plants and how they grow.

HORTICULTURIST: A person who grows and cares for flowers, fruits, vegetables, and other plants.

FARMER: A person who grows crops and uses science to help plants stay healthy.

PLANT SCIENTIST: A scientist who studies plant growth, diseases, and ways to improve crops.

Quick Reflection:

Which plant career sounds most interesting to you? How could that person help Green Valley's garden?

_____

_____

_____

_____

PLANT RESCUE TEAM MISSION DEBRIEF: Excellent work, Plant Rescue Team! You investigated plant parts, discovered how water moves through stems, explored pollination, and began growing your own bean seeds. Now use your discoveries to solve the clues below!

PLANT RESCUE TEAM CLUE PUZZLE: Use what you learned about plant parts, pollination, and how plants grow to solve each clue.

Clue A

A plant's leaves are drooping because it cannot take in enough water.

Which plant part should the team investigate first?

a. roots
b. petals
c. pollen

Clue B

Water enters through the roots and must travel to the leaves.

Which plant part helps move the water?

a. flower
b. stem
c. seed

Clue C

A bee moves pollen from one flower to another flower of the same kind.

This process is called:

a. germination
b. photosynthesis
c. pollination

Clue D

A bean seed begins to grow, and a tiny root appears.

What process has begun?

a. germination
b. pollination
c. reproduction

Mission Debrief

How do roots and stems work together to help a plant survive? _____

Why is pollination important for Green Valley's garden? _____

Mission Update

GREAT WORK, PLANT RESCUE TEAM! You discovered how roots, stems, leaves, and flowers work together to keep plants healthy. You investigated how water moves through stems, learned how pollination helps plants make seeds, and began growing your own bean plants. But Green Valley's gardeners have discovered a NEW PROBLEM! Some plants are getting plenty of water, but their leaves are turning yellow. Others are growing in dark, shady areas. Could SUNLIGHT be the missing piece of the puzzle? Your team must investigate how plants make their own food!

YOUR NEXT MISSION:: SESSION 2 PHOTOSYNTHESIS & PLANT ENERGY

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