

FROM OUR FARM

MAYERS  
Since 1888

TO YOUR HOME!

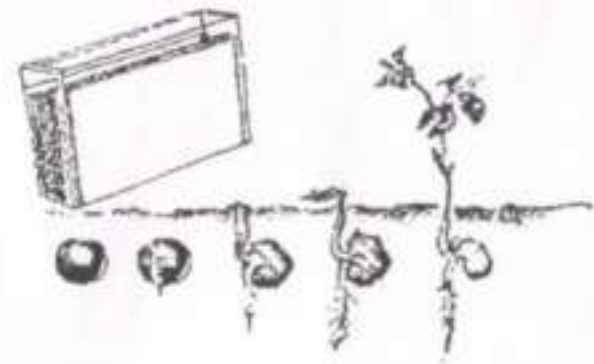
# GERMINATION

FROM THE BEGINNING  
WATCH A SEED SPROUT & GROW

**Kit Contains:**

- . Seeds
- . Seed Starter
- . Viewing Stand
- . Instructions
- . Experiments

*View the Under  
Ground Mysteries,  
Watch a seed come  
to life. See how the  
roots and leaves form  
before your Eyes!*



# CONTENTS

\*\*\*\*\*

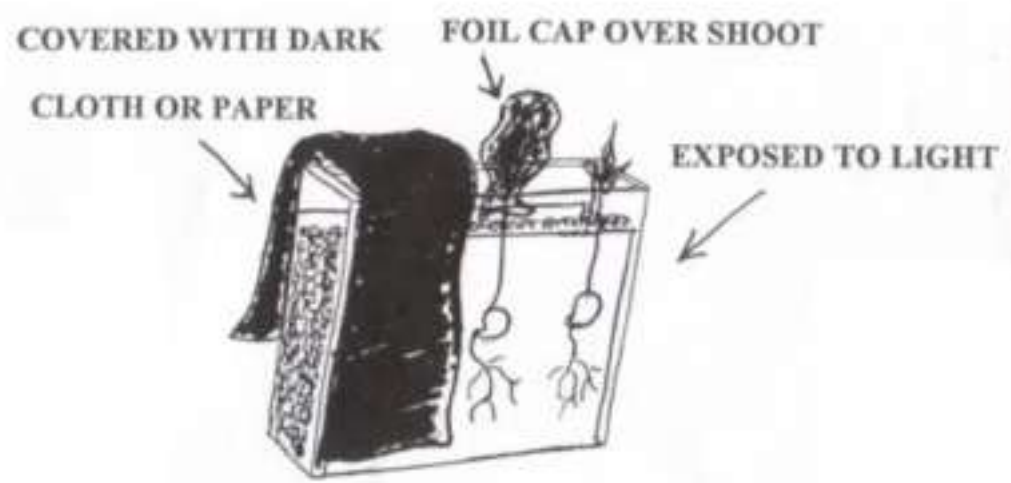
*YOUR KIT CONTAINS: Plastic Viewing Stand. Seed Starter, Packet of Pea Seeds and Instructions.*

Preparing Your Stand.....

A Brief Explanation.....

Experiments.....

Place 3 Beans, Peas, or Radishes in your viewing stand. Space them evenly in thirds. cover the first seed with a dark piece of cloth or paper. Make sure no light can get to this see. (see diagram) After the other seeds germinate, and the shoots have broken the surface, make a foil cap and place it over the center shoot. Leave the other exposed to full sunlight.



## *A Brief Explanation The Process of Germination*

What you will see:

Each day you should see changes in the appearance of your seeds. Your seeds are waking Up!

As your seeds absorb water, they will appear to be getting larger. The moisture touching the seeds causes chemical reactions inside the seed which makes it germinate.

In germination of a Pea, first the root will appear and grow downward. Next the shoot emerges (this contains the leaves of the plant) and a hook forms near the tip. This hook formation protects the delicate tip of the plant as it pushes upward through the abrasive soil. Under our growing conditions, the shoot is not actually pushing through soil, but the hook will naturally still form as if it were.

Once the shoot has broken through the surface, the tip lifts toward the light and straightens out. From this point on, the first leaves which appear on the plant

## EXPERIMENTS

### EXPERIMENT NO.1

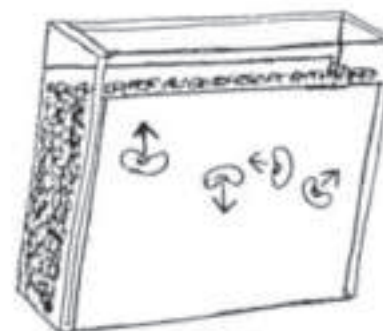
DOES GRAVITY HAVE AN EFFECT ON SEEDS, ROOTS, AND SHOOTS?

**You will need beans for this experiment.**

This experiment will show if a seed planted upside down grows downward with the roots up in the air.

Follow the preparation steps of your viewing stand, step 1, 2, 4, & 5.

Take 3 or 4 beans and place them carefully between the viewing wall and the paper. Position them so that each seed is facing a different direction. (see diagram)

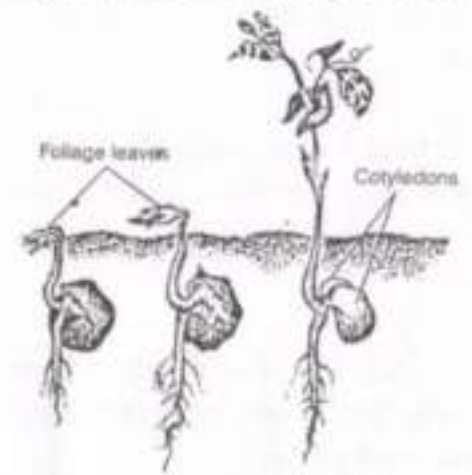
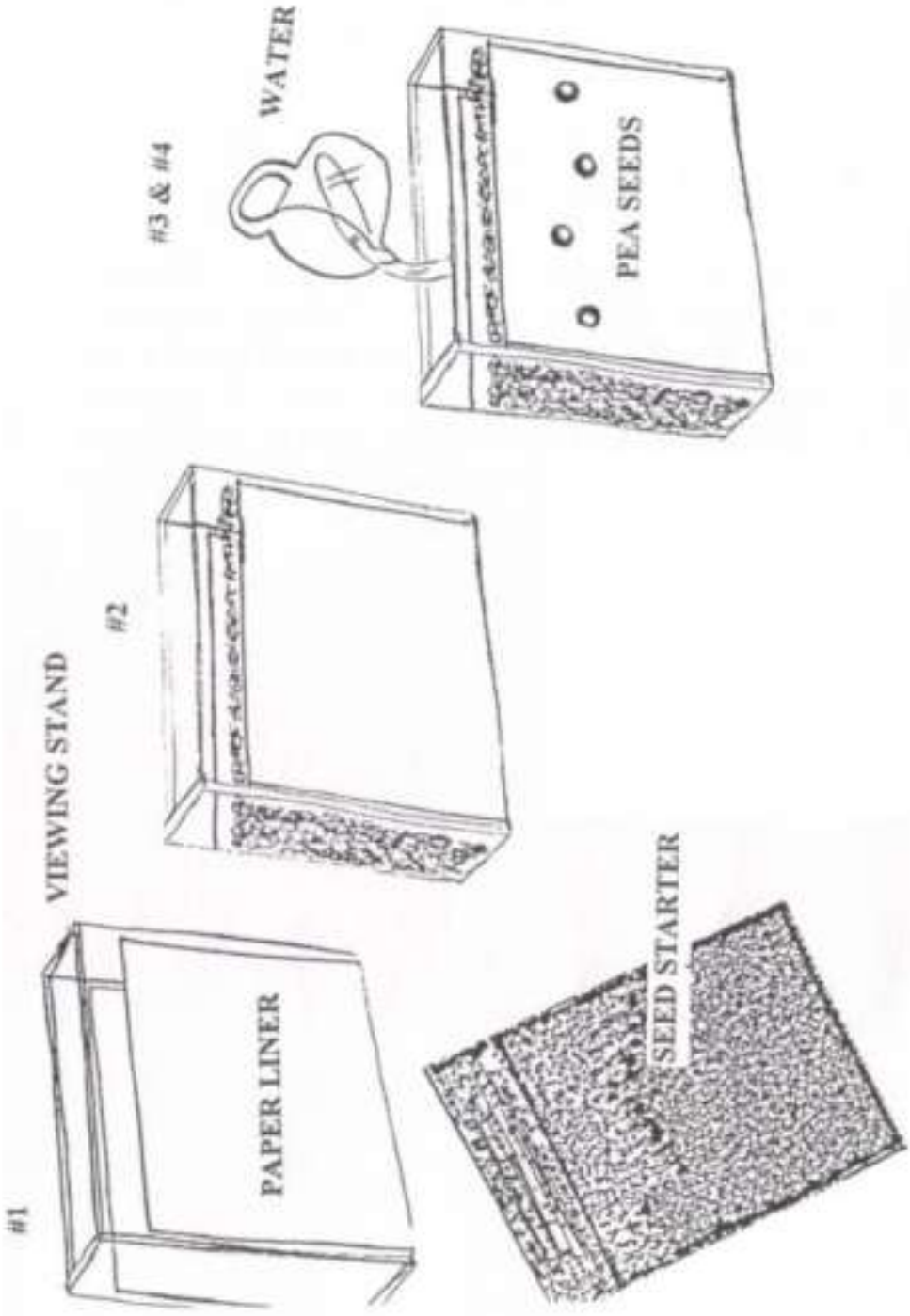


Place the viewing stand in a completely dark place. After 1 or 2 days, check it every day. You will find that the seeds have germinated. You will observe that no matter how the seeds

will begin making food by the process called photosynthesis.\*

Until the plant emerges through the soil, it was getting all of its nutrients from the cotyledons (see diagram) When photosynthesis takes over, these cotyledons remain in the soil and decompose.

A germinating seed is a very delicate stage in a plant's life cycle. This is why most plants produce very large numbers of seeds. In the wild, only a small number of seedlings will survive long enough to reproduce.



\*Photosynthesis: The process by which plants use light energy to make sugars & other organic food molecules from Carbon Dioxide and Water.

## PREPARING YOUR STAND

*NOTE: At this point, you may skip this section and go directly to the experiments. You will follow step 1 & 2 in preparing your stand. Now proceed with the desired experiment.*

- 1) The paper liner is already inside the viewing stand. Remove the bag of seed starter and the seed packet.
- 2) Now empty contents of your seed starter into your stand.
- 3) Now take 3 or 4 seeds and carefully push each one between the paper liner and the outside clear wall of the viewing stand.
- 4) Add 1 cup of warm water to your seed starter . Pour carefully and evenly across the top to thoroughly dampen the seed starter.
- 5) You should add a small amount of water after two or three days.

- 6) Following this setup, you will be able to observe the process of germination.

After completing your seed germination ,or your 1st experiment, you can save the soil ( it may be reused once) You can purchase additional seed starter at any garden store. You must use new paper. You can use any porous type of construction paper or you may use paper towel. Construction paper is a little sturdier and is less likely to tear when damp.

were positioned, the roots still grow downward and the shoots upward. Without the presence of light, the shoot responds to gravity. This is necessary because a seed is in darkness when in the soil before the shoot ever sees sunlight.

RESULTS: No matter in which direction the bean is planted, the roots grow downward. Plants contain **auxin**, a chemical

that changes the speed of plant growth. Gravity causes auxin to collect in the lower part of the plant. Root cells grow faster on the side where there is a smaller amount of auxin, causing this part to bend downward. Auxin causes the roots to grow downward.

---

#### EXPERIMENT NO. 2

##### DO SEEDS AND PLANTS NEED LIGHT?

Seeds do not need light to germinate. When the shoot emerges from the soil, the plant now needs sunlight to make food. Without light, a plant would not turn green. Chlorophyll is the green chemical which makes plants green. It is very important for a new plant to find light. The tip of the shoot is able to detect the direction light is coming from. This enables the new plant to grow toward light. Without chlorophyll, the plant cannot make the food it needs and growth will not take place. This process is called Photosynthesis. The process by which plants use light energy to make sugars & other organic food molecules from Carbon Dioxide and Water.

Prepare your stand as in step 1, 2, 4 & 5.

## GERMINATION

*from the beginning.....*



**T**he germination of a seed is often used to symbolize the beginning of life. A seed already contains a miniature plant, so in reality, when germination takes place, the plant does not begin life, but continues the growth of the plant, which is in a dormant state while in the seed pod.