

## Another FREE SAMPLE LAB from TOPS LEARNING SYSTEMS!

This TOPS Idea is taken from an original series of black-and-white line masters, adapted to stand alone as an independent mini-lesson. Please purchase our original book to get the whole in-depth program.

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### monocots/dicots

adapted by TOPS Learning Systems from  
GREEN THUMBS: Corn & Beans #39

**bean: dicot**  
**corn: monocot**

1. Firmly pack a small jar with moist potting soil. Plant a corn kernel and pinto bean 1 cm deep.
2. Rubber-band a pencil, point up, tightly to the jar.
3. Trim notebook paper along top and bottom lines. Fold in half lengthwise 4 times to make a striped pole. Secure with tape.
4. Number the lines as shown on the pole **and** on notebook paper. Slide the pole onto the pencil, setting 0 at soil level.
5. Draw your plants daily, matching the height on the pole to lines on your paper.
6. **Cotyledons** are "seed leaves" that sprout first. Look up **monocot** and **dicot**, and tell how your plants fit these definitions.

DAY 19

- 01 PENDULUMS (gr 8-12)
- 02 MEASURING LENGTH (gr 6-10)
- 03 GRAPHING (gr 6-10)
- 04 BALANCING (gr 6-11)
- 05 WEIGHING (gr 5-10)
- 06 METRIC MEASURE (gr 8-12)
- 07 MATH LAB (gr 7-12)
- 08 PROBABILITY (gr 6-10)
- 09 FLOATING & SINKING (gr 7-12)
- 10 ANALYSIS (gr 5-10)
- 11 OXIDATION (gr 6-10)
- 12 SOLUTIONS (gr 6-10)
- 13 COHESION/ADHESION (gr 6-10)
- 14 KINETIC MODEL (gr 7-12)
- 15 HEAT (gr 8-12)
- 16 PRESSURE (gr 7-12)
- 17 LIGHT (gr 6-11)
- 18 SOUND (gr 7-12)
- 19 ELECTRICITY (gr 8-12)
- 20 MAGNETISM (gr 8-12)
- 21 MOTION (gr 7-12)
- 22 MACHINES (gr 7-12)
- 23 ROCKS & MINERALS (gr 6-12)
- 31 PERFECT BALANCE (gr K-12)
- 32 ELECTRICITY (gr 3-8)
- 33 MAGNETISM (gr 3-8)
- 34 PENDULUMS (gr 4-9)
- 35 METRIC MEASURING (gr 5-9)
- 36 MORE METRICS (gr 6-10)
- 37 ANIMAL SURVIVAL (gr 3-8)
- 38 Green Thumbs: RADISHES (gr 3-8)
- 39 Green Thumbs: CORN & BEANS (gr 4-12)
- 40 EARTH, MOON & SUN (gr 7-12)
- 41 PLANETS & STARS (gr 7-12)
- 42 FOCUS POCUS (gr 5-10)
- 43 FAR OUT MATH (gr 9-12)
- 44 SCALE THE UNIVERSE (gr 5-12)
- 45 PI IN THE SKY (gr 5-12)
- 61 A SUMMER START (gr 1-8)
- 62 Intermediate ABC SOUP (gr 4-8)
- 63 PEACEFUL PROCEDURES (gr 1-8)
- 64 Primary ABC SOUP (gr 1-3)
- 71 Primary LENTIL SCIENCE (gr K-3)
- 72 Intermediate LENTIL SCIENCE (gr 3-6)
- 73 GET A GRIP Workstation (gr K-6)
- 91 GLOBAL TOPS (gr 3-10)
- 100 TRIPLE MAGNIFIER (gr 3-12)
- 200 CARTESIAN DIVER (adapts K-12)

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#### OBJECTIVE

To construct a pole planter that allows students to draw the daily growth of a corn and bean plant to scale. To note the differences between monocots and dicots.

#### LESSON NOTES

Make a photocopy of the activity above for each student or lab team.

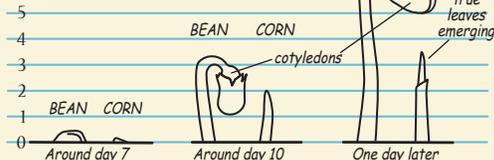
**Step 1.** Soil should be evenly moist, not soggy. Water as needed as plants grow.

**Step 5.** Demonstrate drawing, if needed. Fix reference points at correct heights on ruled paper (top of plant, leaf tips, etc.) corresponding to lines on the planter pole. Then fill in stems and leaves.

Draw plants from the same side each day, tracing unchanged portions and adding new growth. Rotate the jar relative to dominant light source to encourage vertical growth. Gently tie leaning plants to the pole with a loop of masking tape.

**Step 6.** This question may be researched and answered soon after the seeds sprout. More observations are possible later, after plants develop true leaves.

#### MODEL ANSWERS



6. Monocots (corn) sprout a growing tip (coleoptile), from which true leaves emerge, usually with parallel veins. Dicots (beans) produce two cotyledons from the seed, above which a stem and future leaves grow. Dicot leaves usually have veins like nets.

#### EVALUATION

Journal the growth and development of a lentil and a wheat berry. Which is a dicot? (*lentil*) Which is a monocot? (*wheat*)

#### EXTENSION

Graph your plants. Plot number of days along the x-axis, height along the y-axis. Was the growth uniform?

#### MATERIALS

- Small jar, packaged potting soil, water source.
- Ruled notebook paper, scissors, and clear tape.
- Pencil and rubber bands.
- Seeds: corn kernel and pinto bean (or other dry bean). Fresh garden seed is best. Grocery products may be irradiated for long shelf life, so test before using for this lab.

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