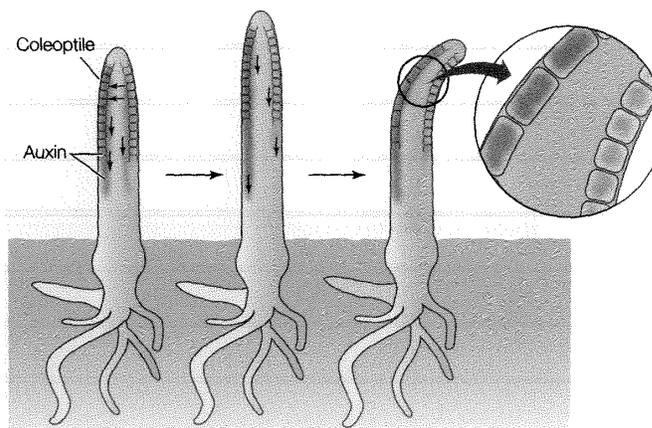


Answer **ALL 7** questions below. Be complete, clear, and concise in your answers and use the questions to help guide your writing; outline format not acceptable.

1. Define "tropisms". Explain the mechanism of gravitotropism.
2. List and explain the advantages and disadvantages of sexual and asexual reproduction in plants. You should be able to discuss at least 2 advantages and 2 disadvantages for each type of reproduction.
3. What are the two fertilizations that make up "double fertilization"? Which plants have double fertilization? What are the chromosome numbers of the two products of double fertilization?
4. Explain how the phytochromes are used by plants to monitor length of night and day. Also explain how they can also indicate the quality of light available to a plant. What effect might this have on a shaded tree?
5. Briefly describe the steps in the hypersensitive response and systemic acquired resistance that result from a plant's encounter with an avirulent pathogen. How might these two types of immune system response in plants be similar to two types of immune response in the human immune system?
6. Auxin is a plant hormone that is synthesized in the shoot tip of a seedling as a response to light. As part of this response, the seedling stem bends toward a light source (phototropism), and auxin diffuses down the shoot in a unidirectional fashion. In an investigation into phototropism, oat seedling shoots approximately 20 mm long were exposed to light from one side. Researchers observed the seedlings after six hours and recorded the response to light. Variable lengths of the seedlings were covered with foil to block the light. The results are shown below

REGION COVERED	Response to
1. Entire shoot uncovered	+
2. Entire shoot covered (20mm)	-
3. Top 5mm of shoot covered	-
4. Top 10mm of shoot covered	-
5. A 5mm band, 5-10 mm from the top covered	+
6. A 5 mm band, 10-15mm from the top	+



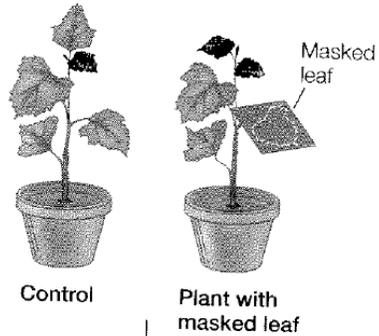
Auxin is produced in the shoot tip as a response to light. The light stimulates cell expansion on the side of the shoot farthest from the light source.

- a. On the figure provided above/left, label "incoming light" to specify the direction of the light that is causing the seedling to bend.
 - b. Identify the control group in the investigation. Describe the role of this control group
7. Flowering in plants is often dependent on a critical period of darkness or light. Cocklebur plants typically flower in the fall when there is a critical dark period (inductive period) and the night is longer than the day. In plants, the seasonal flowering signal moves from leaf to bud. Phytochrome, the receptor for photoperiod, is in the leaf, but flowering occurs in the shoot apical meristem. To investigate whether there is a diffusible substance that travels from leaf to bud, James Knott masked a single leaf, as shown in the diagram below. The masked leaf was then "exposed" to the inductive dark period. With just one leaf masked, the plant flowered, while plants with no leaves masked did not flower. In related experiments, six plants were grown in each of the conditions shown below. Except for the first group, assume that all of the plants were exposed to the inductive dark period for 30 days.

- Describe the physiological mechanism that prevented the leafless plants from flowering.
- Propose a modification of the experiment to explore whether plants with more leaves intact and exposed to the inductive dark period flower sooner.
- Predict whether the necessary duration of exposure would be different for the intact plants than for the plants with only one leaf, and justify your prediction.

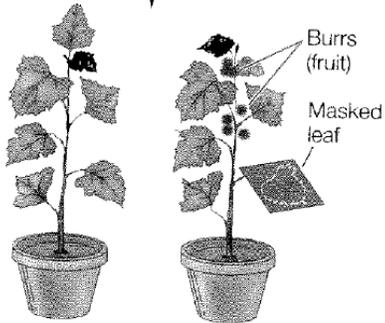
METHOD

Grow cocklebur plants under long days and short nights. Mask a leaf on some plants and see if flowering occurs.



RESULTS

If even one leaf is masked for part of the day—thus shifting that leaf to short days and long nights—the plant will flower.



Condition	Number of plants that flowered
No inductive dark period, intact plant	0
Inductive dark period, intact plant	6
Inductive dark period, all leaves removed	0
Inductive dark period, all but one leaf removed	6