wrong	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
right	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	
score	100	97.1	94.3	91.4	88.6	85.7	82.9	80.0	77.1	74.3	71.4	68.6	65.7	62.9	60.0	57.1	54.3	51.4	48.6	45.7	42.9	

Pruning

Name_____

You have already examined the effect of auxin on causing the growth of roots on treated leaf and stem cuttings. Small amounts of auxin hormone mixed with talcum powder stimulated roots to form on the leaf petioles of your cuttings. Today you will investigate the role of auxin in formation of branches on a plant, in this case a tall cultivar of *Pisum sativum* cv 'Alaska'.

Observation: When the apical bud of a plant is removed, the stem forms lateral branches. The apex of a plant seems to produce hormones that signal the lateral buds of a plant to remain dormant.

Question: What causes plants to form branches when a plant is pruned?

Hypothesis: The decapitation of the apical bud removes the source of a hormone that inhibits branching.

Prediction: If the hypothesis is correct, then

1. Plants will produce more and longer branches when decapitated than when left intact and
2. Decapitated plants treated on the apex with a lanolin paste containing the hormone should produce branches of length and number similar to the intact control and fewer or shorter branches than the decapitated (but untreated) plants.

Experiment: Earlier in the term you decapitated and treated tall pea plants in four pots. Retrieve your pots labeled: "Intact," "Decapitated," "Lanolin," and "IBA."

1. Observe the plants carefully. The intact control plants were untreated and the apical bud is intact. The decapitated plants were treated by removing the apical bud and any attached immature leaves and a terminal stub of the stem should still be evident. The decapitated + IBA plants were treated similarly, but a dollop of lanolin containing 5000 ppm auxin (IBA) was applied to the stub. This dollop has probably been absorbed, depending upon the amount you used and the temperature of the greenhouse.

   What has formed at the treated stem tip? _____

   spelling counts!

2. If you did not do so before, now **eliminate plants in each pot until five remain** in each one. As you do this, be sure to eliminate the unusual plants. For example, if any new plants have sprouted in a pot (you can tell in three of the pots because they will not be decapitated!), eliminate them. Eliminate any unusual plants. Hopefully the remaining plants will look very uniform!

Koning, Ross. E. 1994. Pruning. *Plant Physiology Information Website*.
http://plantphys.info/plants_human/labpdf/pruning.pdf

3. Height of plants. Measure the height of the plants in each pot; measure from the soil surface to the apical bud of the **main stem** for undecapitated plants. For decapitated plants, measure from the soil surface to the end of the decapitated stump. Measure each plant to the **nearest whole centimeter** and then calculate the mean. As usual, round the mean to one decimal place.

		Individual Plant Heights					Mean (cm)
measure from soil to apical bud	Intact (Untreated)						.
	Decapitated (Untreated)						.
measure from soil to stump if more than 10 cm, show Ross	Decapitated (Plain Lanolin)						.
	Decapitated (Lanolin + IBA)						.

4. Number of internodes. Count the number of internodes along the main stem of each of the plants in each pot. Calculate a mean number of internodes for each treatment.

		Number of Main Stem Internodes for Individual Plants					Mean
All intact should have more than one!	Intact (Untreated)						.
If any of the decapitated have more than two, show the instructor!	Decapitated (Untreated)						.
	Decapitated (Plain Lanolin)						.
	Decapitated (Lanolin + IBA)						.

5. Length of branches. Measure the length and record the sum of side branches on each plant in each pot; measure only branches in the axil of leaf #1 or #2 on peas. Be careful about this: the leaves of bean and pea plants are compound and you should be sure that the branch you count emanates from a leaf axil. If in doubt about whether you have a leaf petiole or a branch, ASK! Calculate a mean length of branches for each treatment.

		Sum Total Length of Branches in Axil of Leaves on Individual Plant					Mean (cm)
If you find a branch on any intact plant, show instructor!	Intact (Untreated)						.
If you find more than two branches on any plant show your instructor!	Decapitated (Untreated)						.
	Decapitated (Plain Lanolin)						.
If you find long branches on these plants, show instructor!	Decapitated (Lanolin + IBA)						.

6. Dispose of the plants and potting soil as directed, then rinse out the pots and place them in the designated area.

/24

Analysis:

Under which treatment does the **main stem** of pea plants grow taller?

intact decapitated decapitated + plain lanolin decapitated IBA

Under which treatment do pea plants produce **more internodes along the main stem**?

intact decapitated decapitated + plain lanolin decapitated IBA

Under which treatment do bean or pea plants produce **longer branches**?

intact decapitated decapitated + plain lanolin decapitated IBA

Did the auxin treatment inhibit branch growth? yes no

Decision: The hypothesis: "The decapitation of the apical bud removes the source of a hormone that inhibits branching"

is cannot be

When one of the buds grows out from a decapitated plant, are the cells of the bud:

☐ being genetically re-programmed into a new pathway of development, or

☐ continuing in their original genetic pathway?

The purpose of the Decapitated + Plain Lanolin treatment was:

What evidence do you have that the hormone involved in branch inhibition is auxin?

_____

_____

Have you eliminated the possibility that some other hormone could be involved? yes no

Do you have evidence that if a shrub is repeatedly trimmed (all stems decapitated) the plant will remain shorter but become bushier?

yes no

/10