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Photographic memory technique: An effective tool for reading and memorizing in science subjects with special reference to Plant Growth and Development at under graduate level

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Abstract
Reading is a pleasant deed when it is related to one's favourable topic or the subject. The concepts become easier to understand when those are supplemented with proper diagrams. The aspects which cannot be explained with diagrams or such relative models become more tiresome to read and difficult to understand. Moreover, such topics generally create fear in students and are avoided by them. The same problem is evident in case of topic like plant physiology, biochemistry and genetics as far as subject botany is concerned. An attempt has been made to teach above mentioned topics to the students by using photographic means. It is found that this method is not only proving beneficial to create interest among the students but also making the difficult topic more comprehensible and easy to express. The present piece of work is also focused at participation of students in making photographs and the effect of photographic memory technique in increasing their memorization of concepts.

Keywords: Photographic memory technique, Memorization.

1. Introduction
Reading can be defined as an act of looking at and comprehending the meaning of written or printed matter by interpreting the characters or symbols. It becomes more meaningful from the memorization point of view when the matter is abstracted in the form of photographs. These photographs are of different types. In case of botanical science some of the aspects such as taxonomy, ecology, anatomy etc. can be remembered with the help of diagrams. But the aspects like physiology, biochemistry cannot be remembered with the help of diagrams. These are descriptive, mostly based on biochemical reactions as well as some hypothetical pathways. It may create problems of remembrance. Mere reading is not sufficient and possible also. It requires sound baseline knowledge. Otherwise students may experience a gap. Physiological and biochemical part mostly deals with different types of mechanisms which have some definite sequences. These cannot be remembered by heart. While studying these parts some other techniques should be applied.

The present paper deals with the effect of photographic memory technique on memorization of content on the plant physiology unit 'Growth and Development' by undergraduate students of B.Sc. part II (Botany) of Shivaji University, Kolhapur (MS) India. In this unit, number of subunits are included. Out of these, introduction and definition of growth, growth phases, and growth curve; introduction, definition and practical applications of plant growth regulators, concept of photoperiodism and vernalization with applications are focused to study effect of photographic memory technique.

2. Material and Method
The subunits in question were taught in the regular classes through lecture method. The students were allowed to study for four days, after which pre-test was conducted. The technique of photographic memory was introduced. For visualization the photographs such as diagrams, graphs, flowcharts, Venn diagrams etc were prepared as per the suitability of the contents. These photographs were provided to students and allowed to read or accommodate or screen or observe for four days. Then post-test was taken using question paper parallel to pre-test. Test group comprise forty students at B.Sc. II, Botany.

The marks obtained by the students in pre-test and post-test were analyzed statistically. Observations also made related to response of students to the photographic memory technique.

3. Results and discussion

Photographic memory is a term often used to describe a person who seems able to recall visual information in great detail. Just as a photograph freezes a moment in time, the implication for people thought to have photographic memory is that they can take mental snapshots without error. In case of learning process one can prepare such type of photographs on the basis of subject matter. Practically there is no any standard as such. One can draw the diagram or may write verbally. It is nothing but the abstraction. The form may vary from person to person. The depth, extent of detailing of the subject matter varies greatly.

The present research work is based on the unit Growth and Development included at B.Sc. II – Botany by Shivaji University, Kolhapur. It covers five sub units viz. plant growth, plant growth regulators, physiology of flowering, vernalization and seed dormancy. Total 16 lectures are allotted to the unit. It is a part of plant physiology. Therefore, there are no diagrams. It becomes difficult for memorization. Therefore the photographs (diagrams, graphs, flowcharts, Venn diagrams etc. suitable to the matter) were prepared. The technique of photographic memory was also explained to the students for their own practice. The text book of Botany for B.Sc. Part II Sem. III Paper VI – Plant Physiology, Ecology and Horticulture by Patil et al. published by Phadake publication, Kolhapur was recommended along with the reference books by Verma (1991), Malik (1985) and Gangulee (1994). The regular teaching was carried out in the stipulated time period. Pre-test was undertaken and then the photographs were provided to students. They were promoted to develop their own photographs and allowed to study for four days. Post-test was undertaken. The results of both the tests were analyzed (Table 1). Average marks of pre test were 9.12 ± 3.89 and that of post-test were 14.62 ± 3.09 with 5.50 ± 3.57 increase. The percent increase in post-test marks over pre-test was 27.50. It clearly indicates that Photographic memory technique is suitable for studying the unit Plant Growth and Development. Statistically the observations are significant as the calculated value of t –test is more than the table value.

Out of all the students 22 students tried to develop their own photographs. Statistical analysis of the marks of these students was carried out separately (Table 2). Increase in the marks in post-test is more for these students as compared to entire group of forty students. Statistically these observations are also significant as calculated t-test value is more than the table value. Out of these 22 students 19 were of opinion that photographs prepared by their own were more beneficial than the photographs provided by the authors. Students may create photographs in the form of diagrams, graphs, flowcharts, Venn diagrams as well as verbal abstraction. Flowchart is the most preferred mode by students which follows verbal abstraction and Venn diagrams (Table 3).

It is therefore suggested that the technique of photographic memory should be explained by the teacher. The students should prepare their own diagram. Obviously it has personal touch. Different students may prepare different types of photographs for the same subject matter. Some of the students use minimum words while some prefer more detailing (Figure – 1 to 4). It definitely helps for meaningful reading in science subjects. The same technique can be extended to large scale in the form of charts for the group or a class (Figure 5). If these are prepared by the students their own, they come out of the discussion among them. It facilitates interest as well as memorization.

Table 1: Students wise marks of Pre-test and Post-test, difference in marks and percent increase for photographic memory technique on the unit plant growth and development (Photographs were provided to the students).

Roll No	Pre-test Marks	Post-test Marks	Difference	% Increase
1	10	12	2	10
2	12	14	2	10
3	14	15	1	5
4	11	14	3	15
5	2	13	11	55
6	6	16	10	50
7	8	18	10	50
8	4	17	13	65
9	6	19	13	65
10	2	14	12	60
11	7	15	8	40
12	9	12	3	15
13	10	10	0	0
14	11	15	4	20
15	14	16	2	10
16	12	19	7	35
17	13	14	1	5
18	11	12	1	5
19	14	16	2	10
20	15	19	4	20
21	15	18	3	15
22	11	17	6	30
23	11	13	2	10
24	2	9	7	35
25	6	9	3	15
26	8	9	1	5
27	3	10	7	35

28	1	9	8	40
29	5	13	8	40
30	6	15	9	45
31	8	15	7	35
32	7	14	7	35
33	11	13	2	10
34	10	14	4	20
35	12	18	6	30
36	14	19	5	25
37	11	18	7	35
38	11	18	7	35
39	11	19	8	40
40	11	15	4	20
Average	**9.12**	**14.62**	**5.50**	**27.50**
Standard Deviation	**3.89**	**3.09**	**3.57**	**17.86**
T test- 5.07099				

Table 2: Students wise marks of Pre-test and Post-test, difference in marks and percent increase for photographic memory technique on the unit plant growth and development (Photographs were prepared by the students).

Sr. No.	Roll No.	Pre-test marks	Post-test Marks	Difference	% Increase
1	3	14	15	1	5
2	6	6	16	10	50
3	7	8	18	10	50
4	8	4	17	13	65
5	9	6	19	13	65
6	11	7	15	8	40
7	15	14	16	2	10
8	16	12	19	7	35
9	17	13	14	1	5
10	19	14	16	2	10
11	20	15	19	4	20
12	21	15	18	3	15
13	22	11	17	6	30
14	30	6	15	9	45
15	31	8	15	7	35
16	32	7	14	7	35
17	35	12	18	6	30
18	36	14	19	5	25
19	37	11	18	7	35
20	38	11	18	7	35
21	39	11	19	8	40
22	40	11	15	4	20
Average		**10.45**	**16.82**	**6.36**	**31.82**
Standard deviation		**3.39**	**1.76**	**3.44**	**17.22**
T-test – 5.16					

Table 3: Students' response to the photographic memory technique.

Number of students involved in the activity by providing ready 'photographs'.	Number of students prepared their own 'Photographs'	Number of student thinking of their own 'Photographs' are more useful'	Mode of students' presentation	
40	22	19	Mode	Students responded out of 22
			Diagrams	03
			Graphs	02
			Flow charts	21
			Venn diagrams	13
			Verbal abstraction	17

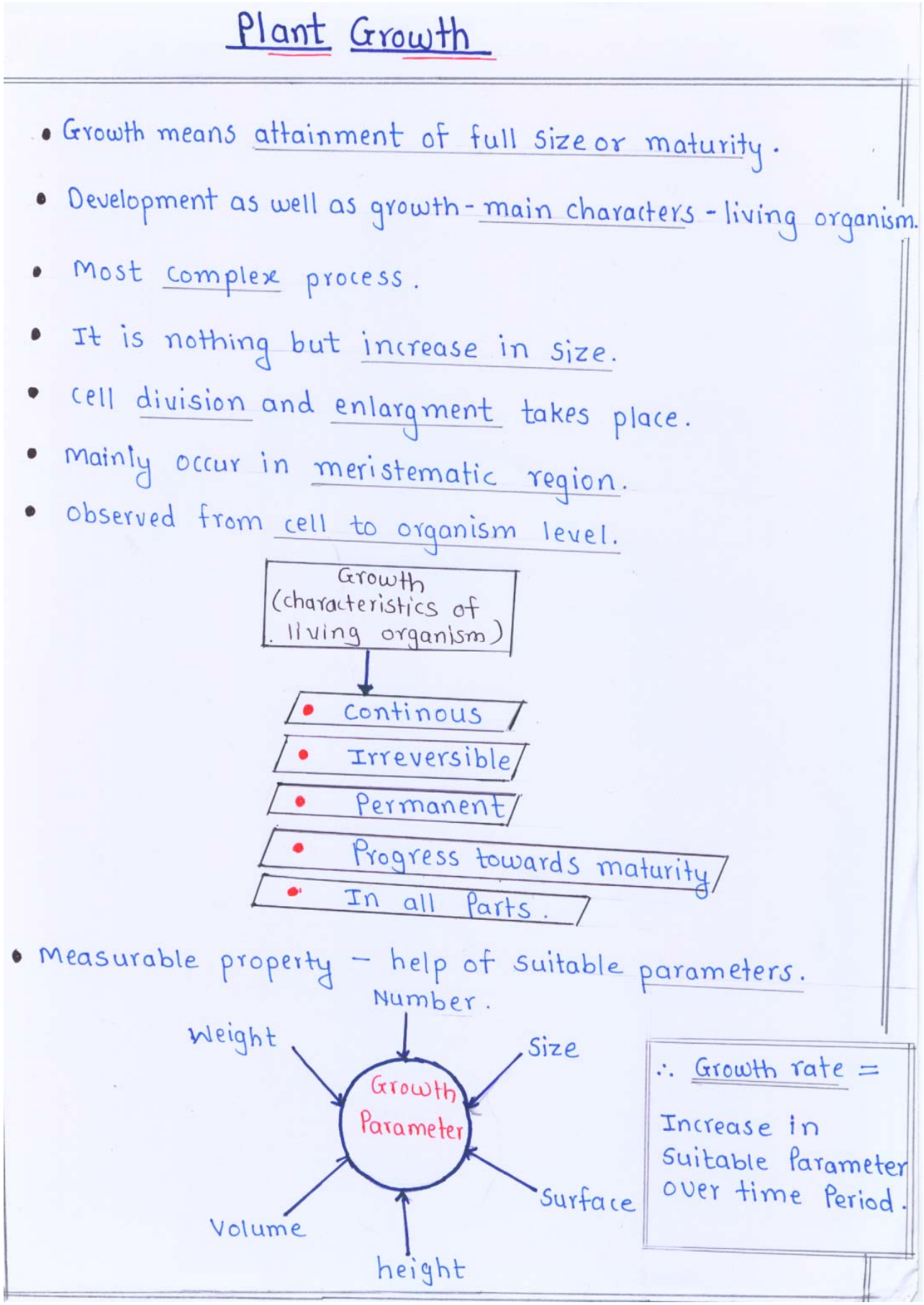
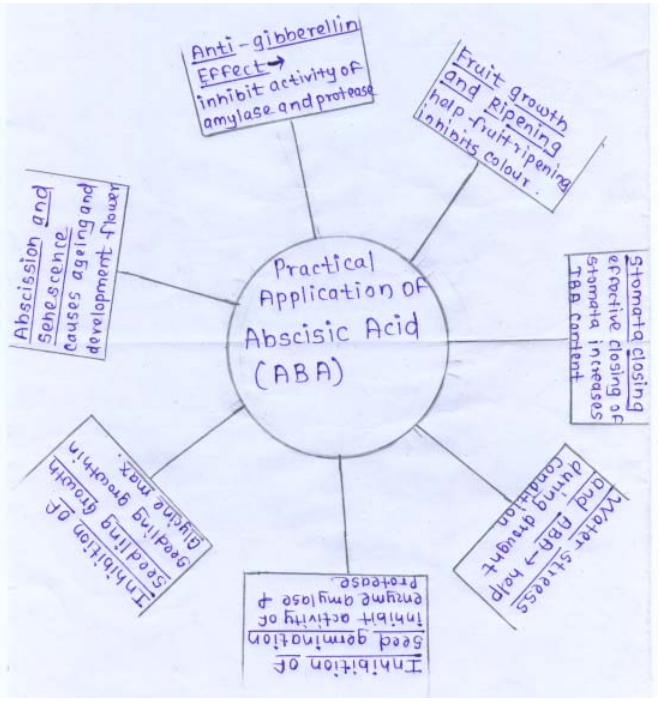
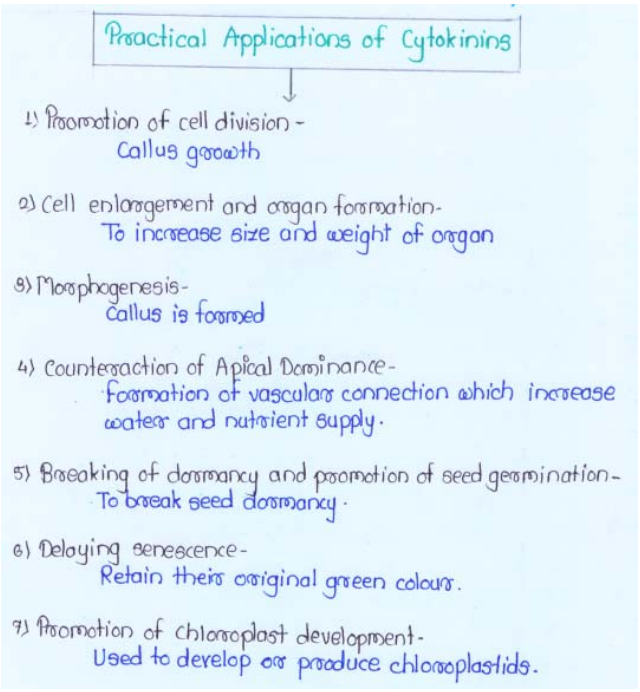


Fig 1: Photograph created by using pens of different colors, important terms are highlighted, flowchart as well as Venn diagrams are used, small text box are inserted for important terms.

Venn Diagram



Flow chart



Table

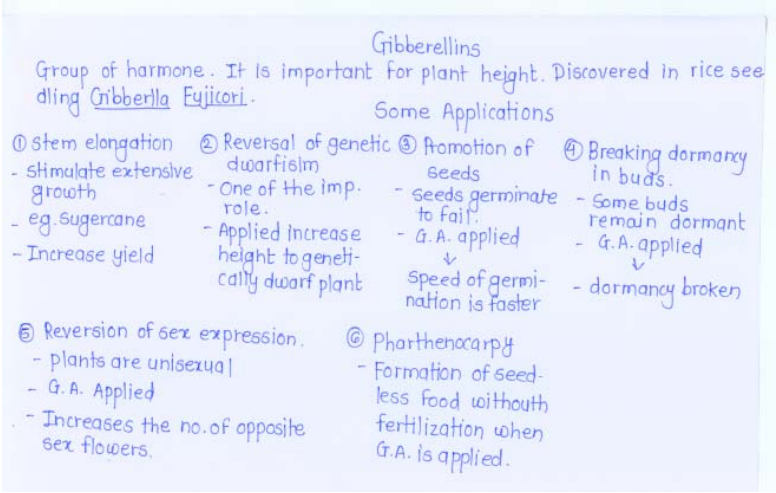
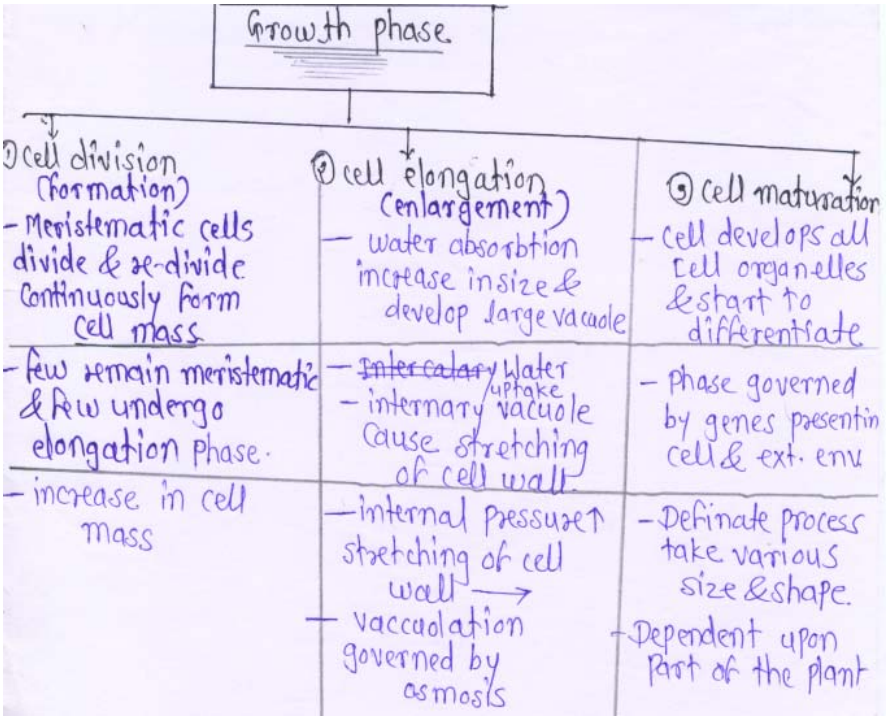
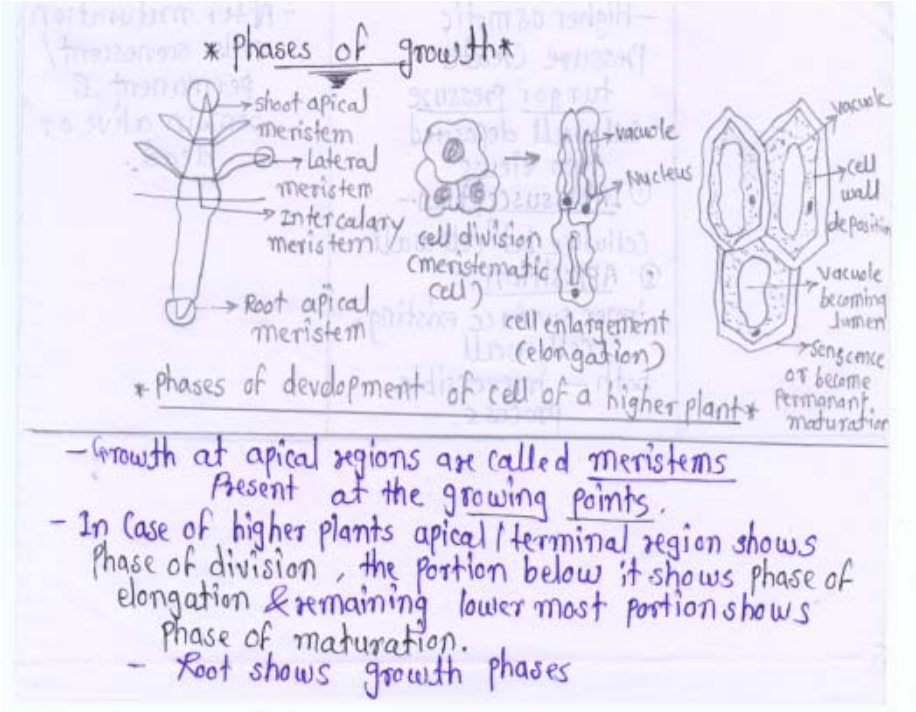


Fig 2: Presentation of same concept in different form (Personal touch)

Table



Figure



Flow chart

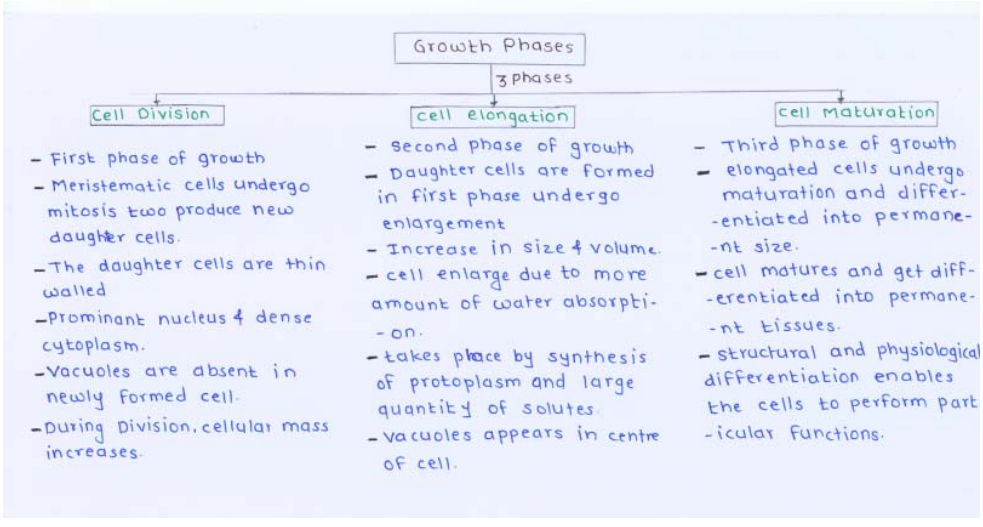
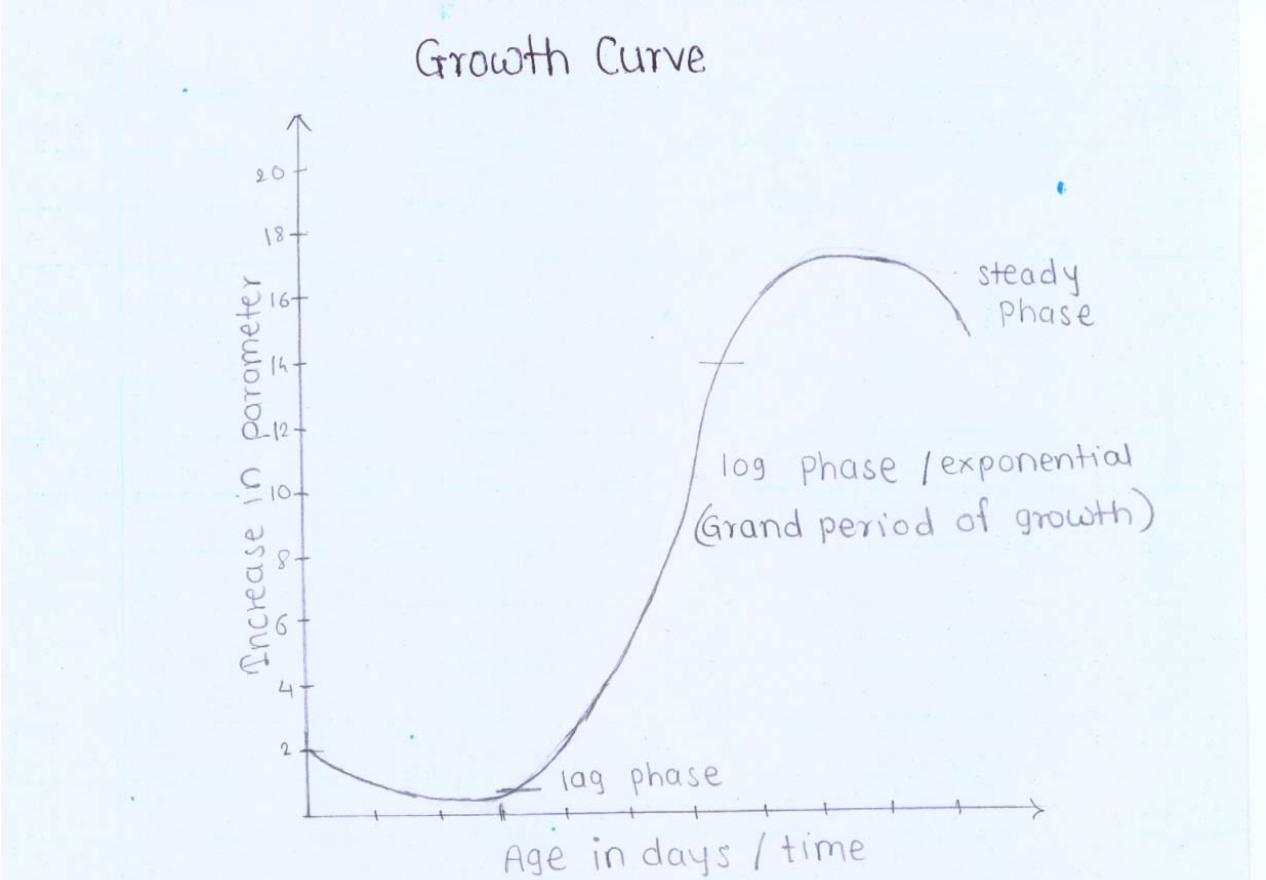


Fig 3: Presentation of same concept in different form (Personal touch)



- Growth is continuos process.
- For practical purposes cells increases can be studied using suitable parameters like size, shape, etc. called as 'measurement of growth'. i.e. 'Growth rate'.
- The growth rate represented graphically called as 'growth curve.'
- Growth curve is 's' or 'sigmoid' shape.
- It shows three different phases.

a) Lag phase:
   - showing slow rate of growth.

b) Log phase / linear / exponential phase:
   - Very rapid growth respresent. 'Grand period of growth.'

c) Maturation / senescence / stationary phase:
   - steady growth rate or decreases.

Fig 4: Graphical presentation with some verbal abstraction.

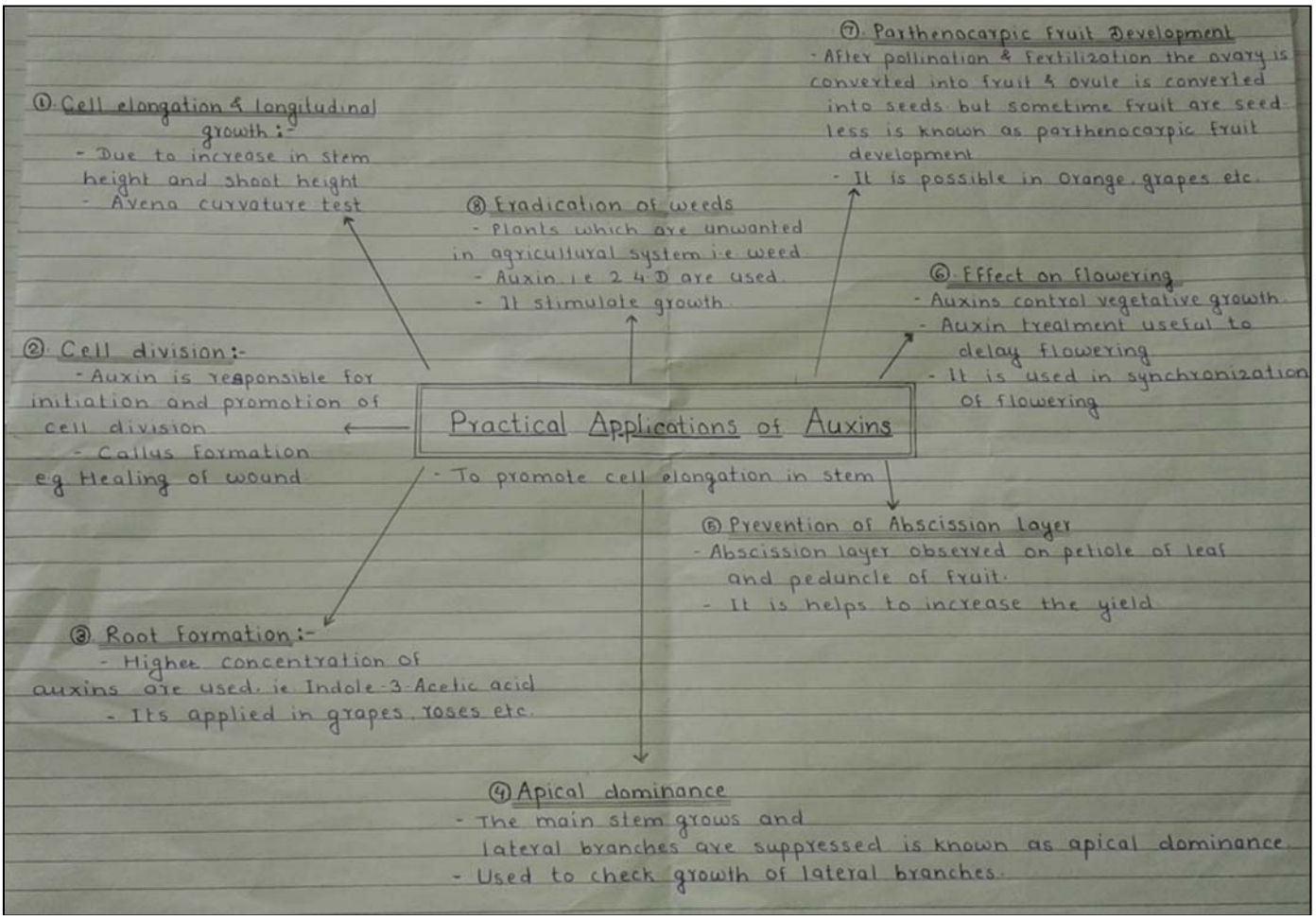


Fig 5: Large photographs created by a group of students as wall paper for entire class. (An extension of photographic memory technique to the group)

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