Sawyer: On Beauty and Power

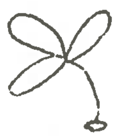
MATHEMATICS AS BEAUTY AND POWER

GETTING INSIDE MATHEMATICIANS AND MATHEMATICS

Philosophy of education - teach what it is to grow as a mathematician

understanding how to grow mathematicians	Poetry can comm.common understandig of processes	historical changes are education. changes	obtain essence of math to create math tradition	book gives central ideas and over-views
1 2	3 5	6 8	9 10	11 16

IMAGE



MOTIF — GROW A MATHEMATICIAN

LEC

P 6-10: Changes in history are essentially changes in education. This book is an example -- essence of math. had to be determined in order to begin developing a mathematical tradition among national scholars.

ILLUS

P.13: Non-Euclidean Geometry systems developed from Question: Given a straight line and a point not on the line, how many lines can be drawn through the point that does not intersect the line? One (Euclid), None (Riemann), Infinite (Lobachevsky). How did they come to raise that question?

ARTISTIC AND UTILITARIAN PATTERNS OF MATHEMATICIANS

Mathematics as Pattern

Defining extent of math				Same pattern in diverse situations
flood of new discoveries	inadeq broad defin. of math	Define: classify and study patterns	power and beauty	
17	18 19	20 21	22 24	25 29

IMAGE

sight
sound
touch
feel
smell

PENTAPATTERNS

MOTIF — PATTERN

LEC

P25-29: Sawyer discusses a common pattern, ^{2}V, which occurs in many branches of science. The key part of this section is that one pattern can provide a way of relating seemingly diverse phenomena, or that math has power (sentence 3, P.29) and beauty (sentence 4, P. 29).

ILLUS

P21: enduring patterns - friend who wears different clothes every day, room with furniture rearranged, year is same every day.

Roles - Mathematicians

Consult. assesses solubility of problem	Artist stimul growth of math	
	art vs. tools	both views incomplete
30 32	33 34	35 40

IMAGE

POWER- MATH PATTERNS -BEAUTY

POWER	BEAUTY
Sci.applica	fascinatn
prob/solv	elegance
soc.needs	as end
	novelties

MOTIF — POWER V. BEAUTY

LEC

P 32: sometimes novel puzzles lead to useful results, sometimes not. Deciding which novelties to pursue, without being sure of outcome is important part of being a mathematician.

ILLUS

P30: I) Determine orbit of lunar model for moon landing (previous flights gave nec. data
II) England has little soil - hence efficiency of experimental crops required. R.A. Fisher developed math techniques of research design.
III) --

Nat/Sci & Phil., CSIIC p14 Summer Acad. '62

CSIIC-46

Sawyer
On Beauty and Power (Math Seminar)
Seminar Orchestration

CSIIC-49

INTRO. (1)	BROAD PICTURE(19)	EXPERIMENTAL DIGGING (30 minutes)	DEPTH DRILLING (35)	CONCL. (5)
"We begin our study of this paper with assumption that every man, woman and child that is, ever was, and ever shall be is a mathematician."	Have someone put up chart superstructure. "Will someone play the role of mathematician for this group by putting up a chart?" 10 MIN. CONVERSATION 1)When did you 1st encounter math? What were you doing? 2)When have you been a mathematician during this course? 3)During these encounters, how did you feel? 9 MIN. CORPORATE CHART In what way is this chart beautiful? What changes would make it more beautiful? In what way does chart have power How did changes for greater beauty influence power of chart?	P1-2What is purpose of the book? Context in which written?(see P9-10) P5Where have you been taught a process of thought rather than just a solut? In what ways did you achieve greater independence or freedom? P18What definition does Sawyer discuss in this paragraph? What value does it have? How is this definition not helpful? P19What more precise definition is proposed? What additional non-mathematical problems might be included under the definition? P20What are your examples of patterns? From these examples, how does Sawyer define pattern? In your own words how would you define mathematics so that Sawyer would agree with you? P22 Sawyer says his definition of math accounts for both beauty and power. How does your definition account for both? P25-27 Where in your own life do you give the same name to different things? What is the underlying pattern? P28-29 What questions are raised? How would you ask these questions? What stance would mathematician take toward your questions?	Paragraphs 30-40 P30 Describe encounter between technician and mathematician. When have you played role of consultant? When have you played role of technician? How does mathematician sort problems? What illustrations do you have for each type of problem (not necessarily mathematical)? P31 How does mathematician anticipate new problems? How do you anticipate new problems? P32 What limits are there to use of theory or pattern? How can puzzle-solving be useful? P33-37 Ground the teaching image - emphasize USA examples and personal examples. Where do you find yourself in tension between utility and beauty? What happens when we fall off on the utilitarian pole? Beauty pole? Do you find yourself to be a pure mathematician or a utilitarian mathematician most often? How could you appropriate gifts of the other pole? P38-40 How is the utilitarian more realistic? the artist?	Is our chart on the utilitarian or esthetic pole? Who decides what patterns you use to create order?

COURSE: NATURAL SCIENCE + PHILOSOPHY. SAWYER "ON BEAUTY + POWER"
LECTURE: MATHMATICS

SEMINAR LAYOUT

NAME: MONTGOMERY.
DATE: 83 | JAN 7

RATIONAL OBJECTIVE	EXISTENTIAL AIM	PREVAILING MOOD	OVER-ALL DRAMA	PARTICIPANT SCREEN
To ground the insight of the tension between Beauty + Power in the application of transrationality to LIFE	To discover the permission to catalyse wonder in the mundane.	Light + practical	Reluctant fun to awe + gratitude	Pure mathematicians Practical Mathematicians Those who hate math

\# Note 30 min study time

INTRODUCTION						CONCLUSION
	SYMPHONY					
	PRELUDE	I	II	III	POSTLUDE	
ENTRANCE, Puzzling with how to convert chart.		TERMS.	CONSULTANT	ARTIST.		TEACHING IMAGE
SYMBOLS Sign pattern on wall.	MATH PUZZLES. x = 2 + 15	Def of math. #1-4	#14 grounding tension 10 min Between consultant + Technician	#17-25 Collapsing tension 10 m		PERSONAL WITNESS Nowadays push Beauty pole
OPENING WORDS This paper is about LENS.	CONSTN. Encounters with math. 10	PATTERN. 3. 3 #5			REFLECTN ON. PAPER. + SEMINAR	BODY POSTURE Back of Room.
RITUAL Sing 4x4.		Beauty Power 10 m. #6-8	3 kinds of problems 10 m #14.	TRANSRATN CHART.		RITUAL 4x4 song
GAMES Encounters with math.	CHARTING 5	#6. 10 m Recurring 5 m #9-13	Brooding + problem-solving 10 m #15-16	20 m		EXIT Stay around to talk.
TIME	30.	30 min	30 m.	30 m.	10 m	

FACULTY TRAINING MANUAL — SAWYER, ON BEAUTY AND POWER. — ACADEMY

THE FOUNDATIONS OF TRANSRATIONALITY

THE NATURE OF MATH

THE DEVELOPMENT OF MATHEMATICIANS

SO MUCH	DEFINTNS OF MATH			PATTN AS REENTRY	BEAUTY + POWER		RECURRING PATTERNS				CONSULTANT.			ARTIST.								
		ALL PROBLMS	PATTN		BOTH	DISCOVERY	$\Delta^2 V = 0$ AND APPLTNS		EXPLANTNS		3 PROB.	PREPTN TO SOLVE PROB		The INCOMPLETE ARGUMNTS		WIO	I'd CHOOSE THE ARTIST.					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	~~25~~

MATH

~~WHAT~~ DO!

~~PROBLEMS~~

PATTERN.

IMPOTENT!

FUTILE

BEAUTY — POWER

PUZZLES

APLICATNS

PROBLEMS

1

2

3.

COURSE

PAPER:

INTRODUCTION/PRELUDE

NAME: Lmiesen

DATE: 4/28/81

INTRODUCTION

great to be a mother

great year: Maine fair: learned more about bald eagles.

(marriage 7 years; 8' nest; 4000 pounds.)

Entrance

Math conv:
- Earliest encounter
- Boring
- Exciting
- what's a mathematician: let's see what he says:

Symbol

#1-24 starting with Section that begins The Extent of Mathematics

Opening Words

¶6 Begins w/ the word "Any," not "and." The equasion $\Delta^2 V = 0$ is correct; not $\Delta^2 V = 0$ as ¶9.

Ritual

Game

Time 9:45

PRELUDE

Key Points

corp. chart of 1-24 ¶.
- ~~key~~ one word per ¶
- where ~~major~~ his divisions
- any divisions w/in
- names of parts.
- name whole.

Key Questions

GAMES SECTION:

→ ~~9 as magic # - multiply any number answer add together equals 9!~~

Image

→ small problem, add all numbers together from 1 to 1000. — Who has the answer?

(Albert Einstein very slow student in school. Uncle introduced him to Sherlock Holmes and said math was detective work. To look for clues.

Spin

→ how many grams of matter is there per cubic centimeter of space in the universe?

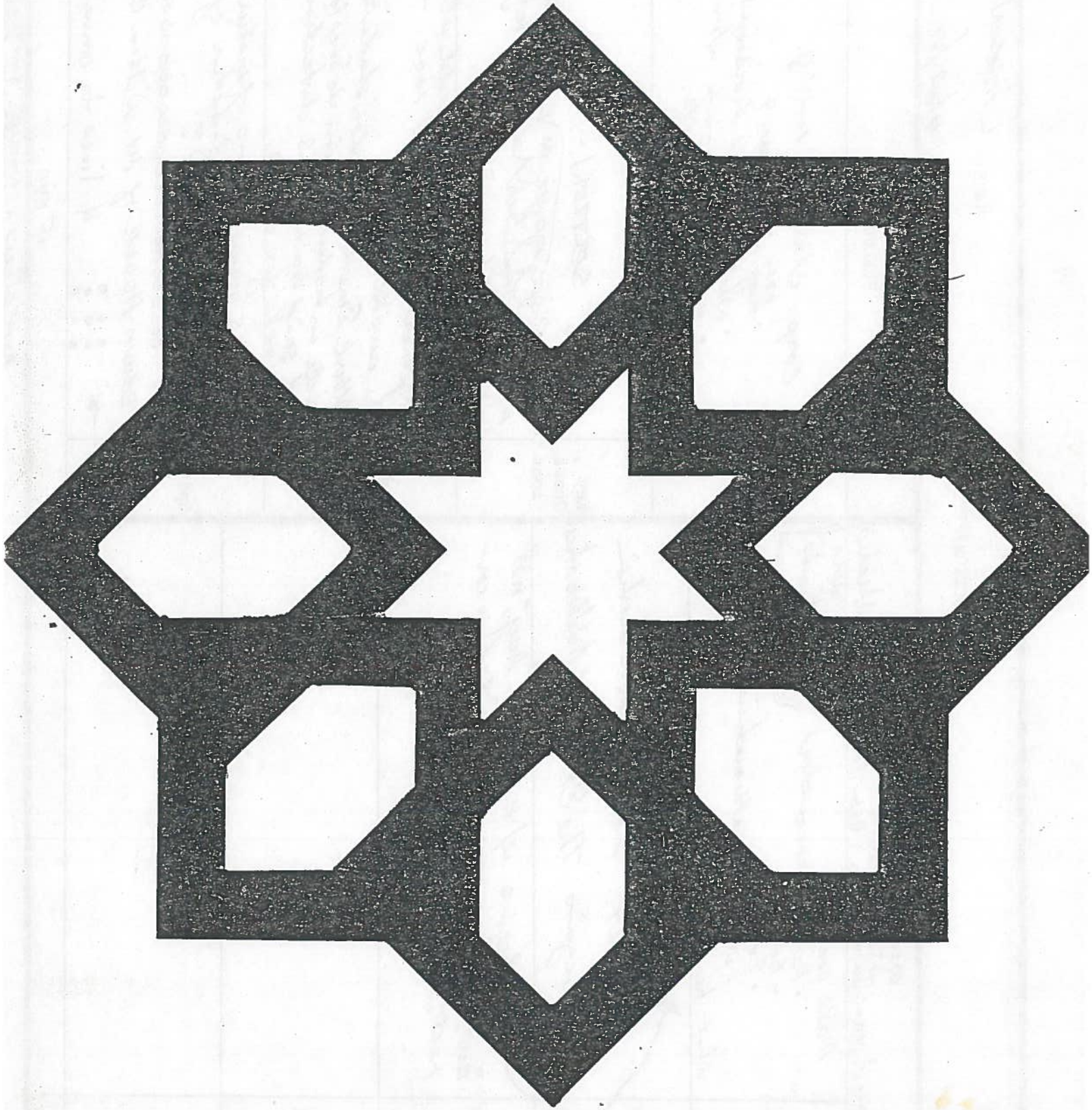
.0000000000000000000000000000001

Edwin Hubble of Mt. Wilson Observatory.

→ ⁝⁝⁝ 4 lines to connect all.

15 min. 10:00

Art piece: NOTICE? SHAPES? CHANGING SHAPES? WHY BEAUTIFUL? WHEN

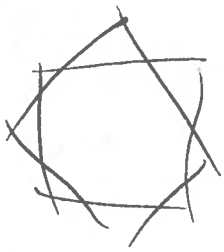
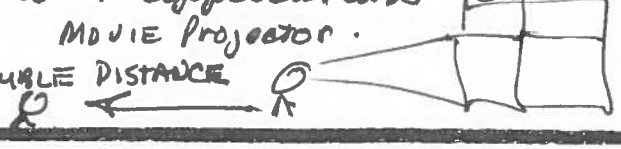


SUFI PATTERN

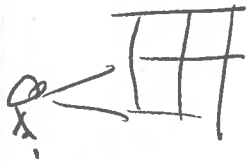
FACULTY TRAINING MANUAL SAWYER. ON BEAUTY + POWER ACADEMY

Movement	Key Point/Image	Script	Time
PRE.	CHART + CONVERSATION	(1) HAVE SOMEONE PUT CHART ON BOARD WHILE YOU LEAD CONVERSATION. * MOST EXCITING TIME LEARNING MATH * MOST INTERESTING TIME. WITH MATH * What's a mathematician?	
		(2) Go over chart – set 2 or 3 subsections	
	GAMES	(3) Play 2–3 math games. * Put several Roman numbers on board asking what is this. XI IV VII (IX) ASK TO MAKE A COPY adding one continuous line SIX * A PIG WEIGHS 50 LBS + ½ of its total weight – WHAT IS THE WEIGHT OF THE PIG (100 LBS) * GET OTHERS AS APPROPRIATE	
I.	3 DEFINITIONS ① —— ② —— ③ ——	(1) READ #1 – ask what this has done to definitions of math. #2 * What is wrong with definition #1 * Get no 2 definition / Problem * What is his definition – other words for pattern: what patterns see in this room.	

FACULTY TRAINING MANUAL — SAWYER – ON BEAUTY + POWER. — ACADEMY

Movement	Key Point/Image	Script	Time
1	#5. Patterns. Allow Recognition	(2) What is his point about the function of pattern – his example. * have someone stand up and ask what patterns allow us to recognise Sally.? Short course Patterns as Rationality, ABSTRACTION	
	#6 Beauty + Power	(3) What are the two dimensions. That Sawyer says must be included in a good pattern. – or abstraction * Clue words that he associates with Beauty?/ Power? SIC that discovery can sometimes happen for Problem ~~or Beauty~~ some times for Beauty – #7,8.	
	Beauty 	* Put Safe Pattern on Board. Art form What other patterns hold the fascination of the mind for you?	
	POWER #9-13.	(4) #9. Read – $(\Delta^2 V = 0)$. What strikes you? Who knows this pattern? only talk about applications + Good abstraction) MOVIE PROJECTOR. DOUBLE DISTANCE ← SQUARES COVERAGE. 	

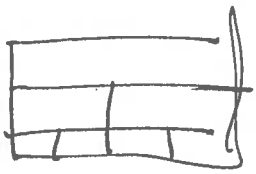
FACULTY TRAINING MANUAL — SAW 4EW – On Beauty & Power — ACADEMY

Movement	Key Point/Image	Script	Time
I		#10. What is the point of Bringing up $\Delta^2 \theta = 0$? Different applications. #10 Problem of not Recognizing? Read: nothing delights . . . – #11. Where have you Been delighted to discover an application of a learning in one area to another area.	
	Mathmetical Mysticism.	(5) #12. What is his question in #12. What is his answer. What is the implication of this in #13. Does that help you? What are some of the seemingly unsolvable questions you continue to wrestle with?	
II	→ Between the technician & consultant.	(10) #14 What is the encounter between engineers and mathmeticians usually like? Why? Read section substituting Prior + Centrum teacher supervisor How does that change the reading for you?	

FACULTY TRAINING MANUAL SAWYER, On Beauty and Power ACADEMY

Movement	Key Point/Image	Script	Time
II	3 Kinds of Problem:	List his classification of problems on Board. What problems are you confronted with? – how does his classification clarify your problemsolving? What is the difficulty with # 3 vs # 2? (one invests one life)	
	Reflection	#15-16 – How develop skill at consultancy vs abstraction. #15 is the power side	
	Puzzle Solving	Reflecting on learnings – Ask when one has discoved method in proceedures? #16 is the Beauty side – puzzle solving – ask about discoverys indirectly By puzzle solvein chance. permission do crosswords etc. PIDDLE.	
III	Both sides are Necessary	(19) Have someone read # 17 as a pure mathematician would Read it. How many feel this is on target? * What is the alternative position? #18. * #19 Both are fatal. (20) Read #20 · note points about importance and futility – Counsel – move into discussion about the insights of this screen for practical use – meeting proceedures · planning etc.	

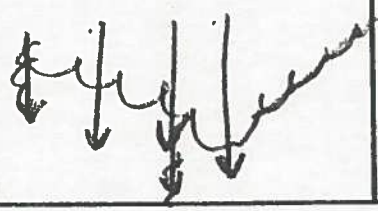
FACULTY TRAINING MANUAL — SAWYER — On Beauty + Power — ACADEMY

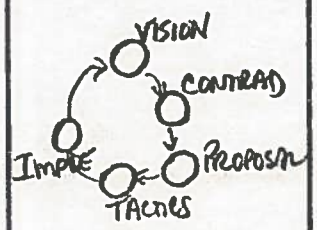
Movement	Key Point/Image	Script	Time
III	H 2024	Short course his Bias + Reasons in H 22 - 24. of moving through the artist pole.	
Post.		Close with having participants Redo Chart in transrational mode as in LENS [mirror] etc- hold both poles - Beauty and power. Share and artform	
		Artform. the Event of Seminar and send out!	

COURSE: Science & Philosophy
LECTURE: On Beauty and Power

SEMINAR LAYOUT

NAME: Jane Booher
DATE: 4/30/80

RATIONAL OBJECTIVE	EXISTENTIAL AIM	PREVAILING MOOD	OVER-ALL DRAMA	PARTICIPANT SCREEN
To Ground the Effective Use of Mathematical Thinking in everyday life.	To experience the wonder and possibility of being fanatical problem-solvers.	Fear and Fascination		Non-Westerners Thinkers of Pattern Problem-Solvers

INTRODUCTION	SYMPHONY				CONCLUSION
	PRELUDE	I	II	III	POSTLUDE	
ENTRANCE: Sitting -- playing game-	PARAGRAPHS: Games	# 1-13	# 17-24	# 14-	POSTLUDE	TEACHING IMAGE: Consultant
SYMBOLS	RATIONAL OBJ.: Fascination with Patterns Use (3)(4) drop 2 objects Earliest Encounters with Math-	To ground			Artfulness of Chart	PERSONAL WITNESS
OPENING WORDS						BODY POSTURE
RITUAL	EXISTENTIAL AIM: List Problems issues in everyday life during Study-	See transparently the Power ... Beauty 		1) The Problem is a well-known one already solved. 2) New Problem can do something about. 3) Old Problem been trying to solve without solution. Take your list. Decide- 1) 2) 3) See how our consultant skills are: Describe problem.		RITUAL
GAMES						EXIT
TIME	10 min.	30 [redacted] min	20 min.	25 min.	10 min.	

4–LEVEL HOLDING CHART

PAPER ON BEAUTY AND POWER Sawyer

NAME: [illegible]

DATE: 4/29/80

TOPICAL

MATHEMATICS AS GLOBAL DISCIPLINE IN BUILDING THE FUTURE

THE DISCIPLINE OF MATHEMATICS

THE ROLE OF MATHEMATICS IN TODAY'S SOCIETY

	Cosmos	Math	DEFINITIONS OF MATHEMATICS		POWER & BEAUTY: ENDURING PATTERN Necessity/Use	POWER & BEAUTY: RELATION TO PHYSICS	ISOMORPHS & FLIGHTS: Repeat Pattern	ISOMORPHS & FLIGHTS: Mathematical Identical	ISOMORPHS & FLIGHTS: Mathematical exploration	PROBLEM-SOLVER: 3 Analytical Screens	PROBLEM-SOLVER: Solving New Problems	HOLDING THE TENSION BETWEEN POWER & BEAUTY: The Limits of Pure or Utilitarian	HOLDING THE TENSION BETWEEN POWER & BEAUTY: Tension of Power		HOLDING THE TENSION BETWEEN POWER & BEAUTY: Tension of Beauty	
para	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

FUNCTIONAL

Definition	Description	Expansion	Uses 1)	Use 2)
Introduction			Uses	

PROPOSITIONAL

1) Mathematics is defined as classification & study of all possible patterns in Life — which are regularities in a real sense, in a time when the field is widely expanding.

2) Mathematics is the search of repeated patterns, a string pattern which hold both the necessity or power-practical value — and the aesthetic, pleasure-filled beauty of discovery and fascination for mind & often times they are discovered b/4 a practical value is found.

3) The location of repeated pattern is called Isomorphis- and is key to mathematics. One of those is $\Delta^2 V = 0$ which is located in 11 or 12 different branches of science. The search is a mathematical discovery which may be useful to future generations.

5) The practical use of Mathematics found in Consultant Role, when able to analyze problems, and propose possible routes of direction. Also in model-building for future

6) The tension between the usefulness of mathematics and the abstract beauty or art of mathematics needs to be held today — for there are concrete needs that are awaiting an answer. However without the love of discovery and the fascination of pattern and logical classification, the workers likely to be impotent, much like the musicians.

4) The Discipline of Mathematics involves the discovery of + study of patterns or regularities in natural Sciences; in theory, mathematicians must account both for the power (practical use) and the beauty (fascination) which are linked by nature. Their work is done in ignorance of final outcome, rather to achieve deep insight into Univ.

7) The mathematician stands as the one who has abstracted from life, patterns of regularity, and who can play a significant role both as a consultant in problem-solving and as a scientist delivering patterns which may have significant use in the future; both artist & practical.

8) The Study and Classification of all possible patterns in the Universe is the task of the Mathematician — and the discerning of identical patterns which are regularities in life; the use of this discipline is seen both in terms of immediate problem-solving and in long range breakthrus in the Science field, A healthy tension being maintained.

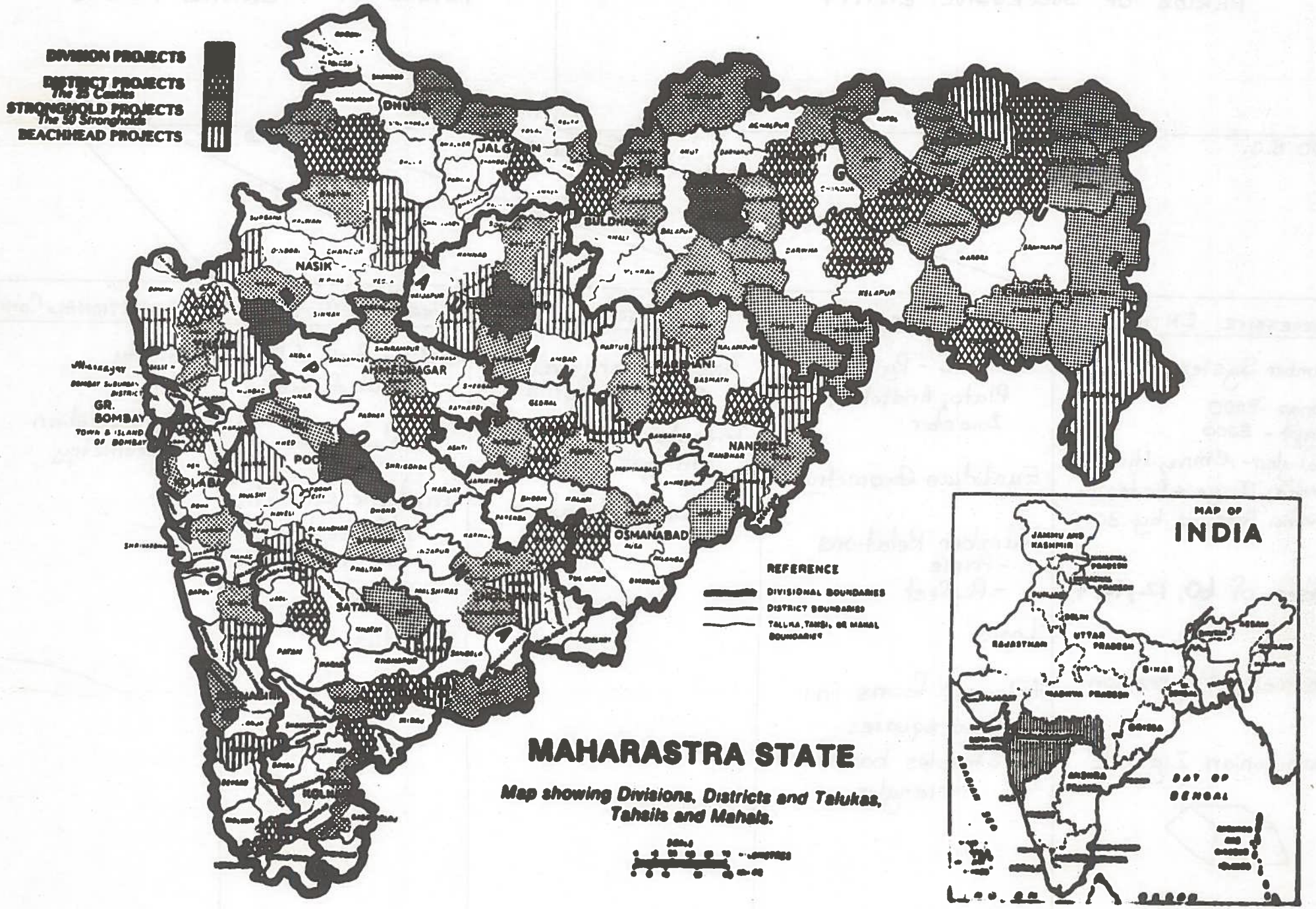
EXISTENTIAL: (Write on the back) 1. The new knowledge or image shifts, 2. The personal address this paper provoked in your life, 3. The positive contribution to your self–understanding, 4. Your critical appraisal of the paper.

HISTORY OF MATHEMATICS

PERIOD OF SUCCESSIVE ENTITY | PERIOD OF ETERNAL FORMS

4000 B.C. | 3000 | 2000 | 1000 | 950 BC | 900 AD | 1637 | 1750

SUCCESSIVE ENTITY	ETERNAL FORMS	ALGEBRAIC NOTATION	PERIODIC MOTION	FOUNDATIONAL CONCEP
Number Systems before 4000BC - Congo - 8000 - Egypt - 5000 - Babylon -, China, Hindus in India, Maya + Aztec in Latin America by 3000 Bases of 60, 12, 10, 4 Geometric Progression Babylonian Zigurat 	600 BC - Pythagorus, Plato, Aristotle, Buddha Zoraster Euclidian Geometry Number Relations - Prime - Perfect Logic Eternal forms in: - city squares - steeples based on triangles	Arabic numerals replaced Roman Introduction of "Zero" concept. Algebraic Notation	1637 - Birth of Descartes Death of Galileo Pendelum conceived Analytic Geometry - association of line with number (graphs) Calculus	Infinity Non-Euclidian Geometry



MAHARASTRA STATE

Map showing Divisions, Districts and Talukas, Tahsils and Mahals.

Formal : origin, definition, truth

math indices come from nature

prac exp — Disguised empirical statement (1+1 = 2)

Truth is meaningfulness w/ to my experience

Logician : Function of culture: disguised logical

real thinking — statements about life that makes sense. One banana + One banana placed in conjunction w/ one another makes sum total of 2 banana

Intuitional : My question is : is it beautiful : maths is shaping, giving form. Beauty power, sheer consistency, gorgeous abstraction

40,000 BC - 950 BC : successive entity

Congo had a Base 12 System (?)

Chinese?

Babylonians : based on 60 x 6 : year : minutes, seconds

Ziggurat. Top king, bottom people 4 sides

Magic : lucky numbers : 3 & 7 lucky, 13 un-lucky

Geometric progression : chess 1, 2, 4, 8, 16, 32, 64, 128

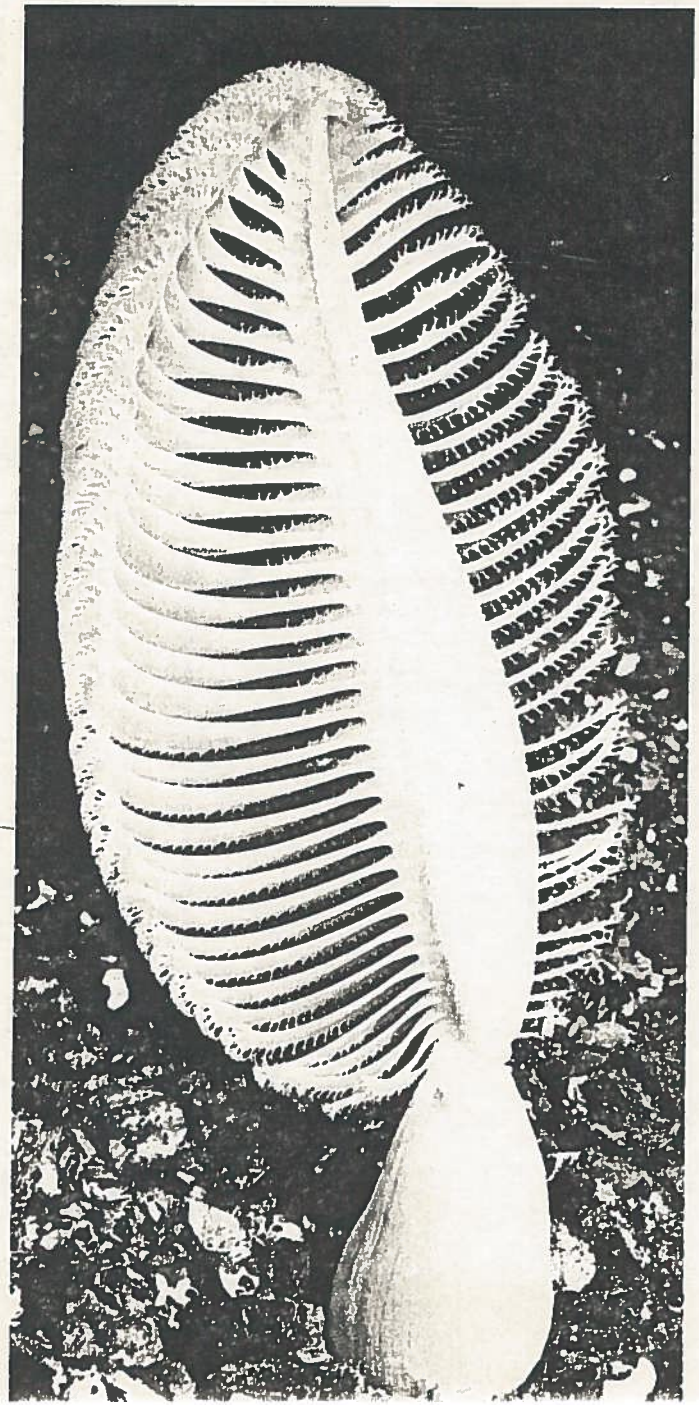
950 BC – 900 AD
Euclydian geometry – axioms, theorems. prime-
numbers, perfect numbers
The ethereal: Sri of ⊙ mystery
cathedral was just a big △

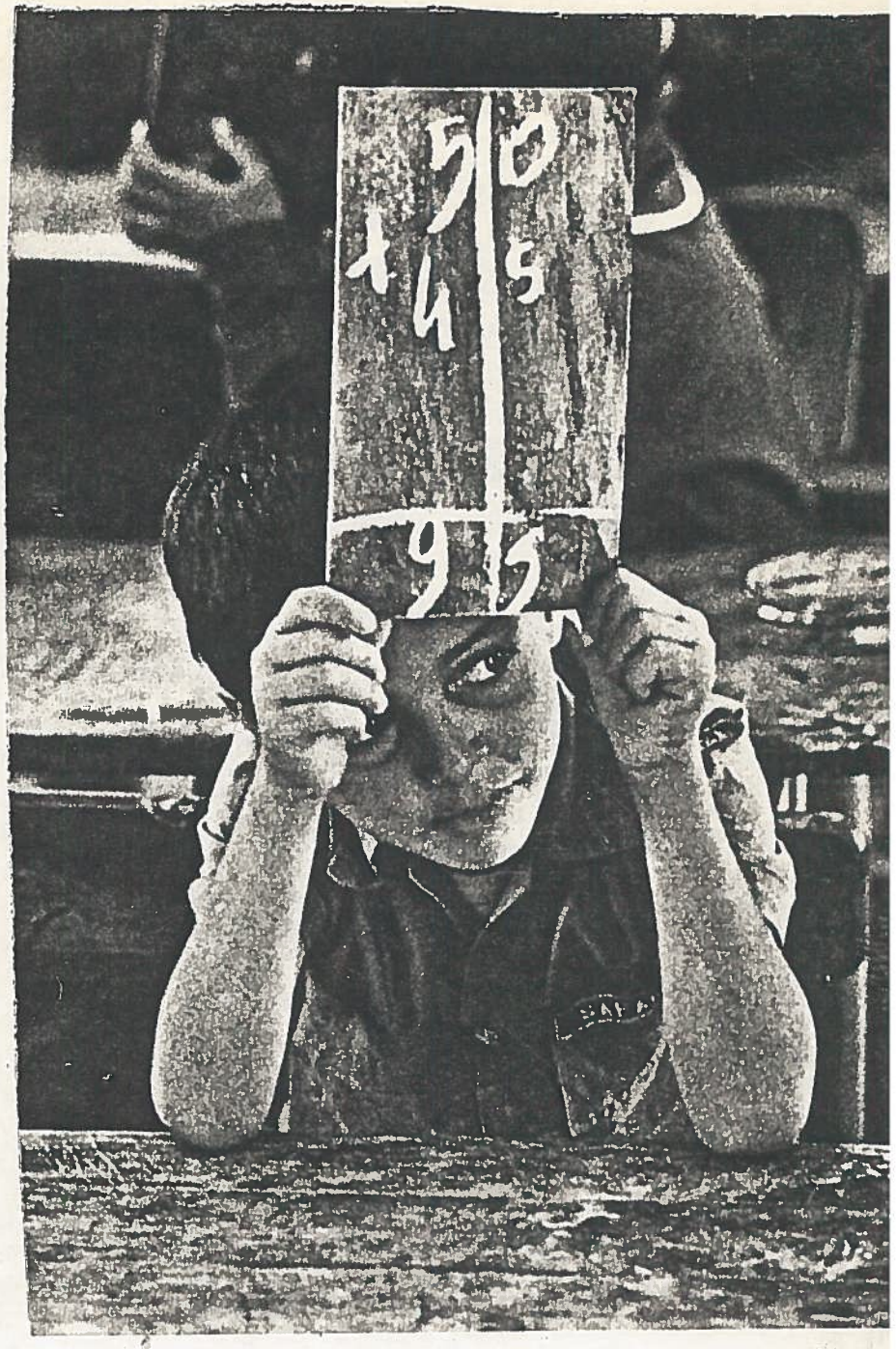
900 - 1600 AD: Algebraic discovery

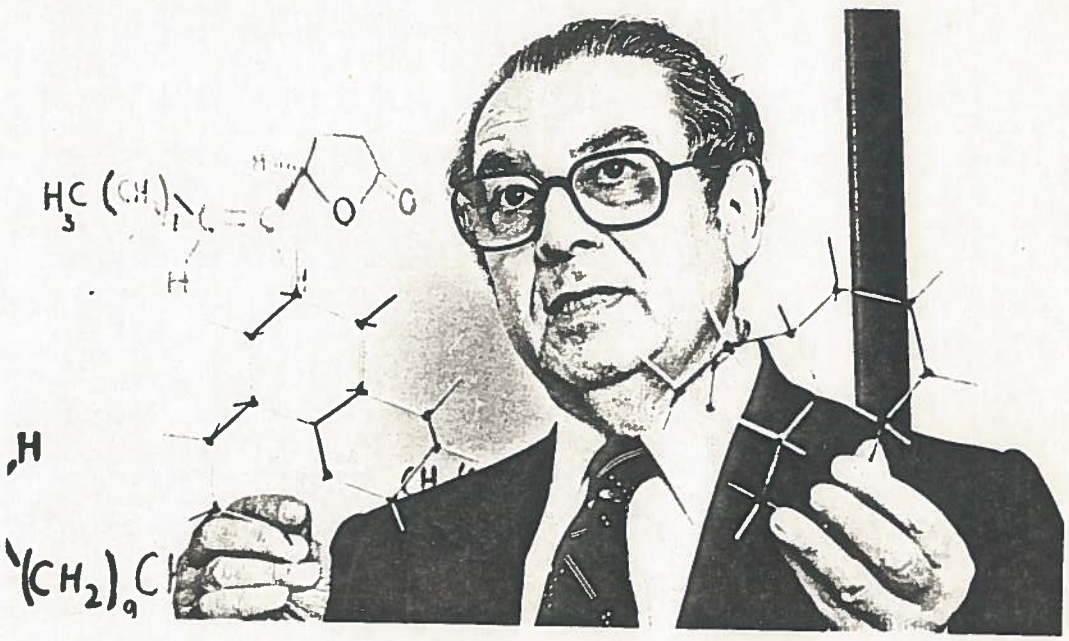
: 1600: Zero: the moslems found in India
This gave us algebra. Research
Let x = the unknown
Math turned practical: Math for peaceful ing

1637 – Galileo dies, Descartes born
Periodic motion
Analytic geometry came from lines & numbers.
Newton & Liebnitz confusion.
Line & number ∞
How many points are On on this line
Area: how many pieces
Now Age: Shaking of ⊙ foundations
Infinity has a whole series
What happened to ⊙ god old days when whole was
Sum of the parts

FLOWER

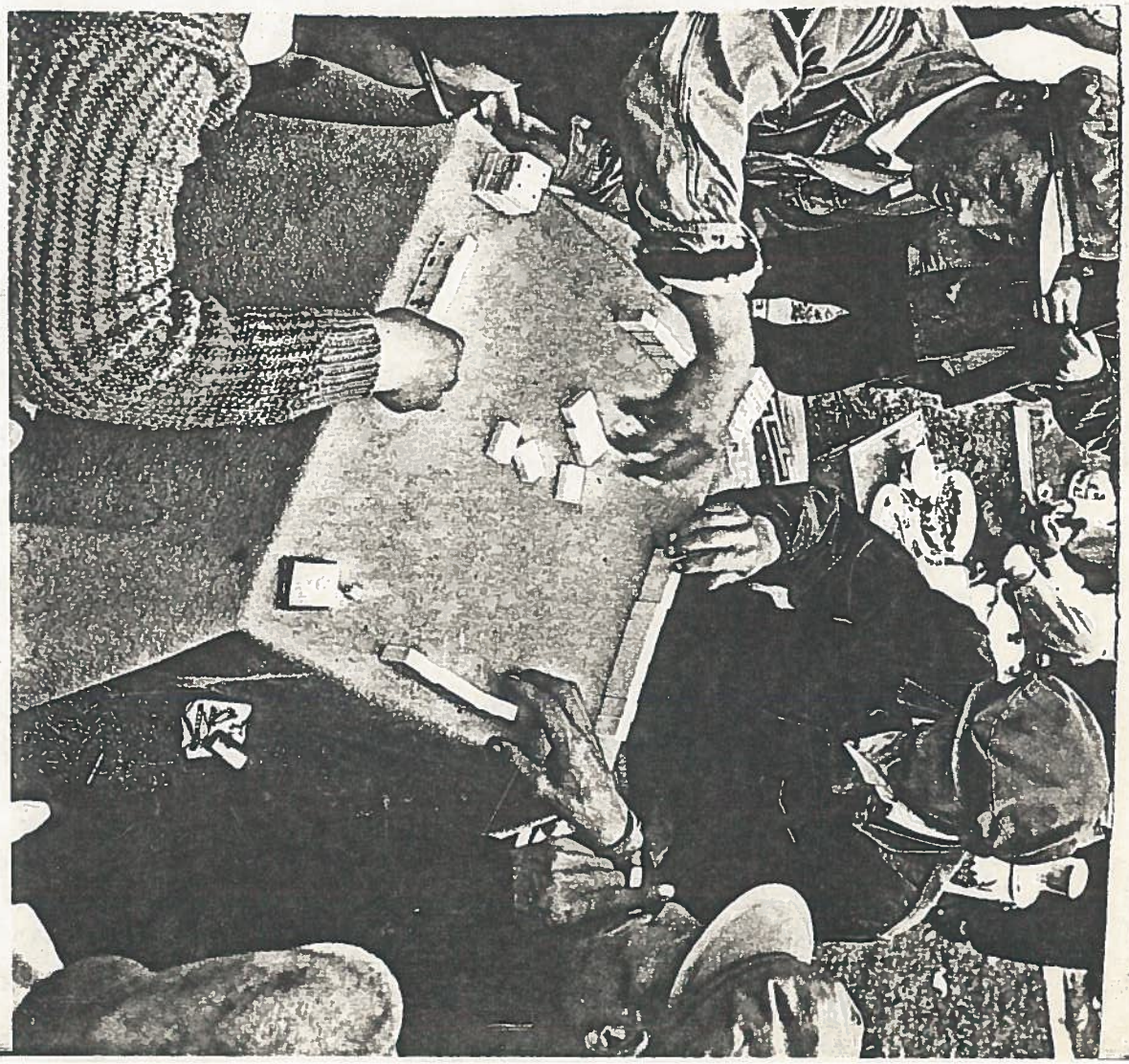




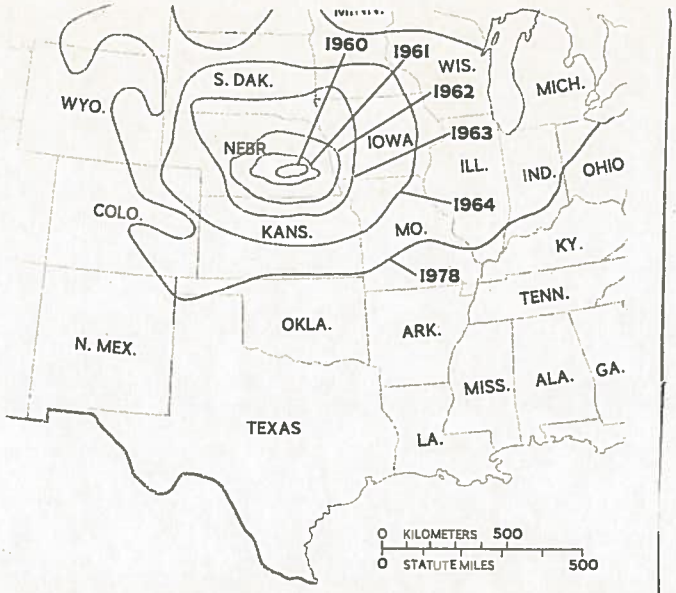


The Pesticide Dilemma

MATHEMATICAL FORMULA
MOLECULAR DESIGN: CHEMICAL SUBSTANCE



*The western corn rootworm has spread from a small area in southern Nebraska to infest 18 states (**map**). Now resistant to once potent poisons like heptachlor, the rootworm profits from the predilection for monoculture, the practice of growing contiguous acres of a single crop. It has fanned out through the endless fields of corn that blanket mid-America—recently at a 140-mile-a-year clip. Control? Crop rotation—interspersing corn with a legume like soybeans—might work. Otherwise, "it may well continue to spread wherever corn grows," predicts entomologist Georghiou, who compiled this map. "It is difficult to tell when an ecological barrier will stop it."*

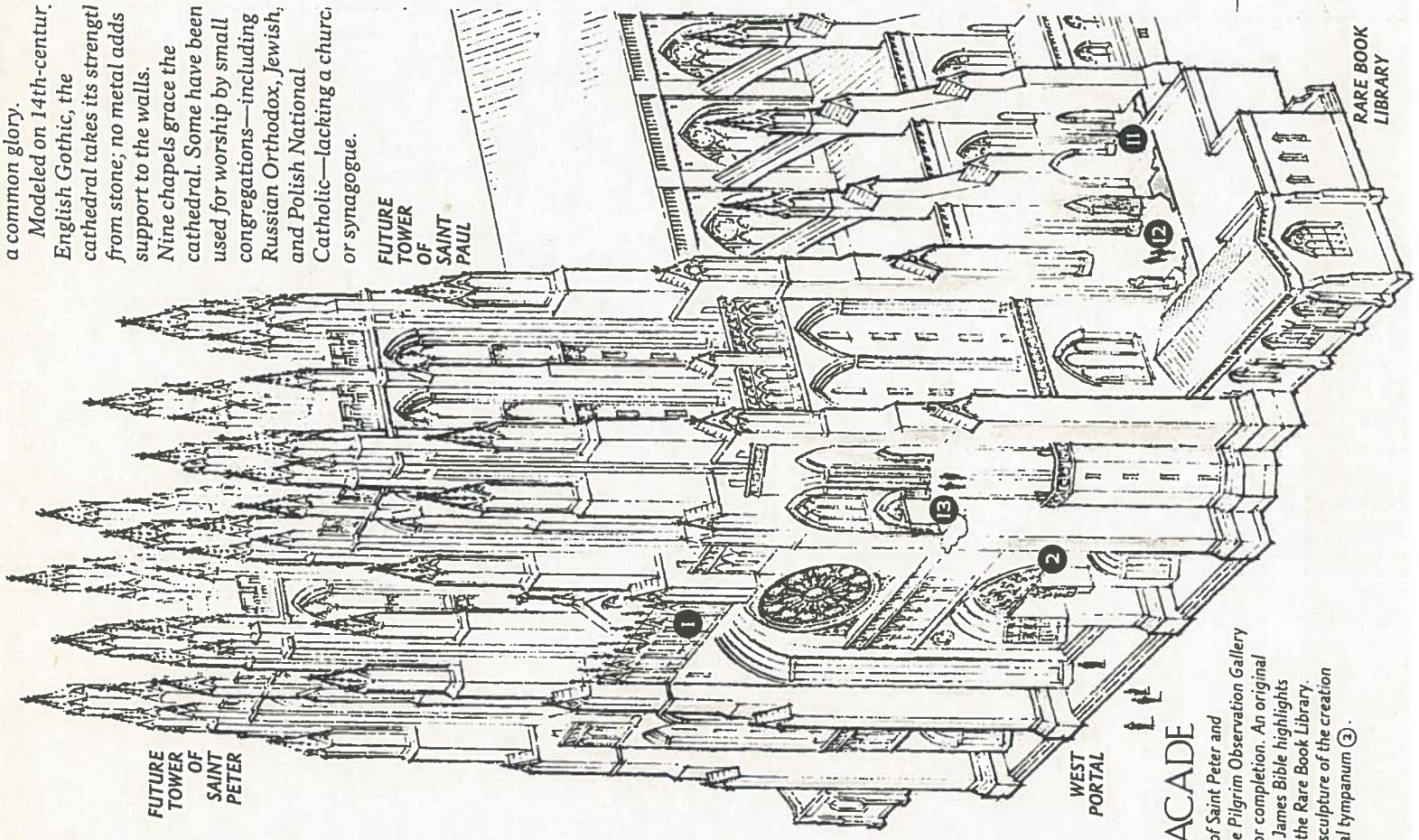


The pesticide-resistant western corn rootworm has the upper hand in the corn belt—and keeps moving on.

(1979) WON NOBEL PEACE PRIZE FOR HIS DISCOVERY OF CHEMICAL TRANSFORMATIONS INVOLVING BOTANES, WHICH EXPEDITE THE PRODUCTION OF SUCH PHEROMONES

artists have aspired towar a common glory.

Modeled on 14th-centur English Gothic, the cathedral takes its strengt from stone; no metal adds support to the walls. Nine chapels grace the cathedral. Some have been used for worship by small congregations—including Russian Orthodox, Jewish, and Polish National Catholic—lacking a churc or synagogue.



WEST FACADE

The twin towers of Saint Peter and Saint Paul and the Pilgrim Observation Gallery ① await funds for completion. An original copy of the King James Bible highlights the collection of the Rare Book Library. Frederick Hart's sculpture of the creation will fill the central tympanum ②.

INTRODUCTION TO HOW TO GROW MATHEMATICIANS ©SH©

The Problem in Math Education

Subject of Growing Mathematicians

How Grow?	Difficulty of Communication	LIVING PROCESS	Changes in Education	Research Method
1 2	3 4	5	6 7 8	9 10

Given cultural differences, understanding the living process of thought of the mathematician may be difficult, but it is not impossible even for someone who grew up in a country with no mathematical tradition.

Elementary Quality of this Math Book

STRUCTURE	Simple Material of Book
11 12 13 14 15 16	

Technical expertise is not necessary for the understanding of higher mathematics, but only a method for looking at mathematical experences and discerning pattern.

The Power and Beauty of Rational Patterns

Definition of Mathematics

BULK	Inadequate Definitions	Defined as: Classification and study of Pattern	Relation to Science	Mystery of Recurring Patterns
17 18	19	20 21 22	23 24	25 26 27 28 29

The enormous bulk and variety of mathematics has led to despair over defining the discipline, but a definition that is adequate is the "classification and study of all possible patterns," for this definition takes into account both the scientific applications and the fascination with mysteriously recurring patterns that mathematicians are concerned with.

Role of Mathematician

Consultant	Artist: The Two Views	Artist: Both Necessary	Artist: Utilitarian Not Enough
30 31 32	33 34 35	36 37 38	39 40 41

Mathematicians may be primarily technical consultants or may be artists concerned with pattern as beauty, but neither a utilitarian or an artistic view is adequate in itself for growing mathematicians, for both are necessary, especially the artist.

The problem in Math education is how to create the influences that grow independent mathematicians trained not in solutions to particular problems but in living processes of thought and thus enable independent solution of puzzles.

Mathematics is concerned with the power or application in science of rational patterns and beauty or the fascination with rational patterns as an end in itself and both of those concerns are essential for growing mathematicians.

Although the need for mathematicians might arise out of scientific technological problems, mathematicians will not grow unless there is developed an artist's fascination with the beauty of pattern and training enables the living process of thought that enables independent solution of puzzles.

CS II C

Sawyer paper
Math — Sci Phil
SAA

Intro. Everyone is a mathematician — Chart up
How describe your encounters with Math
When have you functioned as Math in the Academy
What boring
What exciting
. What is a mathematician?

(instead of 1-2 ... in chart)

I Problem in Math Education today

para 5 objects rather than living processes of thought
important not living attitude of mind

para 8-9-10
true appreciation of potential of Educ.
Tradition Gold Coast?
essence of math influences that develop a mathematician

II What is Math

17. Surprised by Bulk?
18-20 What have you always told yourself Math is
Would Sawyer agree with you.
How would you define Math so Sawyer would agree
21. What is pattern put some on board
22. Chart on power & beauty
23-24 How are these two poles related in history of Math
25-29 Widely applicable patterns
some patterns have more power.
Chart 00. Most useful patterns you know? Most beautiful patterns you know?

III Life as a Mathematician

30. Describe difference technical man & mathematician
Conversation between them (⇔)
Like a clergyman — spirit issue in the practical life complexity
31-32 Events pattern that may be needed
Which pole of Math are we describing? Very rational?
33. Read [illegible] of pure mathematician 34+35
36. Gold Coast — power
37-38-39 pure Math ians Fascination, interest,
— ... with IRRATIONAL — ORDER in Chaos.
Leadership of ... Mind

... Artist ... here

SAA

Concl

List places in your life where you are maldetective

Where fascinated with pattern

Where practical need for better pattern

Why to beauty a value

other than practical reason

Close human congenial or symbolic to the human spirit

complex contradictory produce bad culture

SAW 3

SCIENCE/PHILOSOPHY

Sawyer, <u>On Beauty and Power</u>

ON BEAUTY AND POWER																																							
DESCRIPTION OF TASK																													FUNCTION/ ROLE										
PURPOSE OF BOOK																EXTENT OF MATH								NATURE'S					CONSULT-ANT			ARTIST							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

1. What do you see as the mathematician
   What do you see as the poet?
   What do you see as the mathematician's poet?
2. Where divide chart?
3. Image in first part
4. Move to par. 17
5. What definition of math give?
6. How using word patterns?
7. Patterns only relatively stable thing
   Through patterns participate in change.
8. What polarity does science depend on?
9. Have regional center-
10. What is he saying in 24?
11. Definition of math par. 27? Meaning?
12. What saying in par. 28?
13. Last sentence in par. 29?
14. par. 30-How does mathematicians solve problem?
15. What is he saying in last part?
16. What imperative relative to math does this paper make you aware of?