Preparing Students for Mathematics Competitions

V. M. Sholapurkar
Department of Mathematics,
S. P. College, Pune

June 30, 2021

- A Brief History of Math Competitions

- A Brief History of Math Competitions
- Why a Competition ?

- A Brief History of Math Competitions
- Why a Competition ?
- Competitions: Genuine Vs Commercial

- A Brief History of Math Competitions
- Why a Competition ?
- Competitions: Genuine Vs Commercial
- Competitions at School Level

Outline

- A Brief History of Math Competitions
- Why a Competition ?
- Competitions: Genuine Vs Commercial
- Competitions at School Level
- About Mathematical Olympiad

- A Brief History of Math Competitions
- Why a Competition ?
- Competitions: Genuine Vs Commercial
- Competitions at School Level
- About Mathematical Olympiad
- Preparation of a Competition

- A Brief History of Math Competitions
- Why a Competition ?
- Competitions: Genuine Vs Commercial
- Competitions at School Level
- About Mathematical Olympiad
- Preparation of a Competition
- Role of a Teacher

Outline
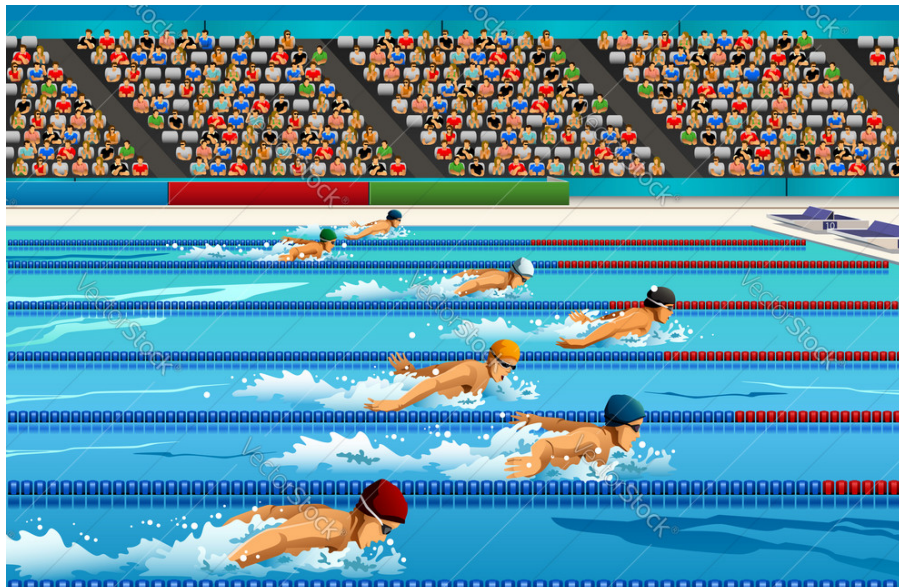
- A Brief History of Math Competitions
- Why a Competition ?
- Competitions: Genuine Vs Commercial
- Competitions at School Level
- About Mathematical Olympiad
- Preparation of a Competition
- Role of a Teacher
- Study Material

Outline

- A Brief History of Math Competitions
- Why a Competition ?
- Competitions: Genuine Vs Commercial
- Competitions at School Level
- About Mathematical Olympiad
- Preparation of a Competition
- Role of a Teacher
- Study Material
- Epilogue

A Brief History

- Earliest known competition took place in Bucharest, Romania in 1885

A Brief History

- Earliest known competition took place in Bucharest, Romania in 1885
- Eötvös competition began in Hungary in 1894

A Brief History

- Earliest known competition took place in Bucharest, Romania in 1885
- Eötvös competition began in Hungary in 1894
- First International Congress of Mathematicians took place in Zurich in 1897

A Brief History

- Earliest known competition took place in Bucharest, Romania in 1885
- Eötvös competition began in Hungary in 1894
- First International Congress of Mathematicians took place in Zurich in 1897
- Several countries, especially in Europe, started organizing regional and national competitions

A Brief History

- Earliest known competition took place in Bucharest, Romania in 1885
- Eötvös competition began in Hungary in 1894
- First International Congress of Mathematicians took place in Zurich in 1897
- Several countries, especially in Europe, started organizing regional and national competitions
- Mathematics Olympiad in St. Petersburg, Russia in 1934

A Brief History

- Earliest known competition took place in Bucharest, Romania in 1885
- Eötvös competition began in Hungary in 1894
- First International Congress of Mathematicians took place in Zurich in 1897
- Several countries, especially in Europe, started organizing regional and national competitions
- Mathematics Olympiad in St. Petersburg, Russia in 1934
- The first IMO took place in Romania (1959) with participants from seven countries: Bulgaria, Czechoslovakia, German Democratic Republic, Hungary, Poland, Romania, and the Soviet Union (USSR).

A Brief History

- Earliest known competition took place in Bucharest, Romania in 1885
- Eötvös competition began in Hungary in 1894
- First International Congress of Mathematicians took place in Zurich in 1897
- Several countries, especially in Europe, started organizing regional and national competitions
- Mathematics Olympiad in St. Petersburg, Russia in 1934
- The first IMO took place in Romania (1959) with participants from seven countries: Bulgaria, Czechoslovakia, German Democratic Republic, Hungary, Poland, Romania, and the Soviet Union (USSR).
- 112 countries participated in the IMO held at Bath, UK in 2019
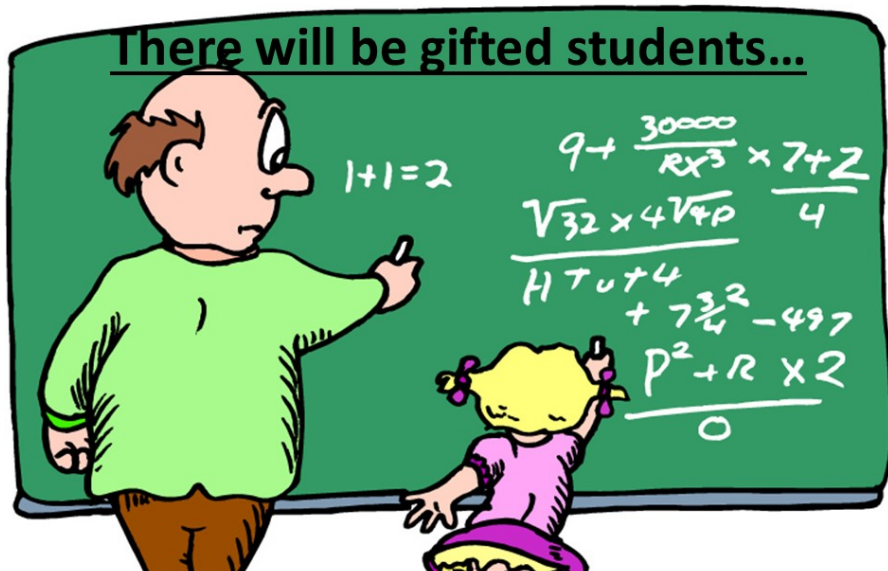
- A competition creates interest in the subject

Why a Competition ?

- A competition creates interest in the subject
- A competition pushes students outside the 'comfort zone' of the regular curriculum

Why a Competition ?

- A competition creates interest in the subject
- A competition pushes students outside the 'comfort zone' of the regular curriculum
- A feeling of accomplishment comes from solving a competition problem

Why a Competition ?

- A competition creates interest in the subject
- A competition pushes students outside the 'comfort zone' of the regular curriculum
- A feeling of accomplishment comes from solving a competition problem
- Students start accepting a need for logical reasoning

- A competition creates interest in the subject
- A competition pushes students outside the 'comfort zone' of the regular curriculum
- A feeling of accomplishment comes from solving a competition problem
- Students start accepting a need for logical reasoning
- A competition creates a vibrant atmosphere in academia

- A competition creates interest in the subject
- A competition pushes students outside the 'comfort zone' of the regular curriculum
- A feeling of accomplishment comes from solving a competition problem
- Students start accepting a need for logical reasoning
- A competition creates a vibrant atmosphere in academia
- A competition develops the sporting spirit among students

Why a Competition ?

- A competition creates interest in the subject
- A competition pushes students outside the 'comfort zone' of the regular curriculum
- A feeling of accomplishment comes from solving a competition problem
- Students start accepting a need for logical reasoning
- A competition creates a vibrant atmosphere in academia
- A competition develops the sporting spirit among students
- A competition enhances the student-teacher relationship

1. Involvement in a competition updates a teacher and raises the level of competence

1. Involvement in a competition updates a teacher and raises the level of competence
2. Creates a space for developing the team spirit in the organization

1. Involvement in a competition updates a teacher and raises the level of competence
2. Creates a space for developing the team spirit in the organization
3. Higher abilities and talent are identified, encouraged and nurtured

1. Involvement in a competition updates a teacher and raises the level of competence
2. Creates a space for developing the team spirit in the organization
3. Higher abilities and talent are identified, encouraged and nurtured
4. Students are driven towards a career in Mathematics

1. Involvement in a competition updates a teacher and raises the level of competence
2. Creates a space for developing the team spirit in the organization
3. Higher abilities and talent are identified, encouraged and nurtured
4. Students are driven towards a career in Mathematics
5. Competitions enhance the reputation of an institution

1. Involvement in a competition updates a teacher and raises the level of competence
2. Creates a space for developing the team spirit in the organization
3. Higher abilities and talent are identified, encouraged and nurtured
4. Students are driven towards a career in Mathematics
5. Competitions enhance the reputation of an institution
6. Pre and Post Competition Events are good for quality enhancement:

1. Involvement in a competition updates a teacher and raises the level of competence

2. Creates a space for developing the team spirit in the organization

3. Higher abilities and talent are identified, encouraged and nurtured

4. Students are driven towards a career in Mathematics

5. Competitions enhance the reputation of an institution

6. Pre and Post Competition Events are good for quality enhancement:
   Problem Coordination Camps

1. Involvement in a competition updates a teacher and raises the level of competence
2. Creates a space for developing the team spirit in the organization
3. Higher abilities and talent are identified, encouraged and nurtured
4. Students are driven towards a career in Mathematics
5. Competitions enhance the reputation of an institution
6. Pre and Post Competition Events are good for quality enhancement:
Problem Coordination Camps
Special Training Camps

1. Involvement in a competition updates a teacher and raises the level of competence
2. Creates a space for developing the team spirit in the organization
3. Higher abilities and talent are identified, encouraged and nurtured
4. Students are driven towards a career in Mathematics
5. Competitions enhance the reputation of an institution
6. Pre and Post Competition Events are good for quality enhancement:
   Problem Coordination Camps
   Special Training Camps
   Prize Distribution Function
   Nurture Camps for Prize Winners

- Mushrooming of Olympiads

- Mushrooming of Olympiads
- Competitions organized by private organizations

- Mushrooming of Olympiads
- Competitions organized by private organizations
- Commercial purpose,

- Mushrooming of Olympiads
- Competitions organized by private organizations
- Commercial purpose, variations in topics,

- Mushrooming of Olympiads
- Competitions organized by private organizations
- Commercial purpose, variations in topics,

- Mushrooming of Olympiads
- Competitions organized by private organizations
- Commercial purpose, variations in topics, high fees,

- Mushrooming of Olympiads
- Competitions organized by private organizations
- Commercial purpose, variations in topics, high fees, cost of study material,

- Mushrooming of Olympiads
- Competitions organized by private organizations
- Commercial purpose, variations in topics, high fees, cost of study material, 'international' in a misleading way,

- Mushrooming of Olympiads
- Competitions organized by private organizations
- Commercial purpose, variations in topics, high fees, cost of study material, 'international' in a misleading way, rote learning,

- Mushrooming of Olympiads
- Competitions organized by private organizations
- Commercial purpose, variations in topics, high fees, cost of study material, 'international' in a misleading way, rote learning, computational rather than conceptual,

- Mushrooming of Olympiads
- Competitions organized by private organizations
- Commercial purpose, variations in topics, high fees, cost of study material, 'international' in a misleading way, rote learning, computational rather than conceptual, misjudgement of abilities

Competitions: Genuine Vs Commercial

- Mushrooming of Olympiads
- Competitions organized by private organizations
- Commercial purpose, variations in topics, high fees, cost of study material, 'international' in a misleading way, rote learning, computational rather than conceptual, misjudgement of abilities
- Competitions organized by recognized institutions or government departments

- Mushrooming of Olympiads
- Competitions organized by private organizations
- Commercial purpose, variations in topics, high fees, cost of study material, 'international' in a misleading way, rote learning, computational rather than conceptual, misjudgement of abilities
- Competitions organized by recognized institutions or government departments

- Mathematical Olympiads (HBCSE, Mumbai)
  http://www.hbcse.tifr.res.in

Competitions at Various Levels

- Mathematical Olympiads (HBCSE, Mumbai)
  http://www.hbcse.tifr.res.in
- European Girls' Mathematical Olympiad
  https://www.egmo.org

Competitions at Various Levels

- Mathematical Olympiads (HBCSE, Mumbai)
  http://www.hbcse.tifr.res.in
- European Girls' Mathematical Olympiad
  https://www.egmo.org
- National Mathematics Talent Competition (AMTI, Chennai)
  https://www.amtionline.com

Competitions at Various Levels

- Mathematical Olympiads (HBCSE, Mumbai)
  http://www.hbcse.tifr.res.in
- European Girls' Mathematical Olympiad
  https://www.egmo.org
- National Mathematics Talent Competition (AMTI, Chennai)
  https://www.amtionline.com
- Madhava Mathematics Competition (S. P.College,Pune and
  HBCSE) https://www.madhavacompetition.in

Competitions at Various Levels

- Mathematical Olympiads (HBCSE, Mumbai)
  http://www.hbcse.tifr.res.in
- European Girls' Mathematical Olympiad
  https://www.egmo.org
- National Mathematics Talent Competition (AMTI, Chennai)
  https://www.amtionline.com
- Madhava Mathematics Competition (S. P.College,Pune and
  HBCSE) https://www.madhavacompetition.in
- Bhaskaracharya Mathematics Talent Search Competition
  (Bhaskaracharya Pratishthana, Pune) www.bprim.org
- State level Organizations of Mathematics Teachers
  - Maharashtra Ganit Adhyapak Mandal: Mathex Competitions

Competitions at Various Levels

- Mathematical Olympiads (HBCSE, Mumbai)
  http://www.hbcse.tifr.res.in
- European Girls' Mathematical Olympiad
  https://www.egmo.org
- National Mathematics Talent Competition (AMTI, Chennai)
  https://www.amtionline.com
- Madhava Mathematics Competition (S. P.College,Pune and
  HBCSE) https://www.madhavacompetition.in
- Bhaskaracharya Mathematics Talent Search Competition
  (Bhaskaracharya Pratishthana, Pune) www.bprim.org
- State level Organizations of Mathematics Teachers
  - Maharashtra Ganit Adhyapak Mandal: Mathex Competitions
  - Gujrat Ganit Mandal

Competitions at Various Levels

- Mathematical Olympiads (HBCSE, Mumbai)
  http://www.hbcse.tifr.res.in
- European Girls' Mathematical Olympiad
  https://www.egmo.org
- National Mathematics Talent Competition (AMTI, Chennai)
  https://www.amtionline.com
- Madhava Mathematics Competition (S. P.College,Pune and
  HBCSE) https://www.madhavacompetition.in
- Bhaskaracharya Mathematics Talent Search Competition
  (Bhaskaracharya Pratishthana, Pune) www.bprim.org
- State level Organizations of Mathematics Teachers
  - Maharashtra Ganit Adhyapak Mandal: Mathex Competitions
  - Gujrat Ganit Mandal
  - Assam Academy of Mathematics

IMO 2019 held at Bath, UK

- Pre RMO is conducted by MTA(I)
  http://www.mtai.org.in/prmo

- Pre RMO is conducted by MTA(I)
  http://www.mtai.org.in/prmo
- More than 1,50,000 students across the country appeared for Pre RMO in the year 20118-19
- All the remaining stages : RMO, INMO and IMOTC are organized by HBCSE, Mumbai

- Pre RMO is conducted by MTA(I)
  http://www.mtai.org.in/prmo
- More than 1,50,000 students across the country appeared for Pre RMO in the year 20118-19
- All the remaining stages : RMO, INMO and IMOTC are organized by HBCSE, Mumbai
- The programme is fully funded by the Government of India through NBHM

- Pre RMO is conducted by MTA(I)
  http://www.mtai.org.in/prmo
- More than 1,50,000 students across the country appeared for Pre RMO in the year 20118-19
- All the remaining stages : RMO, INMO and IMOTC are organized by HBCSE, Mumbai
- The programme is fully funded by the Government of India through NBHM
- About 12,000 students qualified for RMO,

- Pre RMO is conducted by MTA(I)
  http://www.mtai.org.in/prmo
- More than 1,50,000 students across the country appeared for Pre RMO in the year 20118-19
- All the remaining stages : RMO, INMO and IMOTC are organized by HBCSE, Mumbai
- The programme is fully funded by the Government of India through NBHM
- About 12,000 students qualified for RMO, 1200 for INMO,

- Pre RMO is conducted by MTA(I)
  http://www.mtai.org.in/prmo
- More than 1,50,000 students across the country appeared for Pre RMO in the year 20118-19
- All the remaining stages : RMO, INMO and IMOTC are organized by HBCSE, Mumbai
- The programme is fully funded by the Government of India through NBHM
- About 12,000 students qualified for RMO, 1200 for INMO, 60 for IMOTC

- Pre RMO is conducted by MTA(I)
  http://www.mtai.org.in/prmo

- More than 1,50,000 students across the country appeared for Pre RMO in the year 20118-19

- All the remaining stages : RMO, INMO and IMOTC are organized by HBCSE, Mumbai

- The programme is fully funded by the Government of India through NBHM

- About 12,000 students qualified for RMO, 1200 for INMO, 60 for IMOTC and finally 6 in the Indian Team

- The programme is certainly not designed for the last 6 !

- The programme is certainly not designed for the last 6 !
- Thousands of schools get involved in the event

- The programme is certainly not designed for the last 6 !
- Thousands of schools get involved in the event
- Exposure to the exciting area of problem solving

- The programme is certainly not designed for the last 6 !
- Thousands of schools get involved in the event
- Exposure to the exciting area of problem solving
- Gateway for higher mathematics

- The programme is certainly not designed for the last 6 !
- Thousands of schools get involved in the event
- Exposure to the exciting area of problem solving
- Gateway for higher mathematics
- A trusted educational instrument at school level

- The programme is certainly not designed for the last 6 !
- Thousands of schools get involved in the event
- Exposure to the exciting area of problem solving
- Gateway for higher mathematics
- A trusted educational instrument at school level
- The general mathematical know-how in the country

- The programme is certainly not designed for the last 6 !
- Thousands of schools get involved in the event
- Exposure to the exciting area of problem solving
- Gateway for higher mathematics
- A trusted educational instrument at school level
- The general mathematical know-how in the country
- Direct admission to pursue a career in mathematics

Madhava Mathematics Competition

(A Mathematics Competition for Undergraduate Students)

Organized by

Department of Mathematics, S. P. College, Pune

and

Homi Bhabha Centre for Science Education, T. I. F. R., Mumbai

Funded by

National Board for Higher Mathematics

The Competition is named after Madhava, who introduced in the fourteenth century, profound mathematical ideas that are now part of Calculus. His most famous achievements include the Madhava-Leibnitz series for π, the Madhava-Newton power series for Sine and Cosine functions and a numerical value of π that is accurate to eleven decimal places. The "Madhava School", consisting of a long chain of teacher-student continuity, flourished for well over two centuries, making significant contributions to mathematics and astronomy.

A MATHEMATICS COMPETITION FOR S.Y.B.Sc. STUDENTS

Interested Students of F.Y.B.Sc. and T.Y.B.Sc. are also eligible.
(A separate merit list of T.Y.B.Sc. will be prepared.)

Prizes :

- Attractive Cash Prizes and Medals for Rank Holders
- Several Cheer Prizes
- Participation Certificate to All Students
- Nurture Camp for select students

- An extension of Olympiads to Undergraduate classes

- An extension of Olympiads to Undergraduate classes
- Who is Madhava ?

- An extension of Olympiads to Undergraduate classes
- Who is Madhava ?

$$\frac{\pi}{4} = 1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \cdots$$

Madhava Mathematics Competition

- An extension of Olympiads to Undergraduate classes
- Who is Madhava ?

$$\frac{\pi}{4} = 1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \cdots$$

- A proposal from S. P. College, Pune

- An extension of Olympiads to Undergraduate classes
- Who is Madhava ?

$$\frac{\pi}{4} = 1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \cdots$$

- A proposal from S. P. College, Pune
- Competition began in 2009-10 as a pilot project in Pune and Mumbai with a modest participation of 700 students
- Blossmed into a National level competition funded by NBHM

- An extension of Olympiads to Undergraduate classes
- Who is Madhava ?

$$\frac{\pi}{4} = 1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \cdots$$

- A proposal from S. P. College, Pune
- Competition began in 2009-10 as a pilot project in Pune and Mumbai with a modest participation of 700 students
- Blossmed into a National level competition funded by NBHM item Conducted in 23 regions across the country with a registration of about ten thousand students

- An extension of Olympiads to Undergraduate classes
- Who is Madhava ?

$$\frac{\pi}{4} = 1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \cdots$$
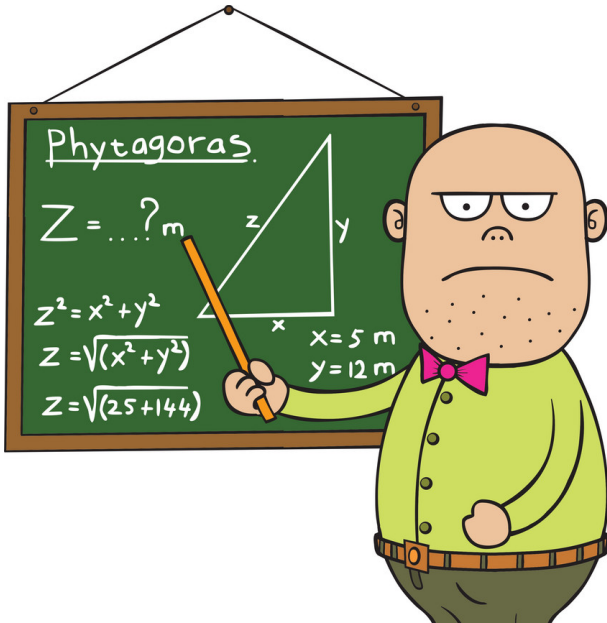
- A proposal from S. P. College, Pune
- Competition began in 2009-10 as a pilot project in Pune and Mumbai with a modest participation of 700 students
- Blossmed into a National level competition funded by NBHM item Conducted in 23 regions across the country with a registration of about ten thousand students
- Nurture Camps

Role of a Teacher

- Love and Pride for the subject

- Love and Pride for the subject
- Passion for Problem Solving

- Love and Pride for the subject
- Passion for Problem Solving
- Enthusiasm in the Classroom

- Love and Pride for the subject
- Passion for Problem Solving
- Enthusiasm in the Classroom
- Training in teaching for competitions

- Love and Pride for the subject
- Passion for Problem Solving
- Enthusiasm in the Classroom
- Training in teaching for competitions
- Collection of study material, especially problems

- Love and Pride for the subject
- Passion for Problem Solving
- Enthusiasm in the Classroom
- Training in teaching for competitions
- Collection of study material, especially problems
- Informing students about the competition

- Love and Pride for the subject
- Passion for Problem Solving
- Enthusiasm in the Classroom
- Training in teaching for competitions
- Collection of study material, especially problems
- Informing students about the competition
- Academic administration

Role of a Teacher

- Love and Pride for the subject
- Passion for Problem Solving
- Enthusiasm in the Classroom
- Training in teaching for competitions
- Collection of study material, especially problems
- Informing students about the competition
- Academic administration
- Join a group of like minded teachers

- Teaching is a 'Performing Art'

- Teaching is a 'Performing Art'
- 'Less' Teaching is 'Good' Teaching

- Teaching is a 'Performing Art'
- 'Less' Teaching is 'Good' Teaching
- Preparation for the Lecture – Am not sure ??

- Teaching is a 'Performing Art'
- 'Less' Teaching is 'Good' Teaching
- Preparation for the Lecture – Am not sure ??
- Take students in confidence and treat them at par

- Teaching is a 'Performing Art'
- 'Less' Teaching is 'Good' Teaching
- Preparation for the Lecture – Am not sure ??
- Take students in confidence and treat them at par
- Active participation of Students

video

- Graded textbook exercises,

- Graded textbook exercises,
- Recreational Mathematics: Magic Squares, Alphametics, etc.

Nature of the Problems

- Graded textbook exercises,
- Recreational Mathematics: Magic Squares, Alphametics, etc.
- Logical Puzzles: Weighing Problems,

Nature of the Problems

- Graded textbook exercises,
- Recreational Mathematics: Magic Squares, Alphametics, etc.
- Logical Puzzles: Weighing Problems,
- Puzzles

Nature of the Problems

- Graded textbook exercises,
- Recreational Mathematics: Magic Squares, Alphametics, etc.
- Logical Puzzles: Weighing Problems,
- Puzzles Twisted problems (1 twist),

Nature of the Problems

- Graded textbook exercises,
- Recreational Mathematics: Magic Squares, Alphametics, etc.
- Logical Puzzles: Weighing Problems,
- Puzzles Twisted problems (1 twist), Twisted problems (2 twists), ...

Nature of the Problems

- Graded textbook exercises,
- Recreational Mathematics: Magic Squares, Alphametics, etc.
- Logical Puzzles: Weighing Problems,
- Puzzles Twisted problems (1 twist), Twisted problems (2 twists), ...
- Start with short and attractive...

Nature of the Problems

- Graded textbook exercises,
- Recreational Mathematics: Magic Squares, Alphametics, etc.
- Logical Puzzles: Weighing Problems,
- Puzzles Twisted problems (1 twist), Twisted problems (2 twists), . . .
- Start with short and attractive...
  Find an integer that is divisible by 10 and such that the sum of its digits decreases by 10% when the number itself increases by 10%.

- Graded textbook exercises,
- Recreational Mathematics: Magic Squares, Alphametics, etc.
- Logical Puzzles: Weighing Problems,
- Puzzles Twisted problems (1 twist), Twisted problems (2 twists), . . .
- Start with short and attractive...
  Find an integer that is divisible by 10 and such that the sum of its digits decreases by 10% when the number itself increases by 10%.
- Preferably doable right on the spot without the need of a 'big theorem'
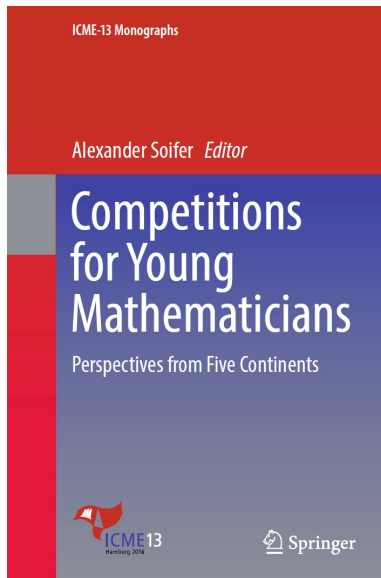
A logical theory may be tested by its capacity for dealing with puzzles, and it is a wholesome plan, in thinking about logic, to stock the mind with as many puzzles as possible, since these serve much the same purpose as is served by experiments in physical science

Bertrand Russel (1872-1970)

A logical theory may be tested by its capacity for dealing with puzzles, and it is a wholesome plan, in thinking about logic, to stock the mind with as many puzzles as possible, since these serve much the same purpose as is served by experiments in physical science

Bertrand Russel (1872-1970)

No branch of intellectual activity is a more appropriate subject for discussion than puzzles and paradoxes... Puzzles in one sense, better than any single branch of mathematics reflect its always youthful, unspoiled and inquiring spirit

Kasner and Newman

John H. Conway,

A logical theory may be tested by its capacity for dealing with puzzles, and it is a wholesome plan, in thinking about logic, to stock the mind with as many puzzles as possible, since these serve much the same purpose as is served by experiments in physical science

Bertrand Russel (1872-1970)

No branch of intellectual activity is a more appropriate subject for discussion than puzzles and paradoxes... Puzzles in one sense, better than any single branch of mathematics reflect its always youthful, unspoiled and inquiring spirit

Kasner and Newman

John H. Conway, Henry Dudeney,

A logical theory may be tested by its capacity for dealing with puzzles, and it is a wholesome plan, in thinking about logic, to stock the mind with as many puzzles as possible, since these serve much the same purpose as is served by experiments in physical science

Bertrand Russel (1872-1970)

No branch of intellectual activity is a more appropriate subject for discussion than puzzles and paradoxes... Puzzles in one sense, better than any single branch of mathematics reflect its always youthful, unspoiled and inquiring spirit

Kasner and Newman

John H. Conway, Henry Dudeney, Martin Gradner,

A logical theory may be tested by its capacity for dealing with puzzles, and it is a wholesome plan, in thinking about logic, to stock the mind with as many puzzles as possible, since these serve much the same purpose as is served by experiments in physical science

Bertrand Russel (1872-1970)

No branch of intellectual activity is a more appropriate subject for discussion than puzzles and paradoxes... Puzzles in one sense, better than any single branch of mathematics reflect its always youthful, unspoiled and inquiring spirit

Kasner and Newman

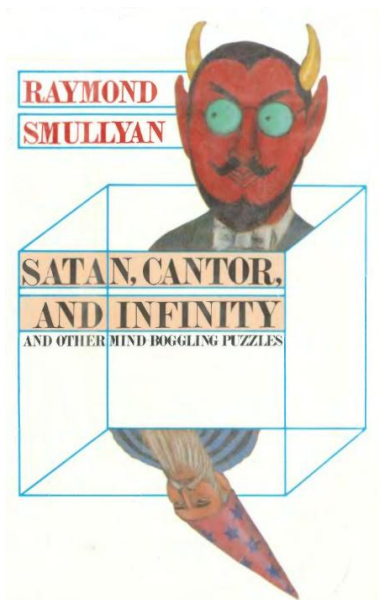John H. Conway, Henry Dudeney, Martin Gradner, Ian Stewart,

A logical theory may be tested by its capacity for dealing with puzzles, and it is a wholesome plan, in thinking about logic, to stock the mind with as many puzzles as possible, since these serve much the same purpose as is served by experiments in physical science

Bertrand Russel (1872-1970)

No branch of intellectual activity is a more appropriate subject for discussion than puzzles and paradoxes... Puzzles in one sense, better than any single branch of mathematics reflect its always youthful, unspoiled and inquiring spirit

Kasner and Newman

John H. Conway, Henry Dudeney, Martin Gradner, Ian Stewart, Raymond Smullyan

1. In a classroom, one or more students always tell the truth. the others sometimes do, and other times do not. The students are asked how many of them always tell the truth. The answers were:

   5, 6, 2, 3, 4, 6, 3, 6, 3, 4, 6, 5, 4, 3 and 6.

   So, in reality, how many students do always tell the truth ?

   (Dutch Mathematical Olympiad 2011)

1. In a classroom, one or more students always tell the truth. the others sometimes do, and other times do not. The students are asked how many of them always tell the truth. The answers were:

   5, 6, 2, 3, 4, 6, 3, 6, 3, 4, 6, 5, 4, 3 and 6.

   So, in reality, how many students do always tell the truth ?

   (Dutch Mathematical Olympiad 2011)

2. Find the smallest number (positive integer) that can be represented in two different ways as a sum of three terms in such a way that the six summands appearing in the said representation are all distinct.

1. In a classroom, one or more students always tell the truth. the others sometimes do, and other times do not. The students are asked how many of them always tell the truth. The answers were:

   5, 6, 2, 3, 4, 6, 3, 6, 3, 4, 6, 5, 4, 3 and 6.

   So, in reality, how many students do always tell the truth ?

   (Dutch Mathematical Olympiad 2011)

2. Find the smallest number (positive integer) that can be represented in two different ways as a sum of three terms in such a way that the six summands appearing in the said representation are all distinct.

3. Eric and Marina wrote two or three poems every day. Over a period of time Eric wrote 43 poems while Marina wrote 61. How many days were in this period of time ? (AMC, 2010)

- Eric and Marina wrote two or three poems every day. Over a period of time Eric wrote 43 poems while Marina wrote 61. How many days were in this period of time ? (AMC, 2010)

- Eric and Marina wrote two or three poems every day. Over a period of time Eric wrote 43 poems while Marina wrote 61. How many days were in this period of time ? (AMC, 2010)

- Suppose the number of days is x with Eric writing 3 poems on y days and Marina on z days.

- Eric and Marina wrote two or three poems every day. Over a period of time Eric wrote 43 poems while Marina wrote 61. How many days were in this period of time ? (AMC, 2010)
- Suppose the number of days is x with Eric writing 3 poems on y days and Marina on z days.

$$3y + 2(x - y) = 43 \text{ and } 3z + 2(x - z) = 61$$

Sample Solution

- Eric and Marina wrote two or three poems every day. Over a period of time Eric wrote 43 poems while Marina wrote 61. How many days were in this period of time ? (AMC, 2010)

- Suppose the number of days is x with Eric writing 3 poems on y days and Marina on z days.

$$3y + 2(x - y) = 43 \text{ and } 3z + 2(x - z) = 61$$

$$y + 2x = 43 \text{ and } z + 2x = 61 \text{ implying } z = y + 18$$

- Eric and Marina wrote two or three poems every day. Over a period of time Eric wrote 43 poems while Marina wrote 61. How many days were in this period of time ? (AMC, 2010)

- Suppose the number of days is x with Eric writing 3 poems on y days and Marina on z days.

$$3y + 2(x - y) = 43 \quad \text{and} \quad 3z + 2(x - z) = 61$$

$$y + 2x = 43 \quad \text{and} \quad z + 2x = 61 \quad \text{implying} \quad z = y + 18$$

Thus y and z both are odd.

- Eric and Marina wrote two or three poems every day. Over a period of time Eric wrote 43 poems while Marina wrote 61. How many days were in this period of time ? (AMC, 2010)
- Suppose the number of days is x with Eric writing 3 poems on y days and Marina on z days.

$$3y + 2(x - y) = 43 \quad \text{and} \quad 3z + 2(x - z) = 61$$

$$y + 2x = 43 \quad \text{and} \quad z + 2x = 61 \quad \text{implying} \quad z = y + 18$$

Thus y and z both are odd. But $y \geq 3 \rightarrow z \geq 21$ and $x \leq 20$ -a contradiction ! So $y = 1$ and thus $z = 19$ and $x = 21$.

1. It could not be less than 21 days, as in 20 days one could write at most 60 poems.

1. It could not be less than 21 days, as in 20 days one could write at most 60 poems.
   It could not be more than 21 days, as in 22 days each one would hve written at least 44 poems.

1. It could not be less than 21 days, as in 20 days one could write at most 60 poems.
   It could not be more than 21 days, as in 22 days each one would hve written at least 44 poems.

2. Since Maria wrote 18 more poems than Eric, there were at least 18 days when Maria wrote 18 poems but Eric wrote 2.
   Now $43 = 18 \times 2 + 2 + 2 + 3$ and $61 = 18 \times 3 + 2 + 2 + 3$

1. It could not be less than 21 days, as in 20 days one could write at most 60 poems.
   It could not be more than 21 days, as in 22 days each one would hve written at least 44 poems.

2. Since Maria wrote 18 more poems than Eric, there were at least 18 days when Maria wrote 18 poems but Eric wrote 2.
   Now $43 = 18 \times 2 + 2 + 2 + 3$ and $61 = 18 \times 3 + 2 + 2 + 3$
   So there were 21 days.

Alternate Solutions

1. It could not be less than 21 days, as in 20 days one could write at most 60 poems.
   It could not be more than 21 days, as in 22 days each one would hve written at least 44 poems.

2. Since Maria wrote 18 more poems than Eric, there were at least 18 days when Maria wrote 18 poems but Eric wrote 2.
   Now $43 = 18 \times 2 + 2 + 2 + 3$ and $61 = 18 \times 3 + 2 + 2 + 3$
   So there were 21 days.

It is better to solve one problem five ways, than to solve five problems the same way- Polya

1. Four friends A, B, C and D need to cross a bridge. A maximum of two people can cross at a time. It is night and they have just 1 lamp. People that cross the bridge must carry the lamp to see the way. A pair must walk together at the speed of slower person.
   Speeds of A: 1 minute, B: 2 minutes, C: 7 minutes, D: 10 minutes to cross the bridge. What is the total minimum time required by all 4 friends to cross the bridge?

2. Show that one can write the squares of appropriate positive integers in the fields of an $m \times n$ array such that all row and column sums of the resulting array are also squares of positive integers.

- Abundance of study material

- Abundance of study material
- Excursion in Mathematics

- Abundance of study material
- Excursion in Mathematics
- Challenges and Thrills of Pre College Mathematics

Study Material

- Abundance of study material
- Excursion in Mathematics
- Challenges and Thrills of Pre College Mathematics
- Mathematical Circles

- Abundance of study material
- Excursion in Mathematics
- Challenges and Thrills of Pre College Mathematics
- Mathematical Circles
- Problem Solving Strategies

Study Material

- Abundance of study material
- Excursion in Mathematics
- Challenges and Thrills of Pre College Mathematics
- Mathematical Circles
- Problem Solving Strategies
- Journals and Magazines(AMM, MM, Crux, etc.)

Study Material

- Abundance of study material
- Excursion in Mathematics
- Challenges and Thrills of Pre College Mathematics
- Mathematical Circles
- Problem Solving Strategies
- Journals and Magazines(AMM, MM, Crux, etc.)
- Art of Problem Solving `www.artofproblemsolving/com`

Epilogue

- A competition is neither well appreciated by 'Mathematicians' nor by 'Math Educators' !

Epilogue

- A competition is neither well appreciated by 'Mathematicians' nor by 'Math Educators' !
- Networking of competitions

- A competition is neither well appreciated by 'Mathematicians' nor by 'Math Educators' !

- Networking of competitions

- WFNMC http://www.wfnmc.org

- A competition is neither well appreciated by 'Mathematicians' nor by 'Math Educators' !
- Networking of competitions
- WFNMC `http://www.wfnmc.org`

- A competition is neither well appreciated by 'Mathematicians' nor by 'Math Educators' !
- Networking of competitions
- WFNMC `http://www.wfnmc.org`

- Mathematics Clubs

- A competition is neither well appreciated by 'Mathematicians' nor by 'Math Educators' !
- Networking of competitions
- WFNMC `http://www.wfnmc.org`

- Mathematics Clubs
- Developing a pool of trained teachers

Email Id: bhaskaraprim@gmail.com