

IITSP Application Form

1. Student Name

2. School

3. Nationality

4. Date of Birth

5. Grade

6. Email address of the school teacher or mentor who will provide the recommendation letter

7. Parent's Email Address

International Intensive Trigonometry Summer Program (IITSP)

About IITSP

IITSP is a summer program led by Professor Shubhrangshu Dasgupta from the Department of Physics at the Indian Institute of Technology Ropar (IIT Ropar), along with PhDs in mathematical physics.

The program adopts the intensive and competitive mathematics teaching methodology unique to IITs and is designed to provide deep and focused instruction in trigonometry for students worldwide, from Grade 7 and above.

Students who participate in this program will gain confidence in studying trigonometry, and having attended IITSP will serve as a valuable credential for high school or college applications.

We hope that through IITSP, students will develop a strong understanding of trigonometry, learn to apply it effectively, and improve their mathematical skills.

Eligibility

Students worldwide in Grade 7 or above who can take classes in English (born before August 2014).

Program Structure

- Daily 60–90 minute video classes.
- Scheduled individual class times.
- Attendance is mandatory.
- Homework after each class, due by the deadline.
- Exams on Days 2, 4, 6, 8, and 10 (choose 1 of 2 offered each day).

IITSP Curriculum and Schedule

Day	Topics
Day 1	Angle and Circular Measure, Arc Length and Area of a Sector, Trigonometry of Right Triangles
Day 2	Formulas for the Same Angle, Evaluating Trigonometric Functions for Any Angle
Day 3	Applications of the Sum and Difference Formulas, Graphs of Sine, Cosine, and Tangent Functions
Day 4	Graphs of Trigonometric Functions, Inverse Trigonometric Functions
Day 5	Trigonometric Formulas and Equations, Trigonometric Inequalities
Day 6	Law of Sines and Law of Cosines
Day 7	Geometry & Trigonometry I
Day 8	Geometry & Trigonometry II
Day 9	Trigonometry Problem Solving for Math Competitions I
Day 10	Trigonometry Problem Solving for Math Competitions II

Documents Required for IITSP Application

1. Application Form

–Problem Solutions

–Essay

2. Mathematics Achievements and Portfolio

–Any math-related certificates, awards, or portfolio materials

–There is no limit to the number of items you may submit.

Please compress all files listed in Items 1 and 2 into a single ZIP file. The file name should be the student's name.

Note: Recommendation letters will be requested directly from the recommender by our office.

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Essay Questions

1. **Why are you applying to the International Intensive Trigonometry Summer Program (IITSP)?**
2. **The International Intensive Trigonometry Summer Program (IITSP) is conducted online. Will you be able to actively participate in the program?**
3. **Beyond what you have learned in school, how far have you studied mathematics on your own?**
4. **If you have participated in any math competitions, please list all of them.**

Problem Set

1. Let α and β denote the two distinct roots of $x^2 - 3x + 6 = 0$. What is the value of $\frac{1}{\alpha} + \frac{1}{\beta}$?
2. In biscuit factory A, 1000 biscuits are produced per hour. In biscuit factory B, 1800 biscuits are produced per hour. How many biscuits can factory A produce while factory B produces 7200?
3. Popsicles are being sold at a school festival. The festival holds an event where for every 4 popsicle sticks collected, 1 new popsicle is given in exchange. Suppose a group of 50 students is participating in this event. If every student needs to have at least one popsicle, what is the least number of popsicles that need to be bought?
4. Consider a 3-digit positive integer $N = \overline{abc}$. How many different values of N exist such that $b = c$ and $a \neq c$?
5. The 5 numbers 1, 2, 3, 4, 5 are used without repetition to form a 5-digit integer. What is the 53th number on the list of numbers from the least to the greatest?

Application

- 6.** A company is holding an interview to recruit new employees. In order to test the sociality of the applicants, the personnel management department is running a team interview. If 6 applicants participate in each round, 3 people remain in the end. Having 9 applicants participate in each round also leaves 3 people remaining. Having 5 people participate in each round, however, does not leave anyone out. What is the number of interviewees, given that less than 100 people have applied?
- 7.** Erika rolled a die three times. If the numbers she gets are a, b, c in order, how many ordered triples (a, b, c) exist such that $a^2 = bc$?
- 8.** Calculate $4\tan\alpha$ when $2\cos\alpha - \sin\alpha = 1$ and $0 < \alpha < \frac{\pi}{2}$.
- 9.** Which of the following is a value of θ that satisfies $\sin\theta + \cos\theta = \frac{1}{\sqrt{2}}$? Suppose that $0 \leq \theta < \pi$.
- 10.** Two laser beams are installed on the ground, apart from each other by 8 meters. Between the laser beams, a long pole is installed. The pole is perpendicular to the ground. Each laser beam is adjusted to point at the top of the pole. Later on, it was discovered that the distances from each laser beam to the top of the pole were 5 meters and $\sqrt{41}$ meters, respectively. What is the distance between the bottom of the pole and the closer laser beam, in meters?

Note : Please submit the following essay and problem solutions. You may type or handwrite your answers and submit them as a PDF or JPEG file. A total of 10 problems will be provided. We recommend solving and submitting at least 60% of them, if possible. Please write out the solution process in detail.