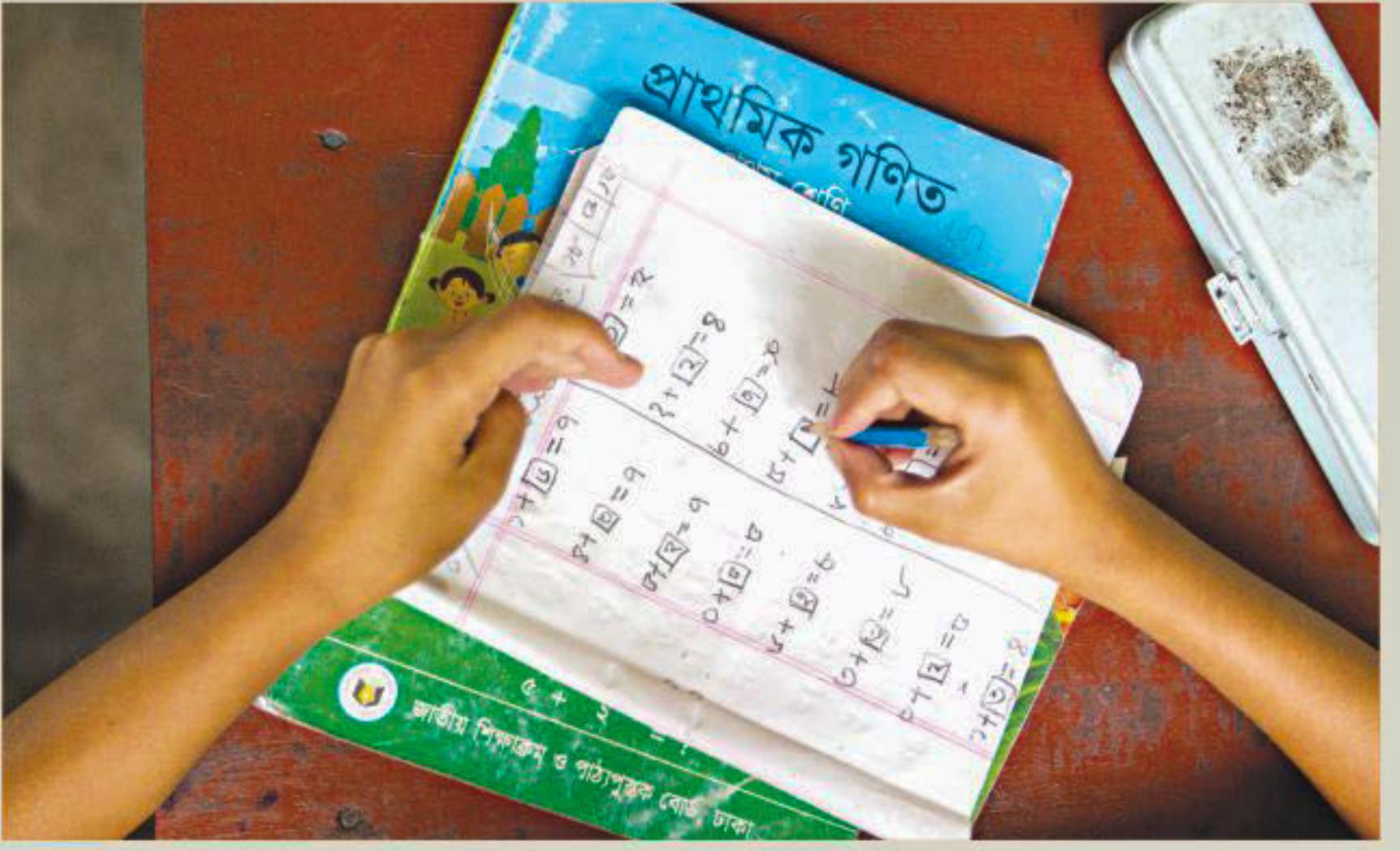


TANGENTS

BY IHTISHAM KABIR



First steps in mathematics.

PHOTO: IHTISHAM KABIR.

The Magic of Mathematics

When my college-bound daughter recently informed us that she wanted to study mathematics as an undergraduate, I was delighted. I have been passionate about mathematics since Class X, when the mathematics teacher Mr. Shawkat Hussain (the subject of a previous column) ignited this passion. The best grades I earned in undergraduate and graduate engineering education were in mathematics courses. If I had a second chance to attend university today I would probably study mathematics. At any rate, in order to prepare her for the demanding courses she will have to face, I started working with my daughter on college calculus. She is self-reliant and learns quickly without help. Nevertheless, I made myself useful explaining some things to her: the big picture, or why a certain theorem or approach is useful (having seen its uses that she is yet to see.) It was a wonderful experience working with her. But it was painful, too, when I saw certain problems and confidently claimed that I could solve them in a heartbeat - only be foiled halfway by the cobwebs of age. Then all I could do was mumble: "I used to know how to do this." Along with the flood of memories came the feelings - I recalled what a pain integral calculus was. My most joyful moments came when she solved problems that confounded me. But the hours spent with her also gave me time for reflecting on mathematics - particularly the dichotomy of discrete and continuous. The calculus belongs to the world of continuous mathematics, closely mirroring the real world. It was the culmination of centuries of thinking about changing or moving things. Newton's (and Leibniz's) genius to some extent lay in the invention of

"dx" - an infinitesimally small change that allowed the development of the calculus.

But in today's world, interesting mathematical applications involve discrete quantities. Thus, for example, when you take a digital picture, you create a very fine two-dimensional grid of numbers. Each of these numbers, called a pixel, represents a brightness level. Computers, cellphones, television signals, music videos - all require mathematical computations on discrete (or digital) numbers. But we don't see, hear, taste or smell the world digitally. Our senses understand analog, continuous input. In general, things in the physical world are mostly analog.

How to connect the two? Digital and analog are connected by Nyquist's Sampling Theorem which points the correct way to move roundtrip between digital and analog worlds. Thus, for example, it tells us how many points we need in that grid of pixels inside the digital camera so the digital photograph is indistinguishable from one taken with a film camera, or how many "bits" we have to have in an "mp3" of a song.

The philosophical implications of Nyquist's theorem are mind-boggling. For example, using it, a passport size photograph can be represented by a grid of 1024x1024 pixels, each pixel taking on one of 64 brightness levels. It follows that the number of all possible passport photographs is $64^{(1024 \times 1024)}$. This (very large) set of photographs will contain, for example, the faces of all humans who ever walked on earth - in fact, many many photographs of each!

Ah, the joys of mathematics. I hope you will join me in wishing my daughter wondrous discoveries on her journey.

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Road crashes kill 7

CITY DESK

Seven people were killed and 15 others injured in road accidents in Chittagong, Kushtia, Munshiganj, Thakurgaon and Noakhali yesterday.

Our staff correspondent from Chittagong reports, a CNG-run auto-rickshaw driver and one of its passengers were killed as the vehicle fell into a roadside sewerage line in the city's Agrabad.

The deceased were Firoz Khan, 55, and

Mahbubur Rahman, the driver.

Our Kushtia correspondent reports, two people were killed and 15 others injured as a bus and a truck collided head-on in the town's Phultala.

The dead were Islam Ali, 45, driver of the bus; and Moazzem Hossain Mozibor, 55, its passenger.

Four of the injured were admitted to Kushtia Medical College Hospital.

Our Munshiganj correspondent reports,

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Gold in smuggler's rectum!

STAFF CORRESPONDENT

The art of smuggling gold has moved up another notch as a man was caught carrying six gold bars worth around Tk 34 lakh in his rectum yesterday.

Customs officials acting on a tip off at first failed to find anything frisking Kazi Rafiqul and scanning his luggage upon his arrival at the capital's Hazrat Shahjalal International Airport on Thursday night from Dubai.

After a night of interrogation failed to yield any result, an x-ray at an Uttara clinic brought the breakthrough, revealing the precious metals weighing 0.7 kilogrammes and wrapped in two cloths, which were retrieved using suppositories.

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Killings can't stop free thinking

Prof Ajay Roy tells discussion

STAFF CORRESPONDENT

Prof Ajay Roy yesterday said the dreams of fundamentalists trying to turn Bangladesh into an "Islamic state" by killing free thinkers in the name of religion would not be fulfilled as the non-communal spirit was ingrained in the masses.

"The killing of one Avijit, one Oysiqur or one Ananta will not have any impact. Bangladesh has seen the blood of revolutionaries and will see it in the future. None could stop them," said the father of slain writer-blogger Avijit Roy.

Prof Ajay was addressing a discussion "Attack on Free Thinking and Free Thinkers" organised by Col Taher Sangsad at Teacher-Student Centre in Dhaka University marking the 39th year past the killing of Col Abu Taher.

Prof Ajay called upon free thinkers not to limit themselves to the internet and to come out onto the streets to practice their democratic right of expressing their thoughts.

Nuzhat Chowdhury Shampa, daughter of martyred physician Dr Alim Chowdhury, criticised the

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SHOT BEFORE BIRTH
No reunion over health concerns

STAFF CORRESPONDENT

Uncertainty looms of the much-awaited meeting between the mother and her baby who survived being shot while still in the womb.

Though doctors brought the woman, Nazma Khatun, from Magura to the capital on Thursday, they did not allow her to meet her son till last night.

"The mother is sick and has breathing problems. The premature baby may be exposed to infectious diseases if we let her make contact with her baby girl," said Khawja Abdul Gofur, assistant director (admin) of Dhaka Medical College Hospital.

The mother was brought to DMCH as doctors thought breast feeding might strengthen the baby's immune system, he said.

Doctors on Thursday feared the baby may suffer neonatal septicaemia as her platelet count has dropped to 50,000, which is supposed to be at least 1.5 lakh.

The baby's father Bacchhu Bhuiyan told The Daily Star that doctors told him that

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CNG-run auto-rickshaws will not be allowed to ply on highways from today as per a ban imposed by the roads and bridges ministry. The photo of the Dhaka-Mawa highway was taken at Keraniganj on Thursday.

PHOTO: ANISUR RAHMAN

War crimes trial critics ignorant

Justice Manik tells reception accorded to Prof Muntassir Mamoon

STAFF CORRESPONDENT

Justice AHM Shamsuddin Choudhury Manik yesterday criticised and termed ignorant people who questioned the standard of the war crimes trials in Bangladesh.

"Many international war crimes experts praised the trial process...as we follow a complete, standard procedure," he said, adding that only some persons and lawyers are raising questions at home and abroad.

Justice Manik, now in Supreme Court's Appellate Division, was addressing a reception Ekatturer Ghatak Dalal Nirmul Committee accorded to its vice president, Prof Muntassir Mamoon, in the capital's WVA auditorium.

The columnist and historian was awarded "Brajendranath Bandhopadhyay Sharok Puroshkar-1422" on June 28 by India's Bangiya Sahitya Parishad for his research on East Bengal's society and culture, particularly for his 14-part book "19 Shotoke Bangladesher Sangbadh Shamayik Patra".

Justice Manik also criticised a British lawyer who opined that the trials failed to maintain international standard.

He, however, enthusiastically praised the US ambassador-at-large for war crimes issues, Stephen J Rapp, for his observation on the trials.

Justice Manik also launched a tirade on late president Ziaur Rahman. "It is said that he was a freedom fighter. Was he actually a freedom fighter or had he gone to the other side with a different aim. Researchers will be able to prove his aim in the future," he said. "But he wanted to convert Bangladesh into Pakistan with its agency ISI while he was in power. There is no doubt over this matter," he claimed.

Justice Manik congratulated Prof Muntassir, saying he had contributed a lot in ensuring through his researches that the trials were duly held. He also accused Bangladesh's media of not giving due coverage of the award.

Bangla Academy Director General Shamsuzzaman Khan chaired the programme while noted author Prof Borhanuddin Khan Jahangir, artist Hashem Khan and Shyamoli Nasrin Chowdhury also spoke.

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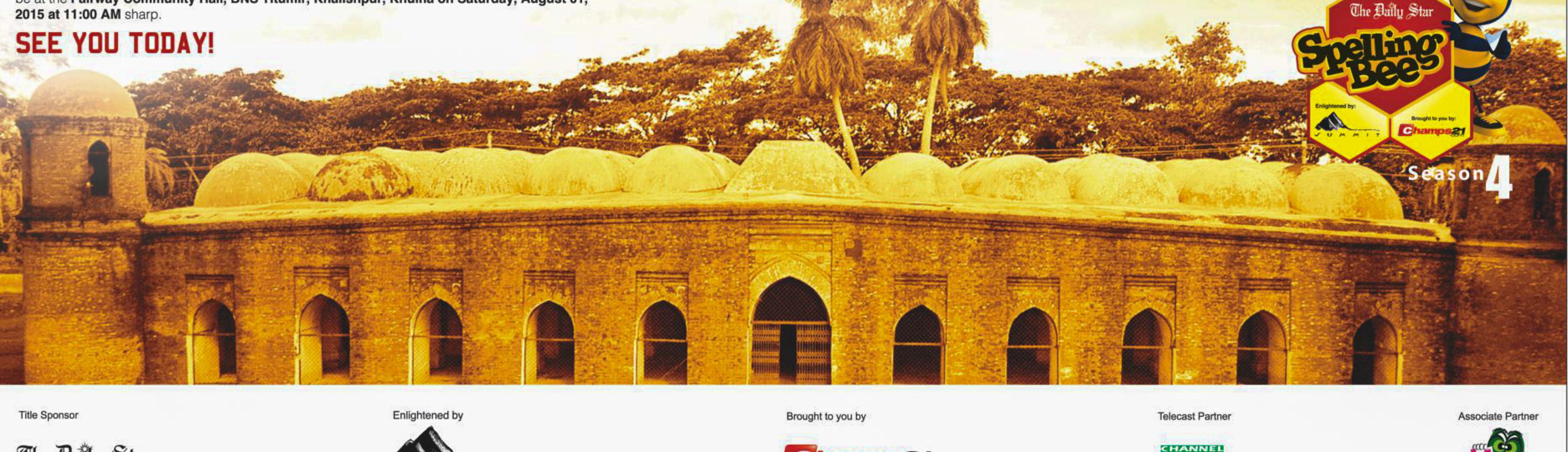
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CONGRATULATIONS KHULNA DIVISION SPELLERS!

Hello participants from Khulna Division! Those who have qualified for the Divisional Round, be at the Fairway Community Hall, BNS Titumir, Khalishpur, Khulna on Saturday, August 01, 2015 at 11:00 AM sharp.

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