# STEM MAGAZINE

2021-2022

# FOREWORD

## MS LEE LAN YUEN, PRINCIPAL

Why do we learn STEM?

We find inspiration when we learn about the wonders of nature, understand the beauty of the laws that govern our world, and appreciate the harmony between humans and our environment with Science.

We find joy when we come up with ideas of applying what we know to unknown situations, innovate to enable things impossible in the past, and move forward with Technology.

We find satisfaction when we channel ideas in our minds into real objects, through our hands as the primary instrument and greatly extended with other tools with Engineering.

We find fulfillment when we fine tune everything to perfection with Mathematics,

Most important of it all, we integrate all of the above to help people in need, to add value to other people's lives, and to make the work a better place.

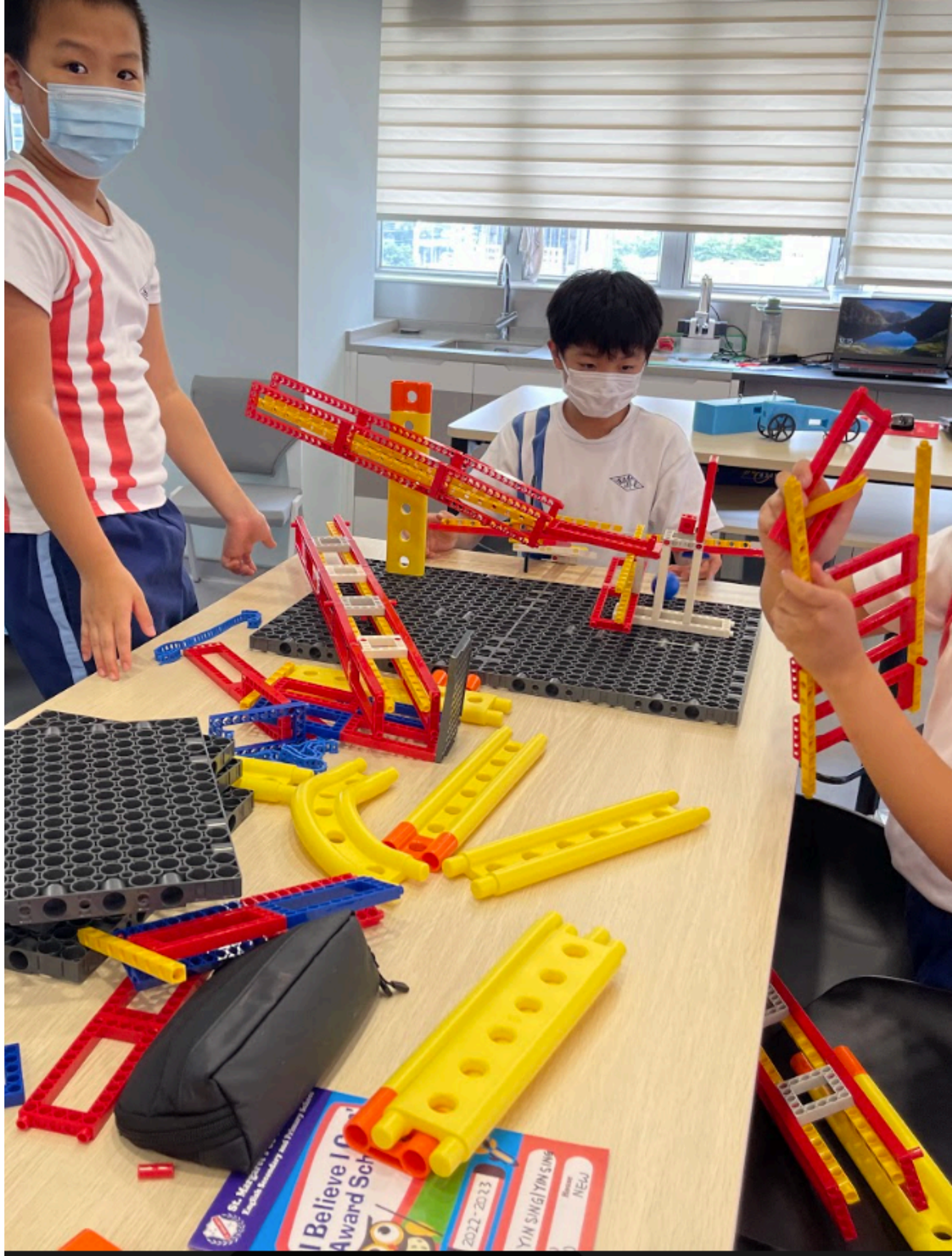
2021-2022 had been an excited year for STEM and Science at St. Margaret's. With the establishment of the new STEM curriculum and reforms in the Science curriculum, more opportunities for integrating knowledge and skills from different domains and disciplines were enabled. This is a journey of exploration, a journey of innovation, a journey of creation. Most importantly, a journey of realization of STEM for humanity and Science as a human endeavor.

Now please join us in the celebration of this meaningful journey!

# CURRICULUM HIGHLIGHTS

## LESSON TIME DEDICATED TO STEM

This year sees the implementation of our new comprehensive STEM curriculum from P1 through S2, with stand alone lesson time dedicated to STEM on top of lessons from related subjects. Students experience graded activities from a wide range of contexts, with the aim to build up foundational knowledge and skills systematically.



# STEM FOR ALL
# P1 TO P4

## MAKING, EXPLORING, CREATING



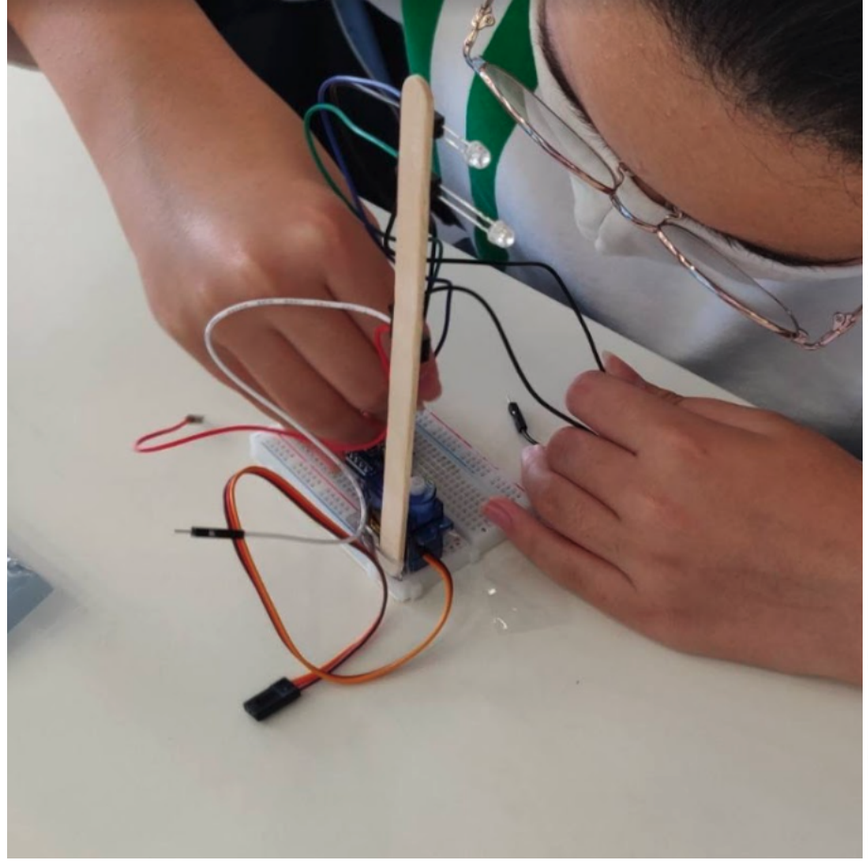


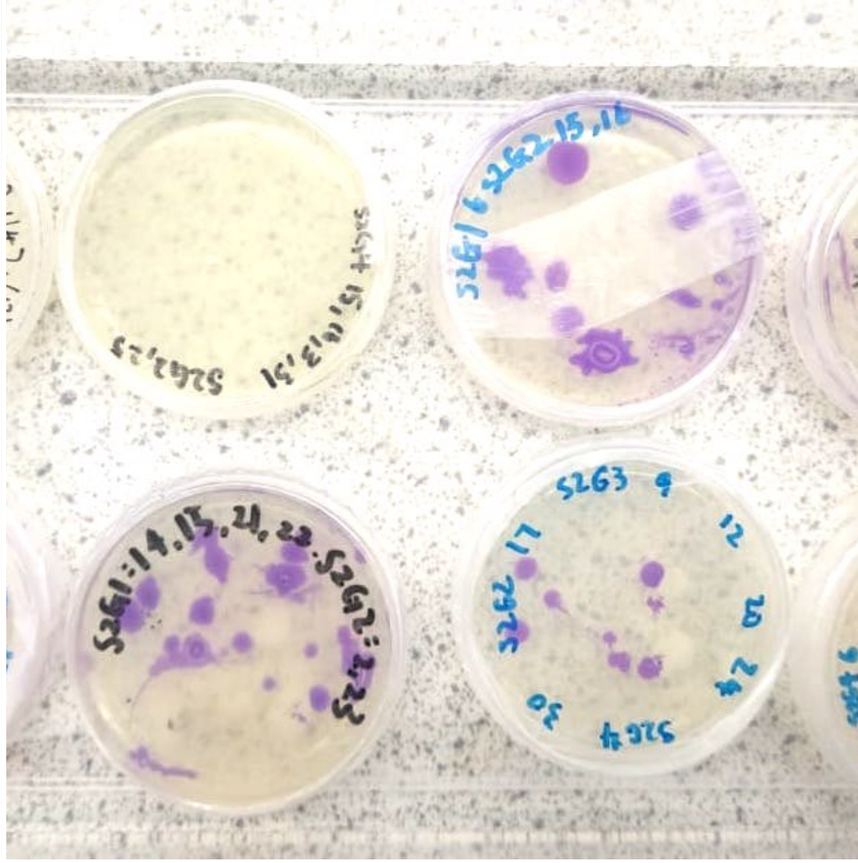




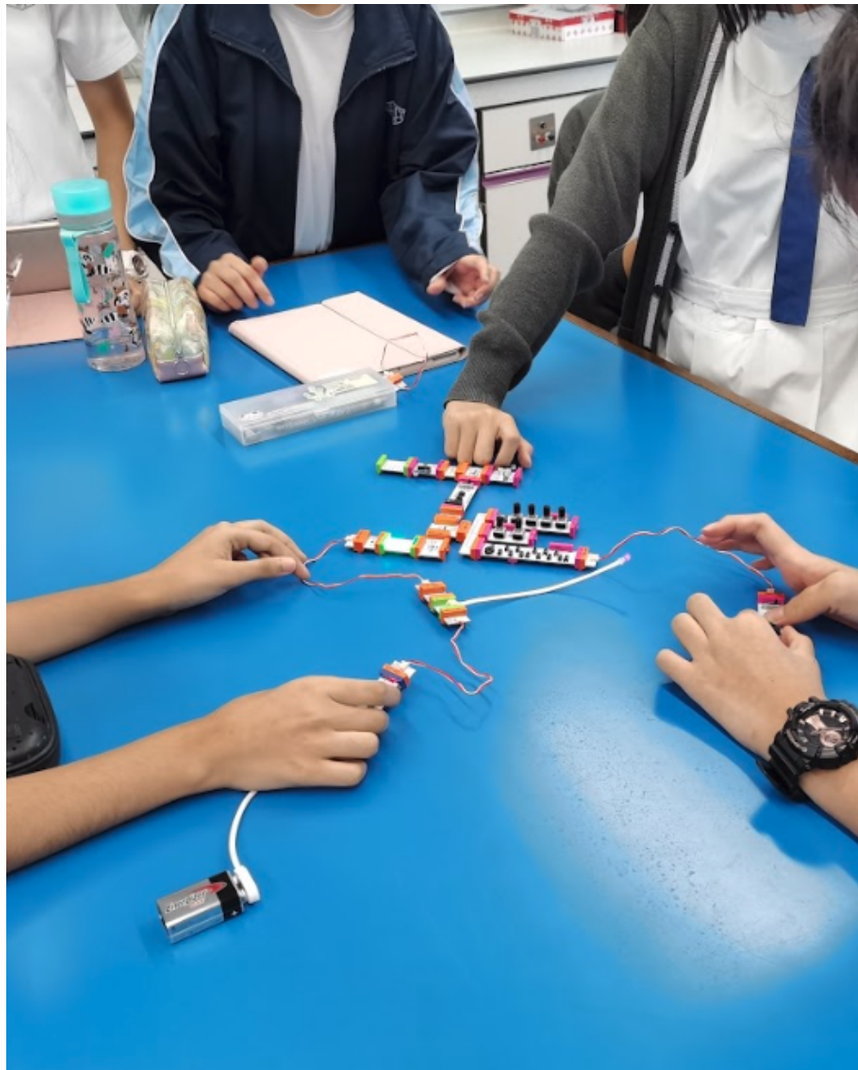
# STEM FOR ALL
# P5 TO S2

## DESIGNING, INNOVATING, ACCEPTING NEW CHALLENGES









# LITTLE EXPLORER

## TALENT CLASS








# CURRICULUM HIGHLIGHTS

## CROSS CURRICULAR HAPPENINGS

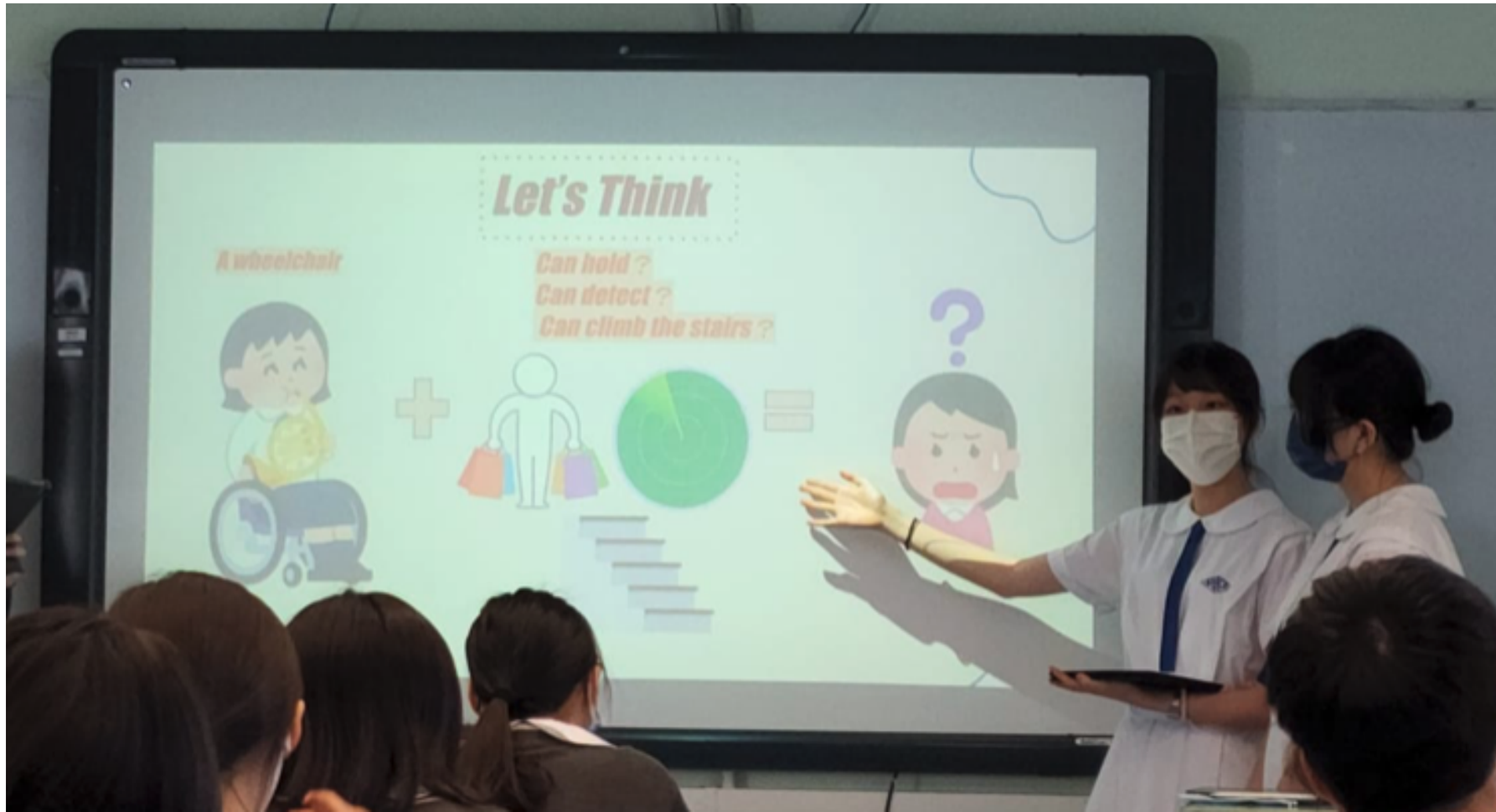
Cross curricular collaborations were further enhanced in order to give students a more comprehensive learning experience in STEM related subjects.



VR in Biology



S.3 Cross-Curricular Project Presentation - STEM



P.2 GS - How to make a toy car



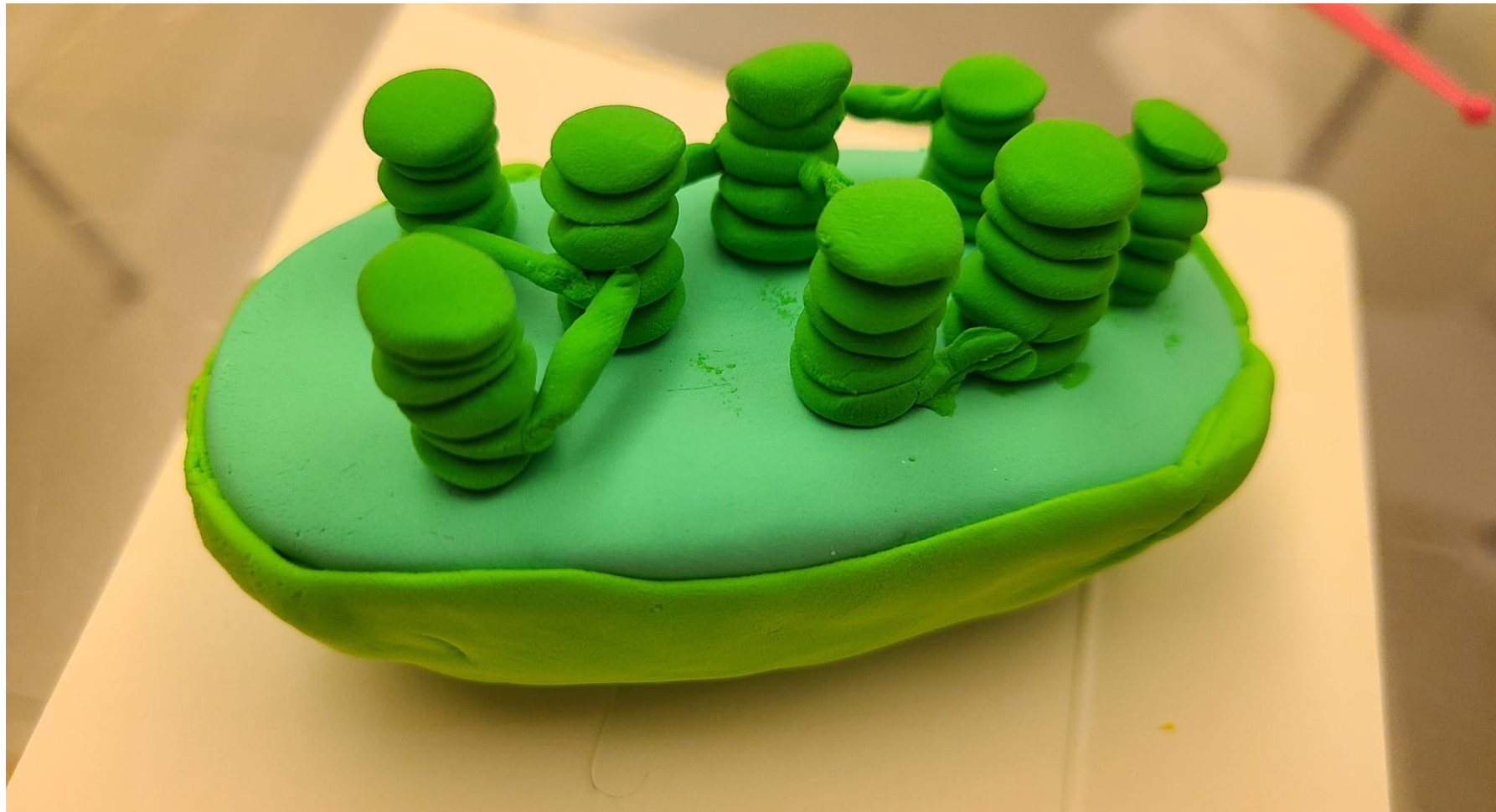
S.4 Music Creation with Makey Makes and Scratch Coding



S.3 Cross-Curricular Project - Science

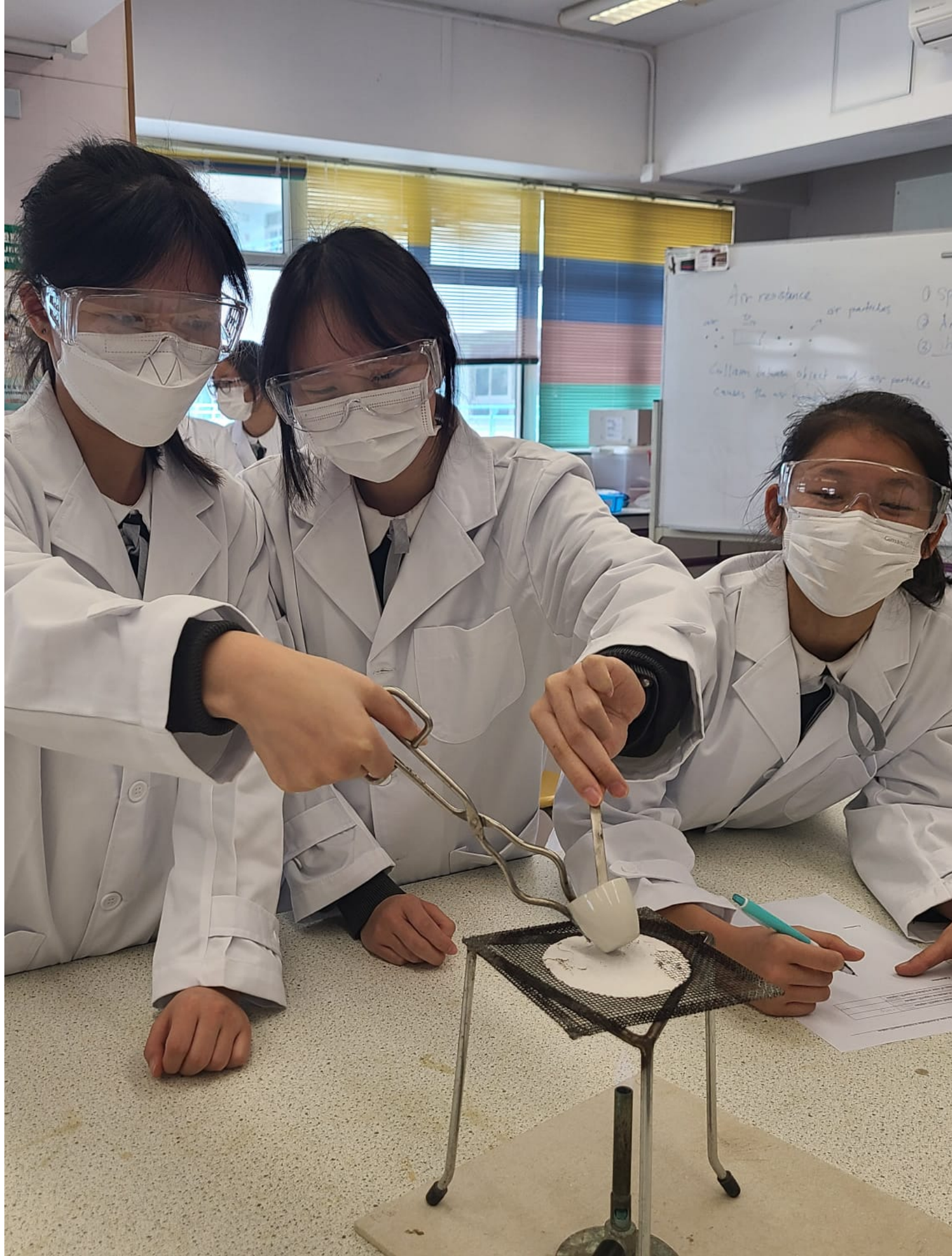



Clay art work in science



# CURRICULUM HIGHLIGHTS

## LAB TIME HIGHLIGHTS



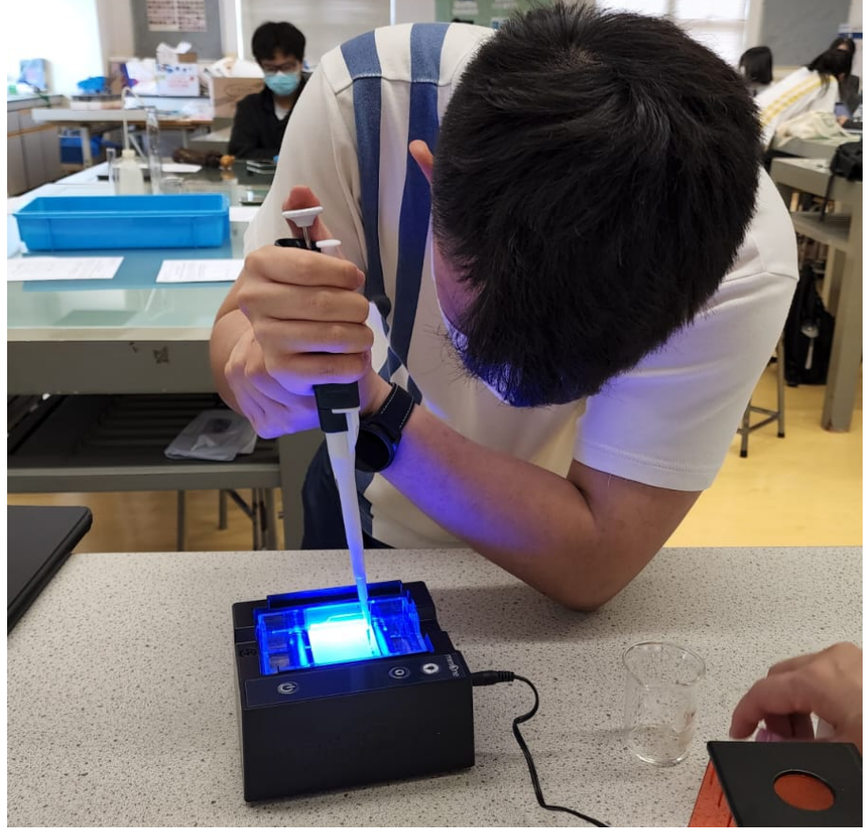
# SENIOR SECONDARY SCIENCE

## EXPERIMENTS AND PRACTICALS

Top left: DNA finger printing

Top right: Membrane permeability experiment

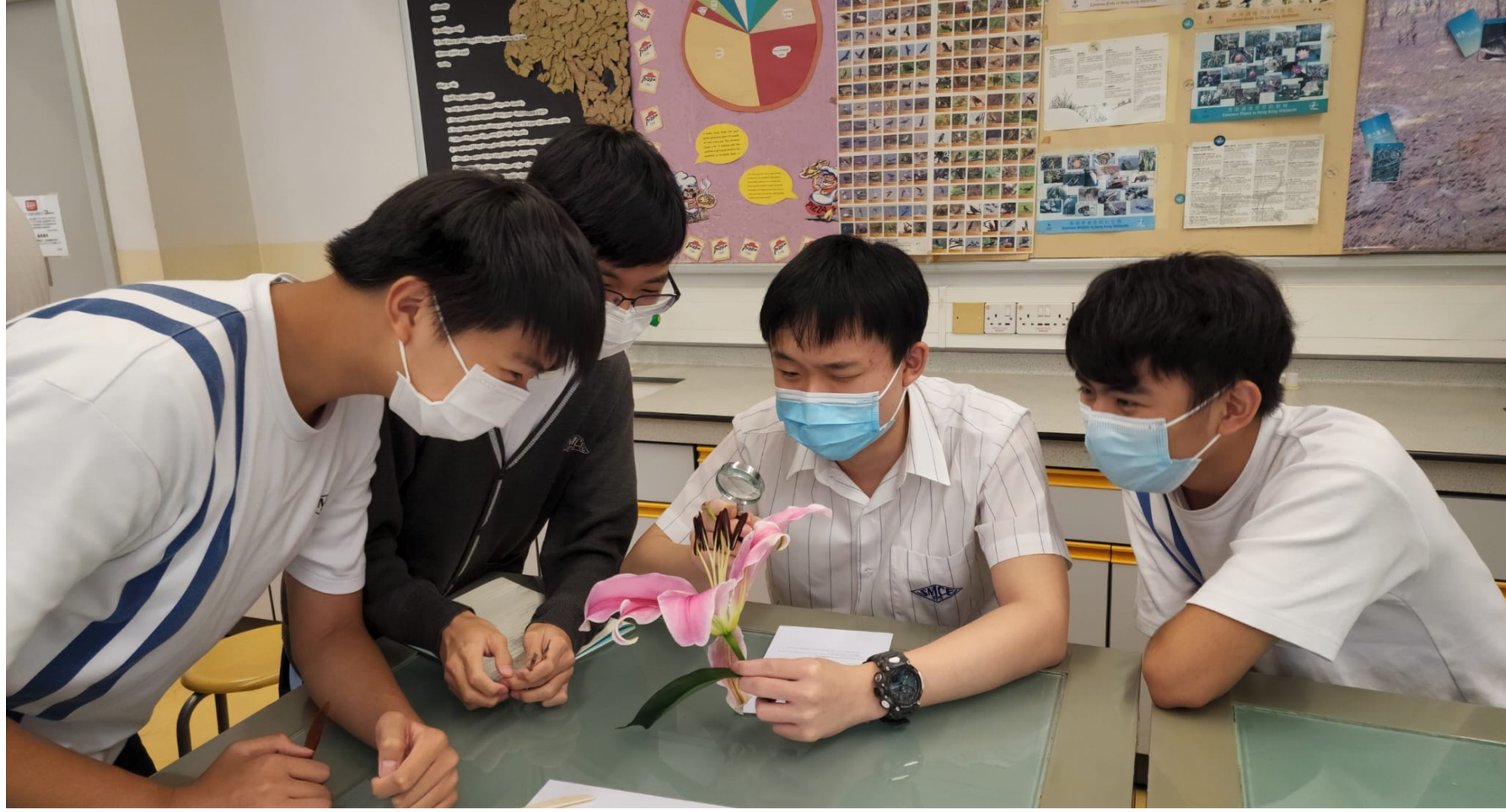
Bottom: Ox eye dissection







Flower Examination



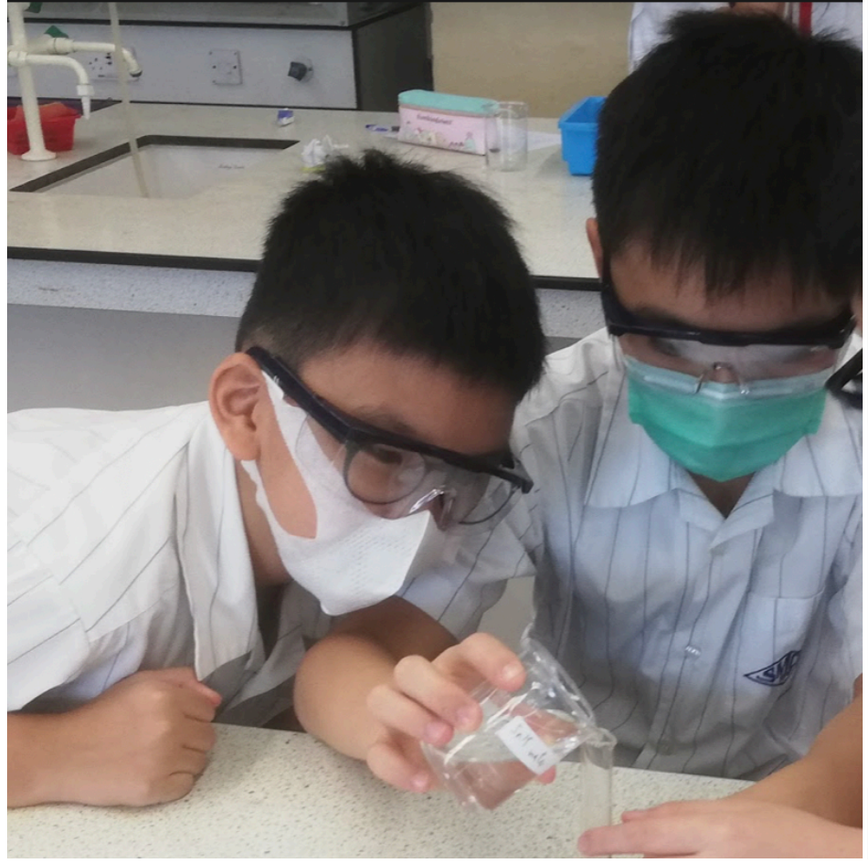
Titration



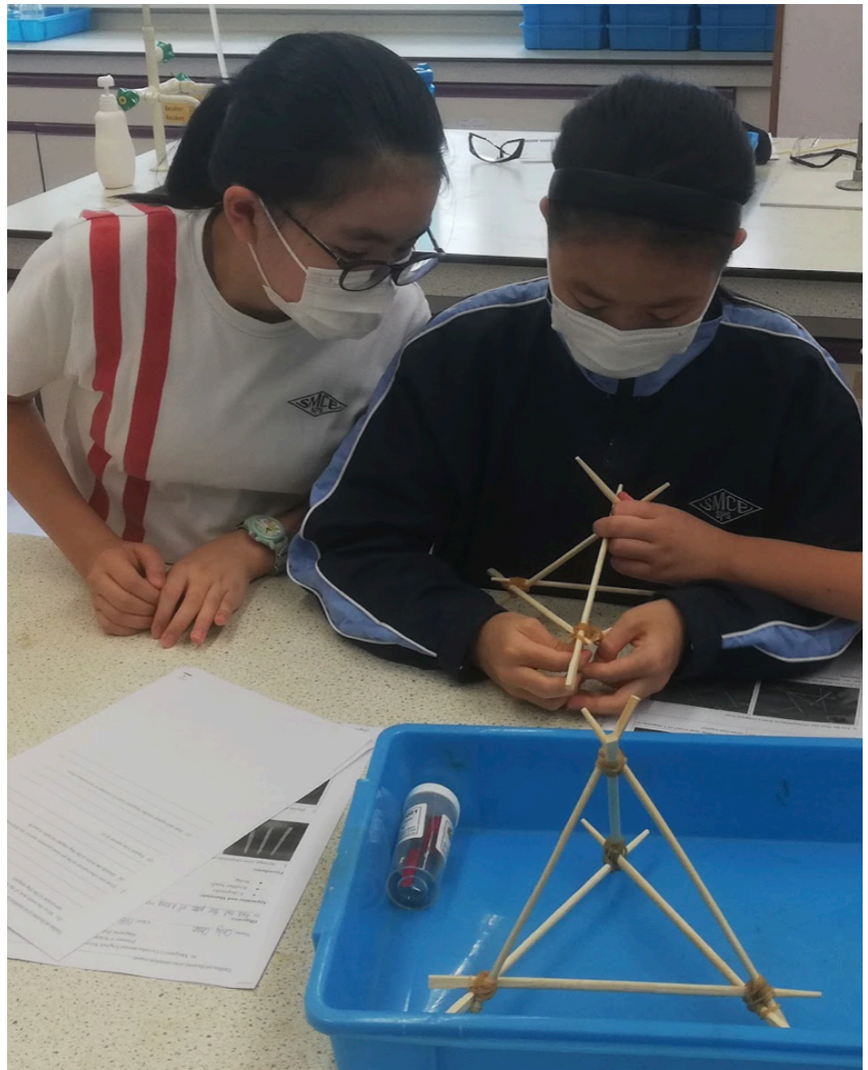
# PRIMARY SATURDAY LAB TIME

## MORE TIME, MORE EXPLORATION

To make up for the loss in teaching time caused by the pandemic and to allow more time for doing more sophisticated tasks and investigations, Saturday Lab Time continues on for our little scientists!









# INTERNAL ACTIVITIES

## ACTIVITIES, ACTIVITIES, ACTIVITIES!



# ALUMNI LEGO WORKSHOP

## STEM AND FAMILY FUN!

Time for some family fun! Our alumni spent a wonderful afternoon building lego cars specially designed to travel on its own!







A Case Study

[1]McKetta Department of Chemical Engineering, The University of Texas at Aus
Molecular Biosciences, The University of Texas at Austin, Austin, TX, USA. [4]DE

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Article | Published: 27 April 2022

## Machine learning-aided engineering of hydrolases for PET depolymerization

Hongyuan Lu, Daniel J. Diaz, Natalie J. Czarnecki, Congzhi Zhu, Wantae Kim, Raghav Shroff, Daniel J. Acosta, Bradley R. Alexander, Hannah O. Cole, Yan Zhang, Nathaniel A. Lynd, Andrew D. Ellington & Hal S. Alper

*Nature* **604**, 662–667 (2022) | Cite this article

**37k** Accesses | **1** Citations | **2026** Altmetric | Metrics

### Abstract

Plastic waste poses an ecological challenge[1,2,3] and enzymatic degradation offers one, potentially green and scalable, route for polyesters waste recycling[4]. Poly(ethylene terephthalate) (PET) accounts for 12% of global solid waste[5], and a circular carbon economy for PET is theoretically attainable through rapid enzymatic depolymerization followed by repolymerization or conversion/valorization into other products[6,7,8,9,10]. Application of PET hydrolases, however, has been hampered by their lack of robustness to pH and temperature ranges, slow reaction rates and inability to directly use untreated postconsumer plastics[11]. Here, we use a structure-based, machine learning algorithm to engineer a robust and active PET hydrolase. Our mutant and scaffold combination (FAST-PETase: functional, active, stable and tolerant PETase) contains five mutations compared to wild-type PETase (N233K/R224Q/S121E from prediction and D186H/R280A from scaffold) and shows superior

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Abstract
Data availability
Code availability
References
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Ethics declarations
Peer review




# STEM WEEK

## ONLINE, HANDS-ON, FUN!

Online assemblies with games and 7 online workshops with a variety of activities including coding, crafting, making and teacher sharing on star gazing skills and using AI for chemistry research were held during the STEM week.

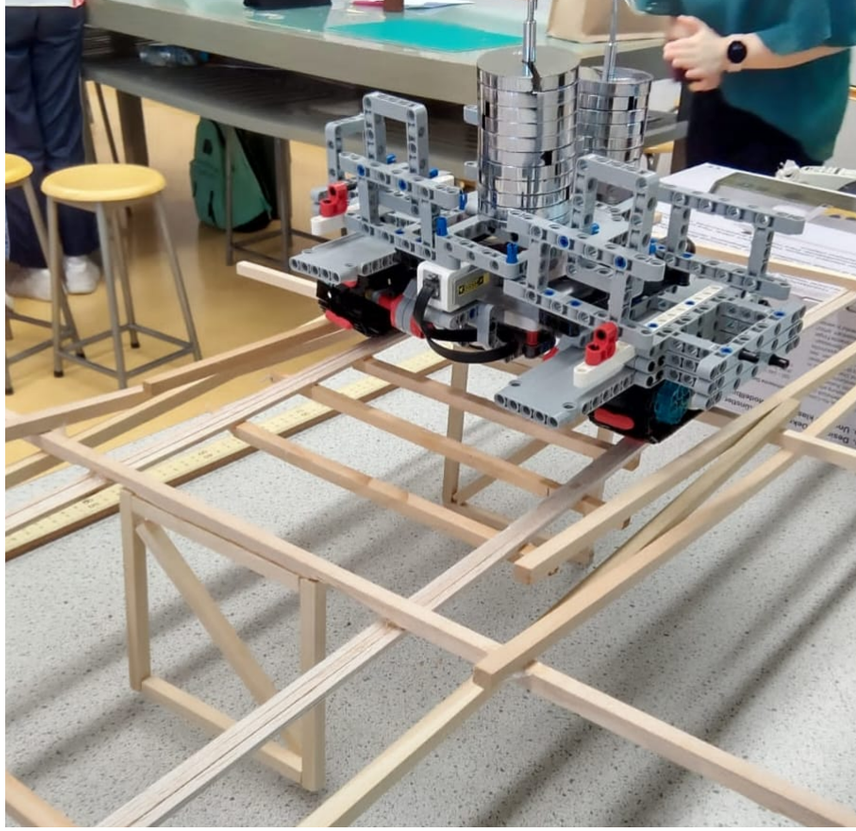


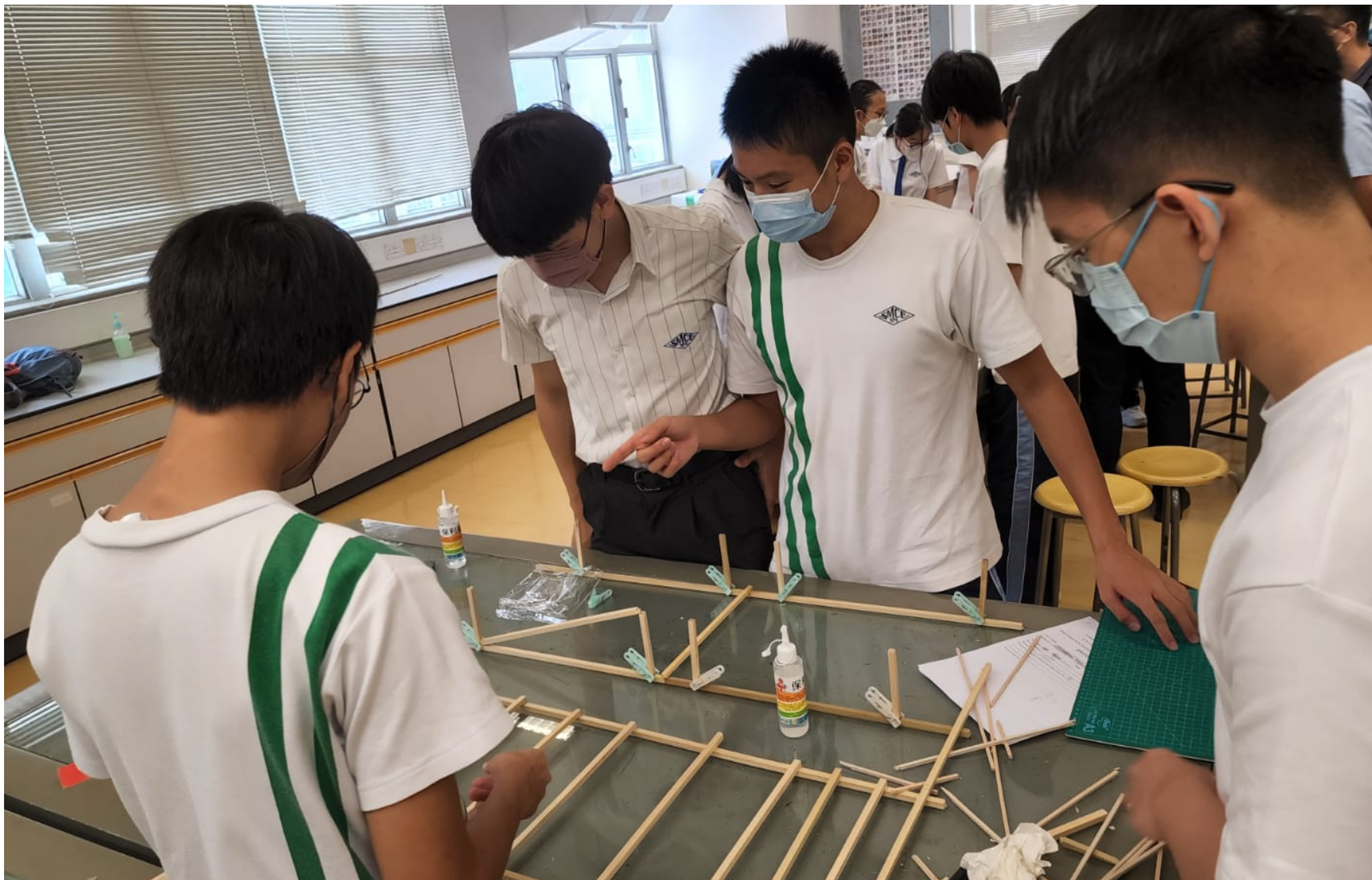
# BRIDGE BUILDING WORKSHOP

## HOW STURDY IS YOUR BRIDGE?

During the post-exam period, a bridge building workshop was organized for S.3 students in which they built bridges using nothing but limited wooden sticks and glue. Some of these could actually withstand a Lego Tank with (lots of) add-on weights!







# CRAFTING WORKSHOP

## THEY CAN CRAFT, SO CAN YOU!

A crafting workshop was held for students to enhance their crafting skills so that they will be able to turn their creative ideas into actual physical products.













# SCIENTIST SHARING

## LEARNING FROM REAL LIFE RESEARCHERS

Several sessions of sharing from real life scientists were conducted for senior secondary science students for them to learn more about life as a scientist and related career pathways both in Hong Kong and overseas.

# EXTERNAL ACTIVITIES

## TOURS, VISITS AND FIELD TRIPS

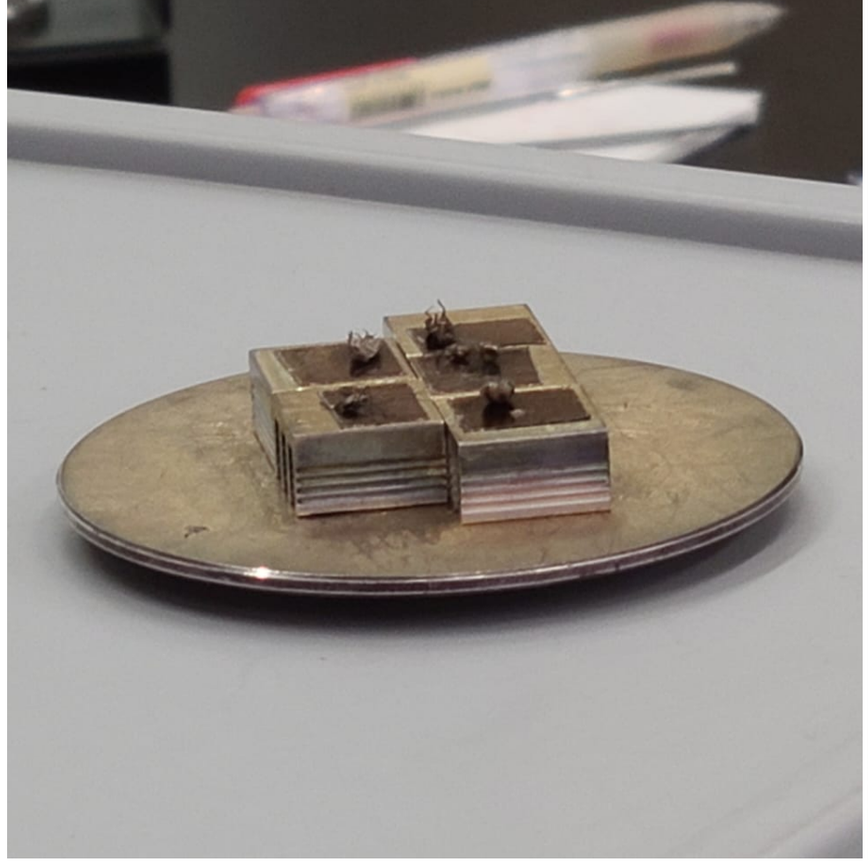
No amount of reading and studying could give a more comprehensive learning experience than having an actual physical visit to the place you are studying about! Check out these interesting experiences our students had throughout the year!

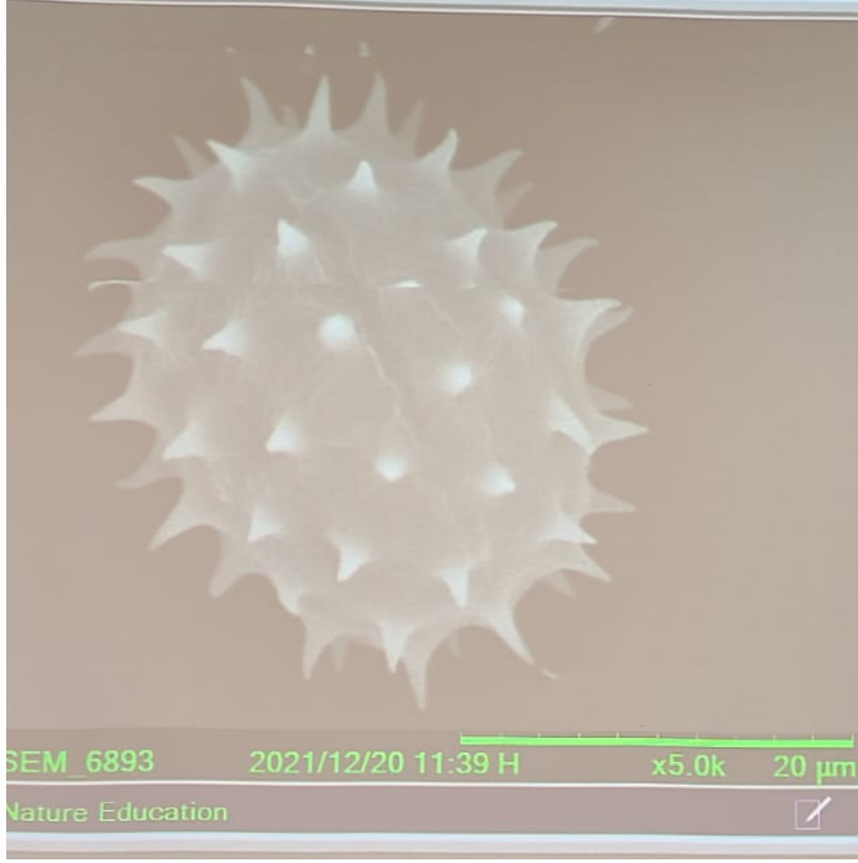


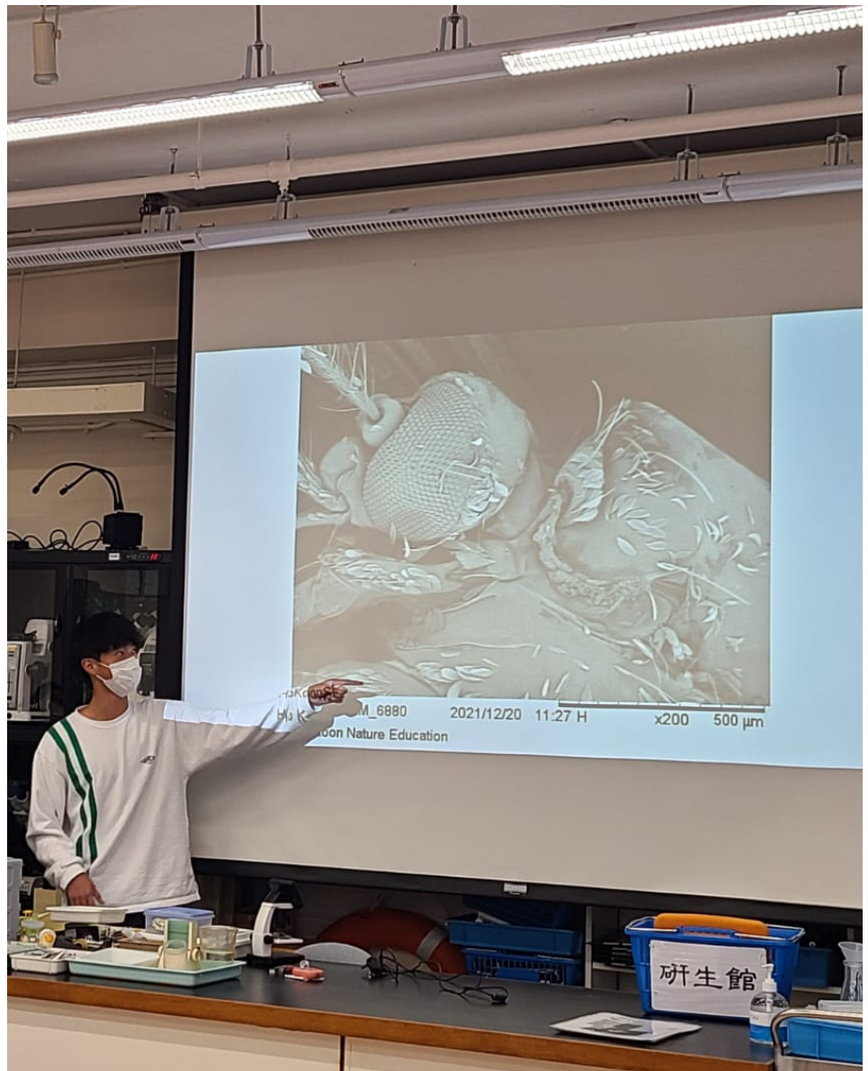
# BIOLOGY FIELD TRIP

## A MICROSCOPIC ADVENTURE

In this field trip, our S.5 biology students collected samples from the environment and examined them under the Scanning Electronic Microscope. From sample preparation to producing the images everything was done by students themselves!








# POST-EXAM TOURS

## S.2 ASTRONOMY VISIT

During the post-exam period, S.2 students got to visit the Ho Koon Nature Education cum Astronomical Centre in which they had the opportunity to learn about star gazing, names of stars and constellations and even use a professional telescope!








# POST-EXAM TOURS

## S.1 ENVIRONMENTAL EDUCATION VISITS

During the post-exam period, S.1 students had the opportunity to visit Mil Mil, a drink carton recycling facility, and Hong Kong Petrochemical Co. Ltd., a petrochemical company. They certainly learnt a lot about caring for the environment!







# POST-EXAM TOURS

## ARTS X STEM EXHIBITIONS

As we continue to celebrate the beauty of integration of different domains of knowledge, our secondary students had the opportunity to visit three cross curricular themed exhibitions jointly organized with Arts Education.

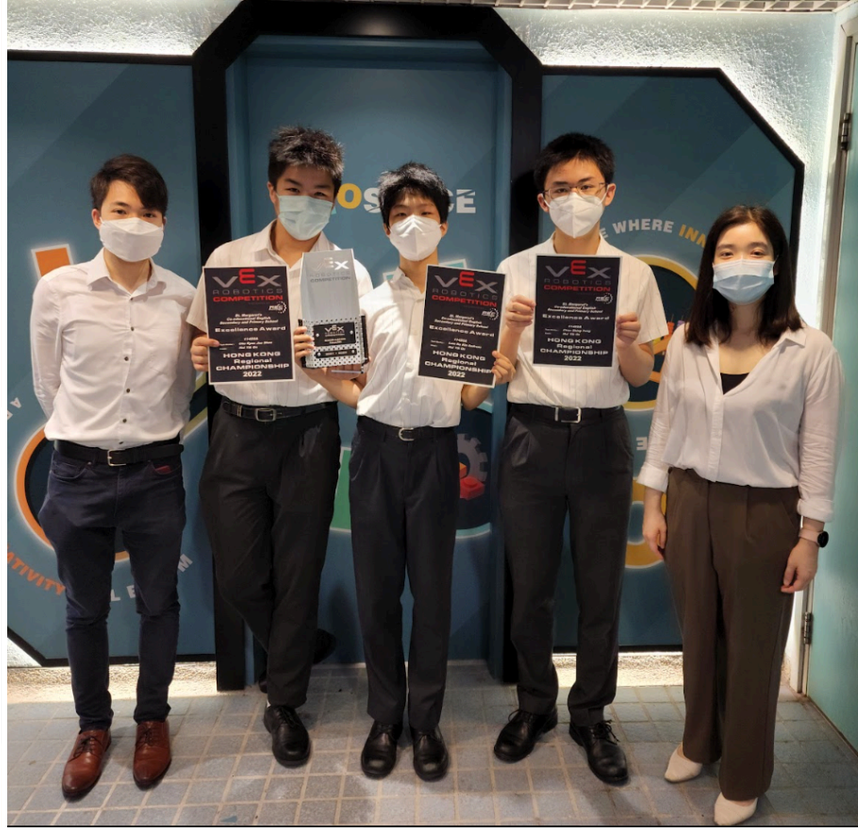






# VEX ROBOTICS COMPETITIONS






# INTERNATIONAL CHEMISTRY QUIZ

## TIME TO SHOWCASE YOUR KNOWLEDGE!

To promote students' interest in chemistry and the role of chemists in society, our students joined this international competition and achieved excellent results!



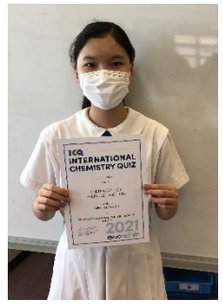
**S.6B Ng Man Lok**
**HD Excellence**
**(Full mark)**



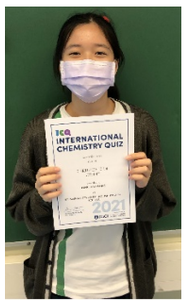
**S.6B Wu Shing Yau**
**HD Excelence**
**(Full mark)**



**S.6B Ho Isabelle**
**High Distinction**
**(Top 10%)**



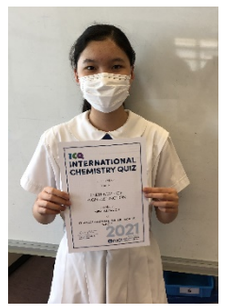

**S.4C Woon Mirabelle**
**High Distinction**
**(Top 10%)**




**S.5C Wong Tsing Hay**
**Credit**




**S.4C Ma Yui Fung**
**Credit**




**S.4C Woon Mirabelle**
**High Distinction**
**(Top 10% in the state)**

# HONG KONG BIOLOGY LITERACY AWARD

## TIME TO SHOWCASE YOUR KNOWLEDGE!

How much do you know about Biology in your daily life? About how scientists discover new knowledge? About the connection between science, technology, society and environment? Our students certainly know a lot!

| | | |
|---|---|---|
|  S.6B Ng Man Lok First Class Honour |  S.6B Wu Shing Yau Merit |  S.6B Ho Justin Merit |

# STEM + E

## WHEN STEM MEETS ENTREPRENEURSHIP

Congratulations to S.4C Chan Yuen Kiu Katie who was awarded MVP in this competition organized by the STEM+E Consortium in which students learn of technology solutions to real-world problems and transform these into business plans and perform start-up pitching.






# CHEMIST ONLINE

## STUDENT-LED LEARNING

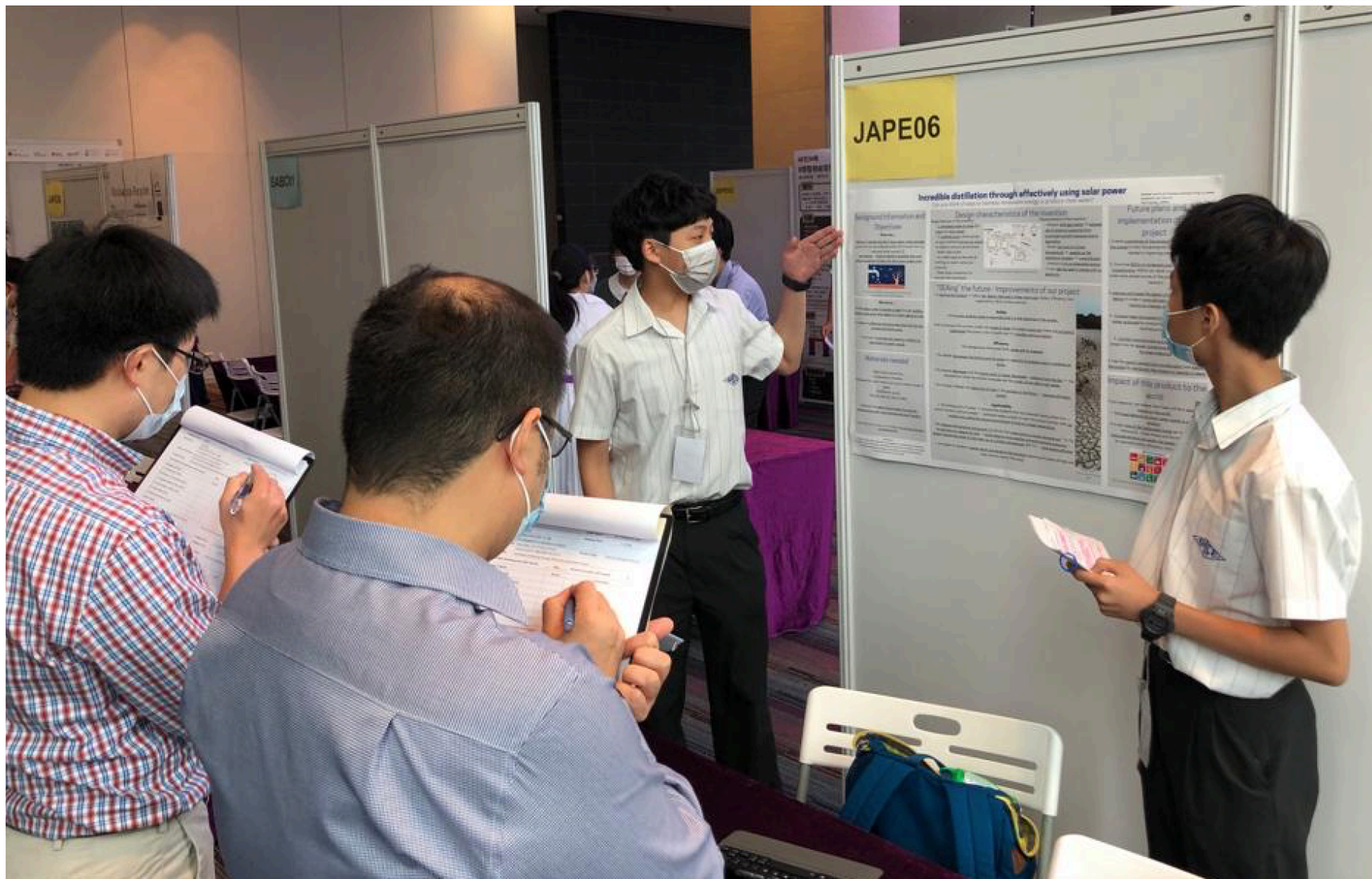
With student-led learning as our major concern, students are given ample opportunities to plan their learning, decide how much they want to learn and finally be awarded for their hard work in this self-learning programme in chemistry.

| | | |
|---|---|---|
|  <br>S.6A Lo Wing Hei<br>Diamond |  <br>S.6B Ho Justin<br>Diamond |  <br>S.6B Chau Isaac Ho Yung<br>Platinum |
|  <br>S.6A Cheung Chun Fung<br>Platinum |  <br>S.5C Chan Lok Yiu<br>Silver |  <br>S.5B Chui Chun Him<br>Bronze |

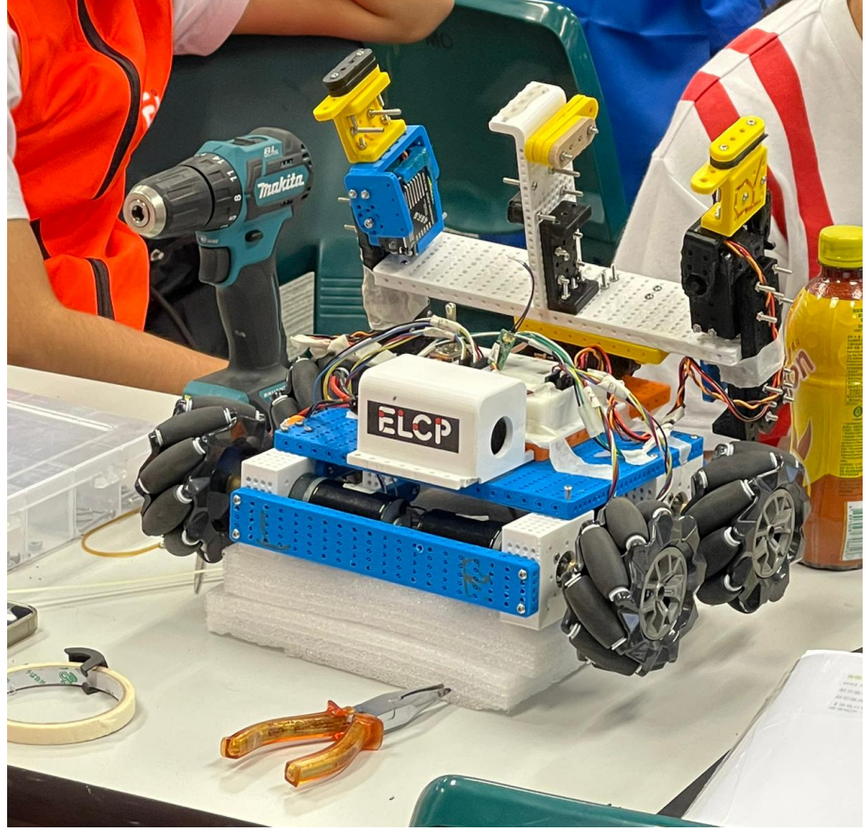
# HKSSPC


HKSSPC
2021
LAM Ka Kin Andrew
Honourable Mention in Design Proposal
HKSSPC
2021
CHOI Ching Yiu Kaster
Honourable Mention in Design Proposal


JAPE06
Incredible distillation through effectively using solar power
Background Information and Objectives
Design characteristics of the invention
Future plans and implementation of the project
"SEAing" the future - Improvements of our project
Materials needed
HKSSPC


JAPE06
Incredible distillation through effectively using solar power

# HKUST ROBOT EXPLORER CUP









# ROCKET CAR COMPETITION

## BEST PERFORMANCE SCHOOL AWARD

Congratulations to our three students from P.5B for their success in this competition which we participated for the first time!







# ODYSSEY OF THE MIND COMPETITION

## OF ZOOM DRAMA AND BAKING SODA

This year was a great milestone for our secondary team! We participated in the Hong Kong contest of this international competition and achieved 2nd runner-up.



