

KEK サマー・サイエンスキャンプ報告

2年7組 吉澤 佑果

大学共同利用機関法人 KEK
高エネルギー加速器研究機構
HIGH ENERGY ACCELERATOR RESEARCH ORGANIZATION

1.サイエンスキャンプについて

正式名称: 高校生のための素粒子サイエンスキャンプ

Belle Plus 2019

日程: 2019年8月5日(月)~8日(木)

場所: 高エネルギー加速器研究機構

2.コース

① Belle の実験データの中から粒子を探索する研究



② 宇宙線(ミュオン粒子)の速度を測定する研究



③ 自作したワイヤーチェンバーを用いて宇宙線の降り注ぐ角度を測定する研究



④ Belle 実験で観測可能な現象の理論的研究



3.日程

【1日目】

- ・開会式
- ・コース別実習①
- ・懇親会
- ・サイエンスカフェ

サイエンスカフェの様子



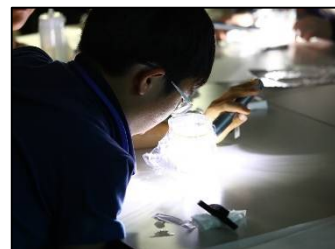
【2日目】

- ・講義(素粒子の研究と Belle/Belle II 実験)
- ・コース別実習②、③
- ・施設見学

講義の様子



・実験実習(霧箱を作る実験)



●コース別実習の様子●

【コース①】



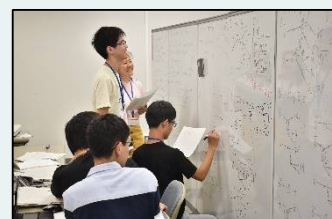
【コース②】



【コース③】



【コース④】

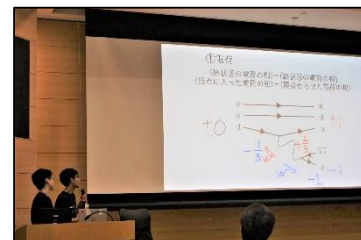


【3日目】

- ・発表準備、発表練習(コース別)

【4日目】

- ・発表会



- ・閉会式



「小林・益川理論」で
2008年にノーベル物理学賞
を受賞された、
小林誠 KEK 特別名誉教授

集合写真








GLOBAL LINK SINGAPORE

SESELI GIRLS' HIGH SCHOOL IN MALAYSIA



Nasa Ojima Mariko Miyazaki Riko Ono Non Nakabayashi

	DAY1	DAY2	DAY3
6			
7			
8			
9			
10		Singapore tourism	robotic research facility
11			
12			
13		visit NTU	
14			
15			marina barrage
16			
17		announcement	
18			
19		chicken rice	
20			

DAY4	DAY5	
6		
7		
8		
9		
10	lecture about cyborg	
11		
12		
13	announcement	
14		
15		
16		
17	Mr.Sato Hiroataka and his assistant	
18		
19		
20		



This time we participated in Global Link Singapore of science section in Nanyang Technological University and visited Sm Sains Seri Puteri in Malaysia.

We could come into contact with different cultures. In Nanyang Technological University, students of different nationalities discussed different themes and enjoyed their school life together.

In addition, what makes us feel new is the posture about environmental issues. I think that developing countries, such as Singapore and Malaysia, may consider the environment more than developed countries such as Japan and America.

Lastly, we want to visit Singapore and Malaysia again and recommend that you travel to the countries.



We enjoyed Singapore tourism. We visited Merlion Park. There are a lot of travelers taking pictures of the landscape. I thought, "Singapore is where diversity overflows."

Also, we dropped in local souvenir shops. I was surprised that the shop clerk asked the number of goods using broken Japanese. I think they became able to speak Japanese due to internationalization.

There are six Merlions in Singapore. So I recommend you to look for all the Merlions!

We listened to Mr. Sato Hirotaka's lecture about insect cyborgs. Mr. Sato Hirotaka is an associate professor, and researches insect cyborgs. The cyborg is made for disaster relief. They embed machinery that can remote control the insect's body, and direct the insect to an injured person or people buried alive in the place where a person or rescue dog can't enter. The insect that is most suitable is a cockroach. It has a lot of physical strength!

I think the study is very novel and interesting.



The main event of this induction course was this, the GLS' program.

All of us did poster sessions which we studied for. And we visited two colleges (Nanyang Technological University and National University of Singapore) with groups of mixed nationality.

There were more Japanese student than the others in the groups, so there were few opportunities to talk with foreigners, but we could make friends with the Japanese students who lived in different prefectures.

In GLS, we listened to others' presentations, which were really logical and great, and from these, learned a lot of different points of view.

It was a nice experiment for me to listen to others presentations which were made by people who have different points of view.

We went SESELI Girls' High School.

SESELI is Maebashi Girls' High School's sister school.

We made a pairs of two (one of them and one of us) and they showed us around their school, country, culture, and so on.

First of all, we introduced each other and exchanged presents.

Next we did our poster session, then they did theirs. Then we observed DNA, listening to "DNA" by BTS.

We had lunch with them while talking a lot.

This was a really good opportunity to interact with foreigners.

More than anything, we really enjoyed spending



How to fly a paper plane far

~focused the angle of its tip and the paper's quality~

Moe Sasaki, Tamaki Tokunaga, Nanoka Wada

1. Introduction

Purpose:To make a paper plane which everyone can fly far

Hypothesis:

- ①Paper planes which are made of thin paper fly farther because they are light.
- ②Paper planes whose angle of trajectory is small fly farther because the area where they touch the air is small.
- ③Paper planes whose wings are small fly farther because the air resistance they receive is small.

※We defined "to fly it far" as "the long direct distance between a person who threw it and the spot it landed."

2. Study Plan

Conditions to change

- paper quality(high-quality paper, *warabanshi*)
- the angle of its tips and the paper's quality(45° 60° 75°)
- size big:B4 small:A4

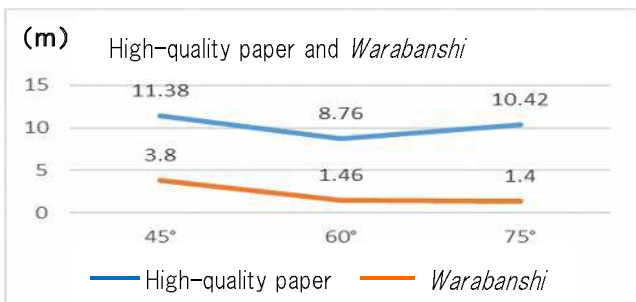
We flew a paper plane under these settings and measured the distance of flight path.



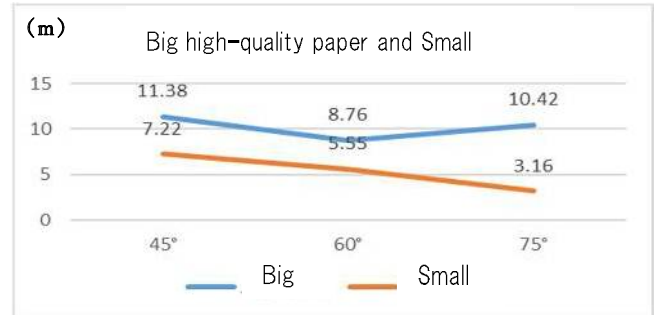
The graph value is the average of 5 experiments.

3. Results

①big high-quality paper > big *warabanshi* (m)

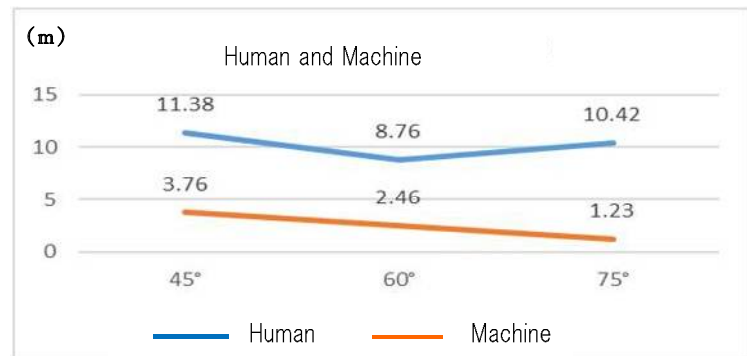


②big high-quality paper > small high-quality paper



※same experiment by a machine

③human's result ≒ machine's results



4. Discussions and summary

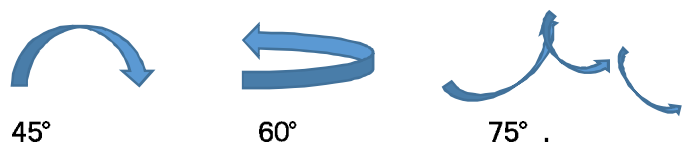
-big high-quality paper > big *warabanshi* (m)

→ *Warabanshi* was softer than high-quality paper so the *warabanshi* airplane was deformed easily by air resistance.

-the longest: high-quality paper and was thrown at 45° angle

→ Large wings benefited flying and the resistance of the wind was small.

- The large angle obstructed the flight because of the resistance of the wind.



「A small angle, large wings and hard paper is best」

※References WWW.venus.sannet.ne.jp/eyoshida/100catap.htm



Memorable and unpredictable password

Maebashi Girls High School

Yamada Karin/Ohshima Miyu/Kobayashi Rinka/Kitazume Satsuki

[Background/Motivation]



MEMORABLE FOR ME
UNPREDICTABLE FOR OTHERS



[Research Purpose]

Make a memorable and unpredictable password

[Experiment]

Experiment A

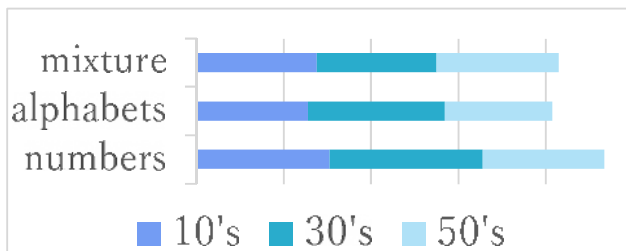
《Method》

Subjects: 10's 30's 50's

Content: Retention rate research

* retention rate [%]
=the number of the correct digits ÷ 8 × 100

《Result》



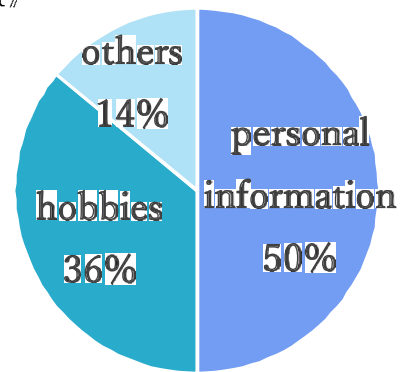
Experiment B

《Method》

Survey Subjects: 40 people in a class

Content: What is their password based on?

《Result》



Experiment C

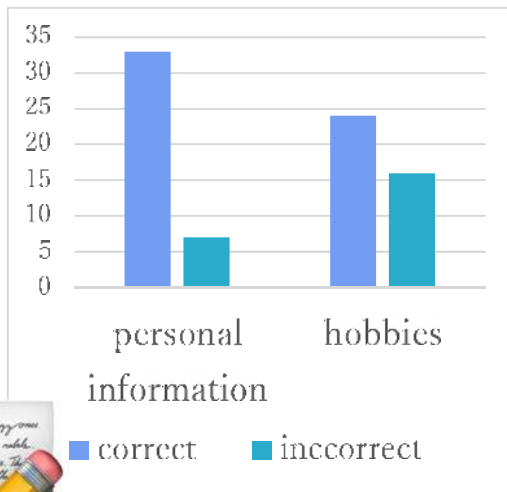
《Method》

Survey Subjects: 40 people

《Content》

- Set two kinds of passwords
- Set three fake passwords of each
- Pick one of each answer

《Result》



[Results and Discussion]

the most memorable password

made by **NUMBERS**

the most unpredictable password

based on **HOBBIES**



[Future Study Plan]

Do surveys with more people



Enhance the reliability of the results

[References]

N/A



Earth

1103
Otoka Ikuta

Then and Now

By Robert Quinn



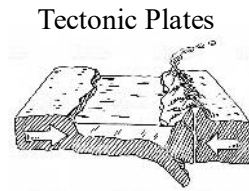
A Ball of Fire



Water and Air



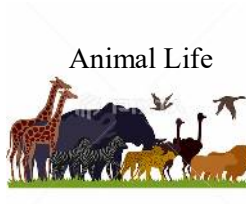
Animals and Rock



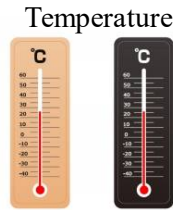
Tectonic Plates



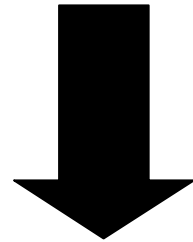
Plant Life



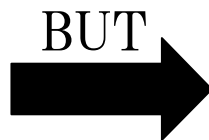
Animal Life



Temperature



People on Earth



The blessing are being destroyed.

The author may want us to feel the blessing and do any action thoughtful for the earth.

Recommendation



1

2

Many Detailed Things!

Beautiful and Concise Illustrations!

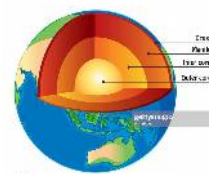


START
START

etc...



Beautiful illustration



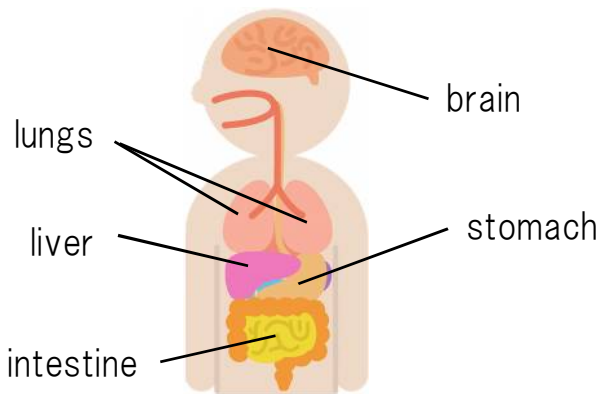
Concise illustration

Your Amazing Body

1 1 3 0 Toyoda Ayaha

☆Summary

Systems of our body are wonderful!



We should take care of it!



☆I would Recommend

You can learn about something new!

Information about

▪ Brain



▪ Nerves



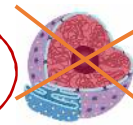
I didn't know that!

Find something new!

I wouldn't Recommend

This book has some real pictures of your body.

I don't like that...



This book could make you feel bad...

Our World In Art

By Richard Northcott

● Summary

Artists draw pictures by using many kinds of technique.

3-D



light



movement



You will be more interested
in art to try finding
techniques hidden in art!

● Recommendation

- 1, There are many techniques used for drawing pictures in this book.
- 2, I want you to be more interested in art.



● Conclusion

Art makes our life more exciting and rich.

This book will make you notice the fun of art.

Animals in Danger

1 2 1 4 SamataMiyuu

By Andy Hopkins and Joc Potter

★Summary

About 1 per cent of the animals in the world disappear every year because humans are killing them. We cannot always protect animals from nature but we can protect them from us.



★Recommendation

I would recommend

The author's message appeals us to help with the crisis of animals.



We can give money to WWF(World Wildlife Fund) .

I wouldn't recommend

This topic caused us to become aware of this deeply seated crisis for animals.



Because of that, I was full of anxiety. I have bad feelings about this.

★Conclusion

We should know about animals facing the threat of extinction and how to protect them. I wish humans and animals could live peacefully in the world forever and ever.

It tells us something important!

Our world in Art by Richard Northcott

1321 Ayaka Shiobara

He painted...

"Mona Lisa"
"The last supper"

He is called...
"Renaissance Man"



Leonardo da Vinci



He designed...
"manuscript"



He used...
"mirror character"

鏡文字



You can know **history** of art through this book.

It is very interesting to know what you don't know.

Please try to read this book !

FUTURE SPACE

Title: Astronauts in Space

By Caroline Laidlow

1335 Eren Hosoi

1. FUTURE SPACE EXPLORATION



RECOMMENDATION

- ① I learned something new.
- ② I can use the information In my life.

2. SPACE CLOTH



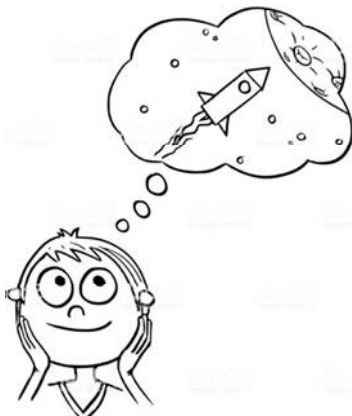
MORAL

To understand space more.
Let' s go to space in the future.

3. SPACE FOOD



4. HOLIDAYS IN SPACE



THIS BOOK IS ABOUT

The importance of space exploration.
Future space.

ALL ABOUT SPACE



1403 Ando Miyu

1 SUMMARY

People are interested in the outside world from a long time ago.



As a result, astronomy and research into life on other planets came into being.



Now People study techniques which are able to go to space

Very fast spacecraft!

The author thinks we will explore other solar systems one day.



2 RECOMMENDATION

(1) Many points that we can be excited!

Ex: Tourists will ... orbit earth and stay in space hotels.

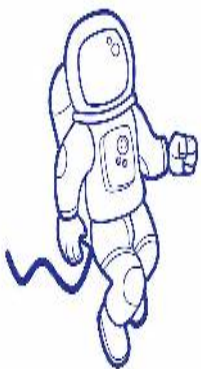
... be able to enjoy an amazing view, zero gravity.

Bacteria have likelihood that they can live on other planets

Aliens?



(2) Interesting stories on research into life on other planets!



VERY EXCITING BOOK!!!



WILLIAM AND KATE

1432 NEMU HIRATA



1 SUMMARY

♥MARRIAGE STORY♥

2001 Entered University of St Andrews
↓
2003 Became boyfriend and girlfriend
↓
2007 Broke up
↓
2008 Back together
↓
2010 Engagement
↓
2011 Wedding Ceremony



2 RECOMMENDATION

○Make you happy

Kate is Cinderella.



Kate is NOT from a royal family.
But she became princess.



○Good Point

Kate: Kate Effect



William: help people



MARRIAGE OF WILLIAM AND KATE BROUGHT HAPPINESS TO EVERYONE!

"World Wonders"

by Barnaby Newbolt

1529 Sakurako Nishi

☆Summary → What is "Beautiful"?



☆Recommendation



History around
the World



Place I want to
visit

☆Conclusion

About: beautiful building and landscapes that define author's
"Beautiful"

Would recommend → ○ Learn about ancient civilization

→ ○ Find places to travel

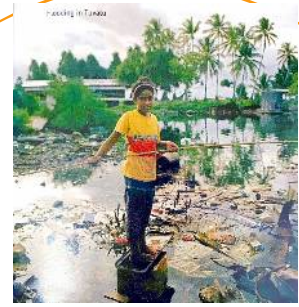
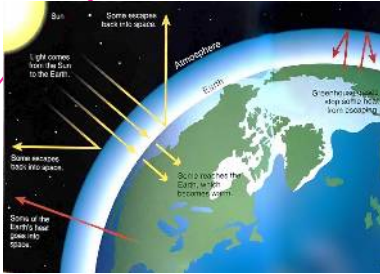
FIND OUR VERY OWN DEFINITION OF "BEAUTIFUL"

AND CREATE OUR ONE AND ONLY "BEAUTIFUL"

Climate Change

1536 Rika Mizunuma

☆ Summary



Extreme weather & Disaster

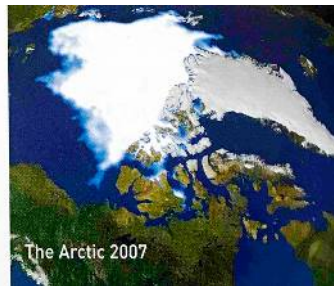
Usually Kept constant.
Now Getting warmer due to CO₂.

Governments around the world work together.



☆ Recommendation

1st ... We can learn something new!



The Arctic has lost a big piece of ice.

New water → High sea level → Floods → Ill from malaria!

2nd... We can get concrete advice!



Don't use them too much!



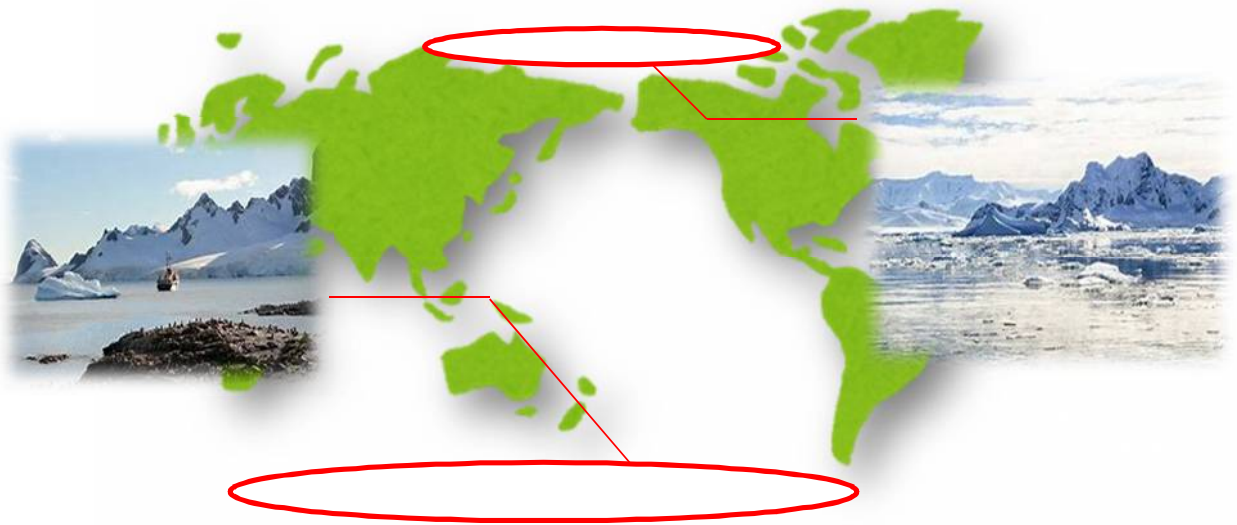
I'd recommend this book to you!

All About Ocean Life

1612 Sasaki Haruka

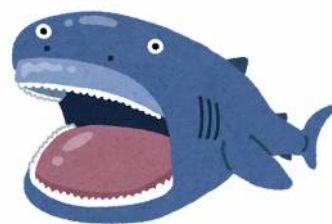
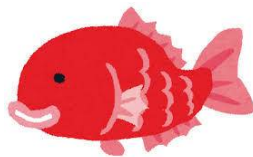
Summary

- There're five oceans.
- Ocean plants and animals have special ways of breathing, eating, moving and keeping safe.
- Some dangerous problems attack them.



Recommend Points

1 . Many connections of ocean's life !!



2 . Saving ocean's life !!



How to Stay Healthy

By Julie Penn

1636 Moe Yamada

* **Summary**

There're many delicious food around us.



We can get healthy bodies.



Getting fatter, disease, unhealthy life.



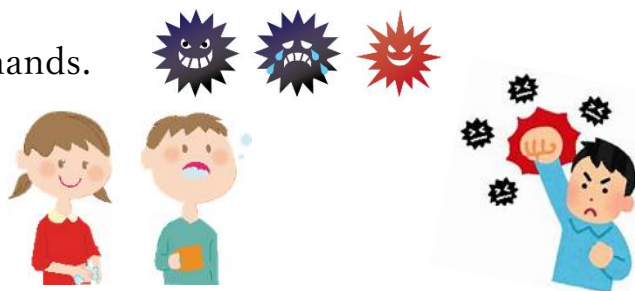
We need right food, exercise, good sleep.



* **Recommendation**

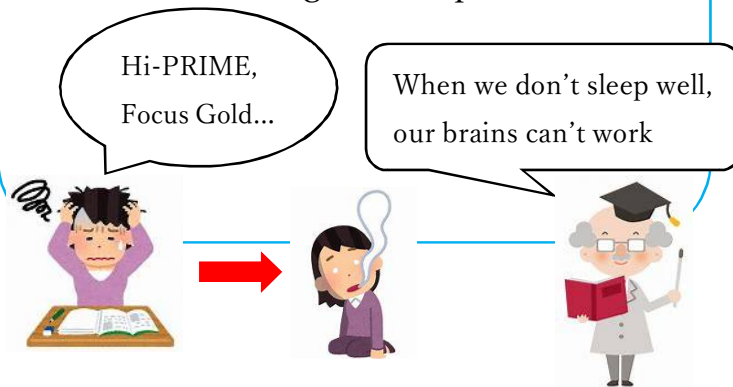
Influenza is coming.

We can protect ourselves by washing hands.



Many people are not getting enough sleep.

We should have good sleep.



* **Conclusion**

Do you want "Healthy body"?



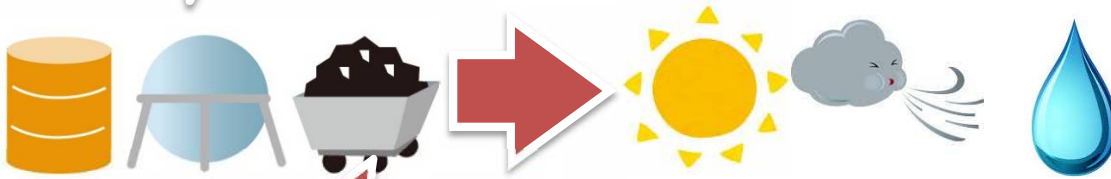
Let's read this book!

Caring for Our Planet

By Joyce Hannam

1728 Tamaki Tokunaga

Resources



Energy



Plastic bags



1. Everyone has to think about environment problem!!
2. Many good pictures!!

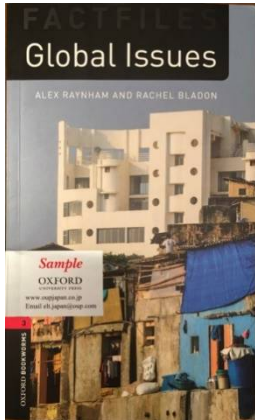


Let's think about our planet!!

Global Issues

By Alex Raynham & Rachel Bladon

1740 Nanoka Wada



Global issues

Health problems

Ex) Malaria, HIV, Ebola...

a lifestyle-related disease



Technology

Ex) Cyberbullying

AI



Environment problems

Ex) Global warming



The reasons to recommend this book are...

👍 I could think global issues deeply

👍 I would like you to care about the topic

Global issues are REAL

What will you do for your future?

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研究論文集
第2年次

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群馬県前橋市紅雲町二丁目19番地の1
TEL. 027(221)4188 FAX. 027(243)2676
e-mail maejo-hs08@edu-g.gsn.ed.jp
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