TOKYO ENGLISH CHANNEL

バーチャル留学：ワークシートの使い方

はじめに

バーチャル留学では、英語で海外の大学教授の講義を聞き、英語でディスカッションに参加します。
映像やワークシートで講義に参加するために必要な英語に慣れておくことができます。
講義当日まで、毎日できる範囲で学習に取り組んでみましょう。

ワークシートは以下の「**Video**」「**Reading**」「**Brainstorming Ideas and Opinions**」の項目から構成されています。

1 Video

映像をみて、ワークシートでその内容と英語を理解します。

ワークシートの項目名	学習方法
First viewing	映像をみて、内容を大まかにつかみましょう。
Confirming	質問に答えて映像の内容が理解できたか確認しましょう。辞書で単語を引いてもかまいません。
Summing up!	日本語の要約文は映像の内容を日本語にまとめたものです。内容を理解した上で、英語の要約文の空所を埋めてみましょう。 ※英語の要約文は **Video** の内容をもとに新しく書き下ろした英文です。日本語の要約文の英訳ではありません。
Second viewing	英語表現を勉強した後に、もう一度 **Video** を視聴しましょう。理解しやすくなったか確認してみるとよいでしょう。

※時間がない人は解答編を見ておくだけでも勉強になります。

2 Reading

Video の発展活動として、もう少し詳しい内容を読み、英語の表現を学び、発音を練習して、英語で内容を説明できるようにします。

手順	学習方法
ステップ❶	【音声素材】を聞きながら、英文を読みましょう。
ステップ❷	音声なしで、英文を読みながら、**The expressions we need** の日本語に合う表現を英文の中からさがして書き入れましょう。
ステップ❸	もう一度【音声素材】を聞きながら英文を読み、理解できるか試しましょう。
ステップ❹	**The information we need** の表に読んだ内容・情報を整理しましょう。

3 Brainstorming Ideas and Opinions

Video と Reading で学んだことを振り返り、英語で自分の意見や考えをまとめるセクションです。

イベント当日のディスカッションに役立てましょう。
イベント当日は **The expressions we need** や、**The information we need** で整理した内容も参照しながら参加しましょう。

TOKYO ENGLISH CHANNEL

バーチャル留学

ワークシート

解答

Student name（ ）

オーストラリア大陸に広がる広大な自然。そこに暮らす動物たちと人間のありかたを考えよう

University of the Sunshine Coast（オーストラリア）

Dr. Christofer Clemente

Animal Ecology: Pre-lecture Packet

Lecturer（ ）

Activities 事前学習の流れを確認しましょう。

After the lecture... 講義を終えてから内容を振り返ってみましょう。

ビデオ教材とリーディングの音声は、「バーチャル留学動画」の中に、大学別に用意されています。
チャプターを確認してご覧ください。
バーチャル留学動画 URL
https://www.tec.metro.tokyo.lg.jp/vr.html

Video 1: *What is a Food Chain?*

First viewing

Watch the video and answer the questions below.
映像を見て、内容をおおまかにつかんでみましょう。

Confirming

Circle the letter of the best answer.
理解度チェック！ 空所に入る語句、質問の答えに〇をつけましょう。

1. Which set is ordered from largest to smallest?

   A. food chain → organism → ecosystem　B. ecosystem → food chain → organism

2. Feeding relationships show us which organisms _____ by other organisms.

   A. are eaten by　B. feed on　C. are eaten by or feed on

3. What does every food chain include?

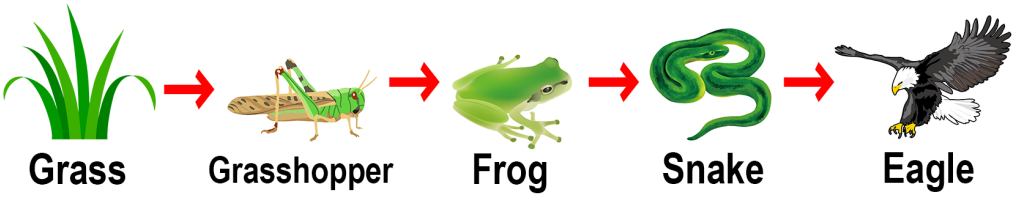
   A. ecosystems　B. trophic levels　C. supermarkets

4. What food chain example is given in the video?

   A. Small animals eat insects that eat plants.
   B. Insects eat small animals that eat plants.

5. In a food chain, there are _____.

   A. prey animals that eat predators　B. predators that eat prey animals



A food chain with five trophic levels

Summing up!

Complete the summary by filling in the blanks with items from The expressions we need below.

以下は予習教材動画の概要です。映像で見た内容について確認しましょう。
次に、理解した内容を踏まえて英文を読み、空所に合う語句を The expressions we need から選んで、英語の要約文を完成させましょう。

地球では、生物は生態系と呼ばれる環境のなかで、互いにさまざまなつながりを持って生きています。そのつながりの一つに食物連鎖と呼ばれる「食べる・食べられる」の関係があります。この食物連鎖はいくつかの層でできています。たとえば、植物を草食性の昆虫が食べ、それらの昆虫をほかの小動物が食べ、さらに、その小動物たちをより強い動物が食べるといった具合です。食物連鎖のなかで、食べる方の動物は捕食者、食べられる方は被食者と呼ばれます。

There are many ecosystems on our planet①. Ecosystems are environments② that include all the organisms existing in them. To live, organisms have to eat. Which organisms eat other organisms? And which are eaten? These relationships are ordered in food chains③. Each food chain has trophic levels④. At each level, there is the prey⑤ that is eaten, and there is the predator⑥ that eats it. For example, plants (low-level prey) are eaten by insects⑦ (their predators). However, these insects are eaten by small animals (higher-level predators). In our world, higher-level organisms feed on⑧ lower-level organisms.

The expressions we need

生態系	ecosystems	環境	environments	存在する	existing
～を食べる	feed on	食物連鎖	food chains	含む	include
昆虫	insects	順序付けられる	ordered	生命体、生物	organisms
惑星	planet	植物	plants	捕食者	predator
被食者	prey	関係	relationships	(食物連鎖の)段階	trophic levels

Second viewing

Watch the video again and confirm what you have learned.

学習した内容を踏まえて、もう一度映像を見てみましょう。今回はナレーションを聞き取ることに集中して、内容理解を深めましょう。

Video 2: *The Cheetah: At the Top of Its Food Chain*

First viewing

Watch the video and answer the questions below.
映像を見て、内容をおおまかにつかんでみましょう。

Confirming

Circle the letter of the best answer.
理解度チェック！ 空所に入る語句、質問の答えに○をつけましょう。

1. What kind of animal is at the top of each food chain?

   A. insect-eating　B. plant-eating　C. meat-eating

2. The cheetah is at the top of the food chain because of its _____.

   A. meat　B. speed　C. prey

3. What helps the cheetah hunt and catch its prey?

   A. the size of its head　B. the shape of its body　C. both

4. To be at the top of a food chain, an animal must have a _____.

   A. maximum speed of 120 km per hour　B. strength　C. flexible spine

5. Prey animals can escape from a cheetah by _____.

   A. running and making quick turns　B. running in one direction
   C. standing and making quick turns

A cheetah chasing its prey

Summing up!

Complete the summary by filling in the blanks with items from The expressions we need below.

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次に、理解した内容を踏まえて英文を読み、空所に合う語句を The expressions we need から選んで、英語の要約文を完成させましょう。

チーターは食物連鎖の頂点にいる動物です。チーターの最大の「強み」はスピード。加速力に優れており、走り出してからわずか数秒で最高速度に到達します。しかもその最高速度は時速 120 キロにもなります。チーターの速さの秘密はその体の作りにあります。小さな頭と細い体が、風の抵抗を最小限に押さえ、細くて長い脚や柔らかい背骨が、最大 7 メートルの歩幅を可能にするのです。しかし、地上最速の動物であるチーターでも、毎回狩りに成功するわけではありません。被食者は、逃げながら急速な方向転換をすることで、急に方向を変えるのが得意ではないチーターから逃げ切ることができるのです。

The animal species at the tops of food chains all eat meat and all have strengths①. One example is the cheetah; its strong point is its speed. It can run up to 120 km per hour because of its body structure②. The cheetah's head is small, its body and legs are slender③, and its spine④ is flexible. These mean low air resistance⑤ for the cheetah, making it the fastest animal in the world. However, the cheetah does not catch its prey every time it goes hunting⑥. When it is running fast, it cannot make quick turns⑦. If a prey animal has the ability⑧ to run and turn quickly, it may escape from⑨ the cheetah.

The expressions we need

能力	ability	空気抵抗	air resistance	体のつくり	body structure
～逃れる	escape from	柔軟な	flexible	狩り	hunting
すばやく曲がる	make quick turns	(他の動物の)肉	meat	細長い	slender
(動物)の種	species	背骨	spine	強み	strengths

Second viewing

Watch the video again and confirm what you have learned.

学習した内容を踏まえて、もう一度映像を見てみましょう。今回はナレーションを聞き取ることに集中して、内容理解を深めましょう。

Reading 1: *Surviving at Lower Levels of a Food Chain*

音声素材あり

Read the article below to find out more about how some prey protects itself.
被食動物について、さらに理解を深めましょう。3ページと5ページの The expressions we need も参考にしてください。

Predators have skills and strengths that help them to hunt and catch their prey. But prey animals also have ways to survive. Some are good at hiding. Others move in groups for protection. And many have hard shells, thick skins, or horns; these all make it more difficult for a predator to kill and eat them.

There are prey animals who trick a predator by acting in surprising ways. For example, a moth might suddenly show spots on its wings that look like large eyes. By doing this, it can frighten a predator and escape. A squid releases ink for the same reason.

Many prey animals send signals to their predators. The white-tailed deer raises its tail to let predators know "I know I'm in danger! I'm ready to run!" And when the gazelle jumps higher than usual, the message is "I'm healthy, so you can't catch me!"

Another strategy is to "play dead." Most predators catch and eat only live prey, and prey animals know this. The click beetle falls on its back and plays dead so predators will lose interest in it. The Virginia opossum lies down with its mouth and eyes open and its tongue out. Its heart rate also drops so a predator will believe it is dead.

The expressions we need

日本語に合う英語の語（句）を英文からさがして書き入れましょう。

生き残る	survive	隠れること	hiding	群れで移動する	move in groups
身を守るために	for protection	硬い殻	hard shells	厚い皮膚	thick skins
角	horns	だます	trick	驚くような	surprising
蛾(ガ)	moth	斑点	spots	翼	wings
～に見える	look like	怖がらせる	frighten	イカ	squid
墨を出す	releases ink	～に信号を送る	send signals to	オジロジカ	white-tailed deer
尾を上げる	raises its tail	ガゼル	gazelle	死んだふりをする	play dead
生きている	live	コメツキムシ	click beetle	あおむけに倒れる	falls on its back
興味をなくす	lose interest	キタオポッサム	Virginia opossum	心拍数	heart rate

The information we need

Organize the key information from *Surviving at Lower Levels of a Food Chain* by completing the table below with your notes.

Surviving at Lower Levels of a Food Chain を読んで、捕食動物に食べられないように被補食動物が取っている作戦についてチャートにまとめましょう。

Ways that prey survives

Protecting themselves		
Hide		
Move in groups		
Have hard shells, thick skins, horns ➡ difficult for predator to kill and eat them		
Tricking and frightening predators		
Moth	Suddenly shows spots that look like eyes	
Squid	Releases ink	
Sending signals to predators		
White-tailed deer	Action: Raises its tail	
	Meaning: I know I'm in danger! I'm ready to run!	
Gazelle	Action: Jumps high	
	Meaning: I'm healthy, so you can't catch me!	
Playing dead		
Click beetle	Falls on its back	➡ predator loses interest
Virginia opossum	Lies down	
	Eyes and mouth open, tongue out	
	Heart rate drops	

Video 3: *Ecological Pyramids: Keeping the Balance*

First viewing

Watch the video and answer the questions below.
映像を見て、内容をおおまかにつかんでみましょう。

Confirming

Circle the letter of the best answer.
理解度チェック！ 空所に入る語句、質問の答えに〇をつけましょう。

1. An ecological pyramid can show us how _____ are related to each other.

   A. ecosystems　B. organisms　C. food chains

2. An ecosystem is balanced when lower levels have _____ than higher levels.

   A. smaller populations　B. larger populations

3. What may affect the balance of an ecosystem?

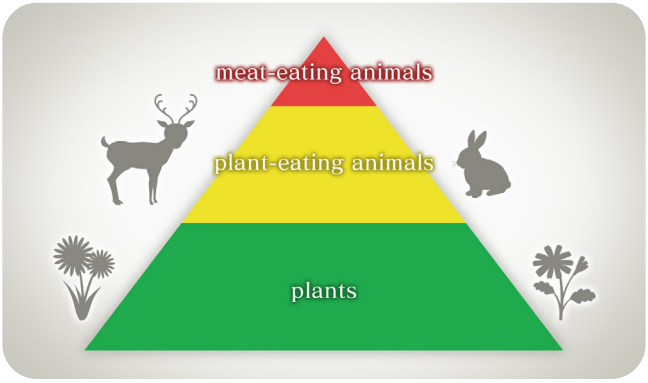
   A. introducing new organisms　B. organisms becoming extinct
   C. both of these

4. Ecosystems are threatened when _____ impact the organisms in those ecosystems.

   A. human activities　B. trophic levels　C. an ecological pyramid

5. What should we do to protect our planet's wildlife?

   A. decrease organism numbers　B. maintain food chain balances



An ecological pyramid

Summing up!

Complete the summary by filling in the blanks with items from The expressions we need below.

以下は予習教材動画の概要です。映像で見た内容について確認しましょう。
次に、理解した内容を踏まえて英文を読み、空所に合う語句を The expressions we need から選んで、英語の要約文を完成させましょう。

生態系における生物の関係性は、生態ピラミッドと呼ばれる図で表すことができます。下層に属する生物の個体数が、上層の生物よりも多いとき、生態系全体のバランスは保たれています。しかし、様々な理由からこのバランスが崩されることがあります。例えば、全く別の生態系から生物（外来種）が持ち込まれた結果、もともとそこに生息する生物（在来種）の個体数が減少したり絶滅したりすると、生態系全体のバランスに影響が及びます。

現在、いくつもの生態系のバランスが崩れていることが問題になっていますが、その原因の多くが、人間の活動によるものだと言われています。人間の活動が生態系に与える影響について正しく学び、食物連鎖のバランスを崩さないようにすることが大切なのです。

We can understand how organisms in an ecosystem are related when we look at an ecological pyramid①. If the lower levels of the pyramid have larger populations② than the higher levels, the ecosystem is in balance. However, one organism may decrease in number or become extinct③. Also, a new type of organism may be introduced④ from another ecosystem. These changes can affect the ecosystem's balance. Human activities also threaten⑤ ecosystems when they have an impact⑥ on organisms. We have to understand that our actions have consequences⑦ and we must protect⑧ food chain balances.

The expressions we need

行動	actions	影響を及ぼす	affect	結果	consequences
減少する	decrease	生態ピラミッド	ecological pyramid	絶滅する	extinct
影響	impact	バランスがとれている	in balance	入り込む	introduced
個体数	populations	守る	protect	脅かす	threaten

Second viewing

Watch the video again and confirm what you have learned.

学習した内容を踏まえて、もう一度映像を見てみましょう。今回はナレーションを聞き取ることに集中して、内容理解を深めましょう。

Reading 2: *Invasive Species' Impact on Ecosystems*

音声素材あり

Read the article below to find out more about what happens when a species invades an ecosystem.

新しい生物（例、外来種）の侵入が生態系に及ぼす影響について、さらに理解を深めましょう。これまですべての The expressions we need も参考にしてください。

What is an "invasive species?" To invade means to enter and cause harm. An ecosystem may be invaded by an outside species. If that species spreads and changes the ecosystem's balance, the species is considered to be invasive.

Some invasive species are predators and hunt native species. For example, Burmese pythons are from Southeast Asia, but were brought to the United States as pets. In some areas of Florida, all of the wild opossums and rabbits have been eaten by pythons.

Other invasive species compete with native species for food and habitats. One example is Asian carp. This fish was brought from rivers in China and Russia to Arkansas in the United States as a way to control water plants. However, they are quickly spreading north by river and invading lakes. Adult Asian carp have no natural predators in North America, and they eat the plankton that other species of fish need.

Invasive species may also bring disease with them from outside the ecosystem. The southern house mosquito was accidentally introduced from tropical areas to the Hawaiian islands in the 1800s by ships. This mosquito carries a disease called avian malaria, which is one of the main reasons that many native birds in Hawaii are now extinct.

All of these examples have something in common: human activities were the main reason that these species were introduced from one ecosystem into another. People, and the goods they carry, travel around the world faster and faster. We must do what we can to prevent species from invading other ecosystems in the future.

The expressions we need

日本語に合う英語の語（句）を英文からさがして書き入れましょう。

侵入種	invasive species	害を及ぼす	cause harm	～であると考えられる	is considered to be
在来種	native species	ビルマ・ニシキヘビ	Burmese pythons	フクロネズミ	opossums
～と競う	compete with	生息地	habitats	(アジアから来た)コイ	Asian carp
水生植物	water plants	天敵がいない	have no natural predators	プランクトン	plankton
病気	disease	ネッタイイエカ(蚊)	southern house mosquito	偶然に	accidentally
鳥類のマラリア	avian malaria	共通して	in common	～から種を守る	prevent species from

The information we need

Organize the key information from *Invasive Species' Impact on Ecosystems* by completing the table below with your notes.

Invasive Species' Impact on Ecosystems を読んで、ある生態系に新たに入ってきた生物が、その後生態系にどのような影響や害を及ぼすかについて、読み取った内容をチャートにまとめましょう。すべての The expressions we need の表現を使ってください。

Invasive species	Enter an ecosystem and cause harm	
	Spread and change the ecosystem's balance	
Examples	Burmese pythons	
	Harm	Hunting native species
	Brought	From Southeast Asia to U.S.
	Reason	Pets
	Result	Hunt opossums, rabbits
	Asian carp	
	Harm	Competing with native species for food
	Brought	From rivers in China, Russia to Arkansas, U.S.
	Reason	Control water plants
	Result	Eat plankton needed by other fish
	Southern house mosquitos	
	Harm	Bringing avian malaria to native species
	Brought	From tropical areas to Hawaii (1800s)
	Reason	Accidentally brought by ship
	Result	Many native bird species extinct

Causes

- Human activity introduced invasive species from one ecosystem to another.
- People and goods travel around the world faster and faster.

Reading 3: *Human Activities and Japan's Ecosystem*

音声素材あり

Read the article below to find out more about how human activities impact ecosystems in Japan.

日本では人々の行動が生態系にどのような影響を及ぼしているかについて、さらに理解を深めましょう。これまですべての The expressions we need も参考にしてください。

There are several types of ecosystems in Japan. These ecosystems are home to wide ranges of plants and animals. However, human activities are threatening much of this biodiversity.

One problem for Japan's biodiversity is waste management. Over 60% of the country's waste is burned, releasing dioxin into the air. Another challenge is development. Building a ski resort means that various organisms lose their habitats. Human activities also cause air, water, and soil pollution. Noise and light pollution from houses, businesses, roads, and trains also hurt Japan's plants and animals.

Pollution adds to global warming, which is another problem for Japan's biodiversity. Global warming is causing higher water levels around Japan and is affecting temperatures and weather. It is also bleaching the country's coral reefs. A 2017 government report said that about 50% of Japan's largest coral reef had bleached. Overfishing is another problem related to the waters around Japan. People are catching fish faster than they are replaced with new fish, so the balance of the ocean's ecosystem is changing.

Most people do not understand how quickly Japan is losing its biodiversity. Local governments and businesses have choices: Should we build a golf course that will bring money and jobs? Or save the plants and animals living there now? It is time to make decisions that save biodiverse ecosystems.

The expressions we need

日本語に合う英語の語（句）を英文からさがして書き入れましょう。

幅広い	wide ranges	生物多様性	biodiversity	廃棄物管理	waste management
焼却される	burned	ダイオキシン	dioxin	開発	development
土壌汚染	soil pollution	騒音	noise	地球温暖化	global warming
水位	water levels	気温と気象	temperatures and weather	白化する	bleaching
サンゴ礁	coral reefs	魚の乱獲	overfishing	置き換えられる	replaced

The information we need

Organize the key information from *Human Activities and Japan's Ecosystem* by completing the table below with your notes.

Human Activities and Japan's Ecosystem を読んで日本の生態系の問題について読み取った内容をチャートにまとめましょう。

Japan's ecosystems	
What they are	Home to wide ranges of plants, animals
The problem	Human activities threatening biodiversity
↓	
Waste management	Over 60% of the waste is burned
	Result: Releases dioxin into the air
Development	Building a ski resort, golf course
	Result: Organisms lose habitats
Pollution	Types: Air, water, soil, noise, light
↓	Result: Hurt plants, animals
Global warming	Results: 1. Causing rising water levels
	2. Affecting temperatures, weather
	3. Bleaching coral reefs
Overfishing	Catching fish faster than they can be replaced
	Result: The balance of the ocean's ecosystem is changing.

Brainstorming Ideas and Opinions

How can we avoid harming food chains and the biodiversity of ecosystems?
食物連鎖と生態系における生物の多様性を保つために、何をしたらいいか、自分の意見をまとめてみましょう。

Step 1: Reviewing

Take another look at the reference materials in this packet.
この Pre-lecture Packet の全資料を読み返して、概要を把握しましょう。

Step 2: Understanding harm to native species

What causes problems for native species? Complete the table below with information from the video and reading worksheets.

生態系やそこに生息する在来種に害を及ぼしている原因はなんでしょうか。映像とリーディング資料、そしてこれまで作成した表などから情報を集め、下の表にまとめましょう。

Species organization	
Ecosystem	Environment and all its organisms
Food chain	Feeding relationships: Organism that eat/are eaten by others Each relationship: Trophic level
Biodiversity	Range of plant and animal species
Ecological pyramid	Balance of ecosystem: Larger populations in lower levels
Examples of strengths	Predator: Speed (body structure)
	Prey: Shells, skins, horns, tricks, signals, playing dead

Problems species face	
Invasive species	Predators: Pythons eat opossums, rabbits
	Competitors: Asian carp eat plankton needed by other fish
	Disease-carriers: Mosquitos carry avian malaria, kill birds
Human activities	Pollution, waste management, development
	Results: Organisms lose habitats, rising water, bleaching coral reefs, ocean's balance changing, losing biodiversity

Step 3: Writing your ideas!

Speed and turning skills can decide who will survive: the predator or the prey. In Australia, invasive or alien species such as cats and middle-sized dogs are considered predators. What strengths do you think they have that allows them to affect the balance of Australia's ecosystems?

動物の走る「速さ」と「急速な方向転換をする力」は生存に大きく関係しています。オーストラリアでは、入植者が持ち込んだ動物、猫・(中型)犬などが主たる捕食者となっていますが、これらの特別「強い」とは思えない動物が、なぜオーストラリアの固有種に致命的な影響を与えているのか考えましょう。

Should we kill invasive species? Or should we find ways for them to live together with native species?

Step 4: Taking notes

On September 23rd, take notes on the lecture below.

イベント当日は、メモを取りながら講義を受けましょう。

Reflecting on the Lecture

After the lecture on September 23rd, look back on what you have learned from this packet. Write some notes on each point. Write as much as you can about what you have learned from Dr. Clemente's lecture.

すべてのワークシートを読み返し、クレメンテ先生の講義を振り返って、今回学んだことを英語でまとめましょう。

1. Strengths and skills of predators and prey

2. Balance in ecosystems

3. How the balance in ecosystems is harmed

4. New information you have learned from Dr. Clemente