Teacher's GUIDE

CATAPULTS

Awesome ORGANS
BY STEPHEN MINCHIN

WHEN GERMS ATTACK!
BY STEPHEN MINCHIN

DRAGONS
BY EMILY FALLOON

The Golden Age of PIRATES
BY Keri Trim

PYP AGENTS

What do we mean by "Transitional Readers"?

In this teacher's guide, we often use the term "transitional readers". The term is used in some educational systems and not in others, but we think it is useful. Why?

Transitional readers are moving from the early stage of reading to fluency. They are at a stage in their learning, rather than an age, and it's a vitally important stage.

Researchers and teachers Szymusiak and Sibberson have this to say about students at the transitional stage:

> They [have] reached a critical point in their development and [need] their teachers to engage them in learning experiences that ... support them in new ways. Most of them have the necessary decoding skills and strategies for successful reading ... they need a new set of strategies for reading more complex texts.

Beyond Leveled Books (Stenhouse, 2001)

This teacher's guide offers support to you and to your students as they engage in these new learning experiences.

Contents

Welcome to PYP Agents

Informational texts to support transitional readers on the path to literacy

The *PYP Agents* books are engaging informational texts (that pack a fun surprise) for readers transitioning from simple informational texts to more complex, content-rich chapter books.

The *PYP Agents* books contain exciting curriculum-based science, mathematics, and social studies content, as well as rich opportunities to explore the PYP transdisciplinary themes. They also include essential informational text features – chapters, glossaries of academic and general language, breakouts, pictures, captions, diagrams, and maps. *PYP Agents* is a flexible resource which promotes language as inquiry and encourages conceptual thinking. It is suitable for explicit teaching and learning, and as a classroom library.

The *PYP Agents* books are between 24–32 pages. They are available in both print and digital formats for interactive shared reading, guided learning, and independent reading.

Level	Reading age
J	7 – 7.5
K	7.5 – 8
L	8 – 8.5
M	8 – 8.5

Editable lesson plans!

The *PYP Agents* books come with downloadable lesson plans in an editable format that you can personalise to your students' needs. These include references to possible conceptual understandings and Visible Thinking Routines that might support thinking.

The *PYP Agents* books are complex and challenging, with strong scaffolds to support transitional readers. They contain unique and fun features (see next page) to help keep readers feeling supported and on track to fluency in reading.

"Students move from reading picture books and early chapter books to reading more complex texts across content areas. This stage of literacy is critical as students build on their early experiences to become more sophisticated readers."

Sibberson and Bass

Meet Nat the Ant!
The student guide and mentor

"Ants work hard, they build pathways, they are stronger than they look, and they work as a team to achieve their goals - just like transitional readers!"

Throughout each *PYP Agents* book, Nat the Ant asks the reader inquiry questions about the text to encourage critical thinking and academic conversations.

When someone touches something that has germs on it, they can get sick. A lot of scientists think that viruses aren't really alive. If that's true, viruses can't die. They can sit around for years and years, waiting for someone to pick them up.

Imagine if everyone could see germs in the air, or on desks, chairs, door handles, and people's hands ...

? How differently do you think people would act?

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different people who live in Kazakhstan, as well as the rest of the world. People can meet there to talk about stopping wars and being nicer to each other.

There are lots of famous pyramids in the world. In Slovakia, the Slovac Radio Building is a little different. It's built upside down!

It is hoped that this peaceful pyramid will be a good place for people to talk about being nicer to each other.

? Do you think this will work? Why, or why not?

17
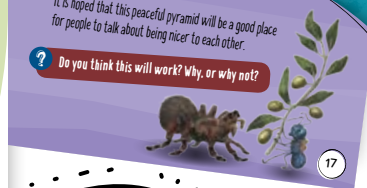
Find out more about Nat and the Ant tunnel on page 18!

You will also find an illustrated Ant tunnel to explore halfway through each book. Nat appears in the Ant tunnel, to summarise the text so far and motivate, encourage, and focus the readers' thinking for the second half of the book.

Print and digital books *The 20 digital books are ideal for shared reading, which is an essential part of a transitional reading program. Find out more on page 15.*	• 5 x titles at 24 pp and 15 x titles at 32pp • Glossary for academic and general language • Questions throughout for critical thinking • Essential informational text features for transitional readers
Fluency, language, and text features support	• 20 x teacher support documents with a focus on fluency support, text features, and language and reading skills
Comprehension strategies lesson plans	• 20 x downloadable, editable guided-lesson plans focused on comprehension strategies and building content knowledge for the first few chapters of each book, followed by collaborative work for students • Teacher and student support for using digital texts for explicit teaching and learning using the shared reading approach
Mini-lessons	• Teacher-led and student-led short lessons with a focus on fluency support, text features, and language and reading skills
Writing	• 5 x "writing in response to text" activities for each book, available online

Transitional readers

The term "transitional readers" describes a stage (not an *age*) when learners must be motivated and supported to comprehend text, develop fluency, master new language and text features, build on their decoding skills, build content knowledge, and write in response to texts.

You may have transitional readers in any of the following settings:

1. General Education classrooms, from years 3–6+

2. Targeted teaching groups in classrooms, from years 3–9+

3. Bilingual learners from years 3–9+

Note that for English language development, the term "transitional readers" often applies to those readers who are transitioning from their first language into English.

The *PYP Agents* books are designed to support ALL learners who are moving from the early reader stage to more complex texts. This *includes* English language learners.

Why transitional readers need support

Transitional readers and writers need support when they meet new and challenging texts that might disrupt their progress on their pathway to literacy.

Transitional readers must acquire explicit strategies, skills, and knowledge to read, write, and interpret new forms of information. *PYP Agents* is designed to support and guide you and your students through this otherwise tricky transition. We are committed to supporting your readers to make meaning from their reading, enjoy and find motivation from informational texts, and make strong progress in literacy.

> Understanding non-fiction requires a different set of strategies for young readers ... because young readers often have little experience with non-fiction text, we find that much of our explicit teaching is concerned with ways to make sense of it.
>
> Szymusiak and Sibberson

More complex texts require greater effort and knowledge for comprehension, language development, and writing in response. Further, fluency development can drop off, as it is much harder to develop fluency with informative texts as opposed to narrative texts.

Elements that can confuse, challenge, and overwhelm students include:

Academic language	Non-linear breakouts	Sequences/procedures
Diagrams and maps	Headings/ subheadings	Punctuation
Captions	Unfamiliar concepts	Language features

With *PYP Agents* books, and with your support, students learn to handle these features.

With *PYP Agents*, all transitional readers can take part in group discussions and hands-on activities, and they are supported to build skills, strategies, and experience, and fuse them together into effective literacy practise. This provides hands-on and minds-on learning experiences that broaden understanding of big ideas, as well as teaching essential literacy skills.

"Students' background knowledge is essential to reading comprehension. Curricula should help students build content knowledge … in order to empower reading success."
Myracle, Kingsley, McClellan

"Making connections across instructional areas is essential to develop both language and literacy"
Uribe and Nathenson-Mejía

Now is the time to act!

PYP Agents books and levelling

The *PYP Agents* books have been professionally levelled to provide curriculum-rich informational texts that are complex, yet accessible to students progressing from the early reading stage to fluency. *PYP Agents* uses the reading levels from F and P, but a conversion chart is available if your school uses a different levelling structure.

The books have 24 pages or 32 pages and provide a progression in challenge and support, and build stamina for reading informational texts.

The books' topics have been derived from curriculum content at the transitional reading stage. They are academically relevant, yet also to appeal to the interests and background knowledge of students.

"A level is a teacher's tool, not a child's label"

It is widely accepted that young learners pass through four stages of development in order to become successful readers and writers.

Emergent	Early	Transitional	Fluent

It's important to remember that students with strong knowledge of a topic may read *well above* an assigned reading level. Because of this, reading levels shouldn't be used to restrict students to certain books, but rather help to guide them toward books that are a good fit.

Irene Fountas and Gay-Su Pinnell, Fountas and Pinnell blog

PYP Agents levels

Level J – 24 pages — Reading age 7–7.5

Building Shapes
Stephen Minchin
Maths – Geometry

It's About Time
Julie Ellis
Maths – Time

The Shape of the Land
Jane Kelley
Science – Geology

The Golden Age of Pirates
Stephen Minchin
Social Studies – History

Rocks
Paul Mason
Science – Geology

Level K – 32 pages — Reading age 7.5–8

Going, Going, Gone!
Stephen Minchin
Science – Geology

Killer Plants
Emily Falloon
Science – Living World

On the Move
Emily Falloon
Science – Living World

The Rabbit in the Moon
Claire Gibb
English Language Arts – Myths and Legends

Vikings
Keri Trim
Social Studies – World History

Level L – 32 pages   Reading age 8–8.5

Dragons
Emily Falloon
Myths and Legends

Flying Through Time
Neale Pitches
Social Studies – World History

Money, Money, Money, Money!
Jane Kelley
Maths – Currency
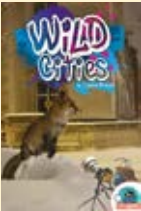
Wild Cities
Stephen Minchin
Science – Living World

Level M – 32 pages   Reading age 8–8.5

Awesome Organs
Stephen Minchin
Science – Human Body
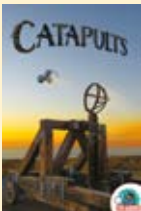
Catapults
David Chadwick
Social Studies – World History

Healthy and Delicious
Stephen Minchin
Science – Human Body
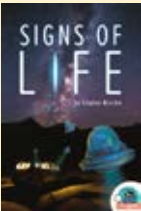
Signs of Life
Stephen Minchin
Science – Space

Weather Monsters
Matt Comeskey
Science – Weather

When Germs Attack!
Stephen Minchin
Science – Human Body

PYP Agents lesson support

The instruction for each *PYP Agents* book includes downloadable, editable lesson plans, mini-lessons on comprehension, fluency support, language, and text features, and accompanying Powerpoints and worksheets.

Book-specific

|	
Comprehension strategy lesson plans	These lesson plans introduce each topic with a focus on comprehension strategies, and give explicit lesson ideas for the first few chapters of each book. See pages 38–39 for more detail.
Fluency, language, and text features support	These support documents outline specific fluency, language, and text features in each book. A suggestion list of conceptual lenses is also provided to help teachers connect literacy skills to possible units of inquiry. See pages 40–41 for more detail.

For use on any book

Teacher mini-lessons	These are fast, discussion-based lessons that focus on a particular language skill, reading skill, or text feature for the chapter. They encourage inquiry-based learning and suggest Visible Thinking Routines to promote different types of thinking and ways to document evidence of thinking. Find these on the *PYP Agents* website (www.extendeducation.co.uk/pyp-agents).
Student activities	These are student-friendly activities to help students learn independently or with learning partners. Find these on the *PYP Agents* website.
Fun activities	These worksheets contain fun games and puzzles that build on the skills introduced through the books.

> To be successful, each student needs to experience explicit support through shared and guided instruction and experience hands-on opportunities to read, think, talk, and write in response to the texts. The *PYP Agents* teacher support is based on the "gradual release" approach, which is supported by peer-reviewed research.

The *PYP Agents* website (www.extendeducation.co.uk/pyp-agents) is home to resources that you can download and use alongside the print resources.

- Lesson plans and support documents
- Writing activities

Options for using PYP Agents in different settings

PYP Agents is a flexible resource that can suit a range of teaching and learning approaches.

Shared reading instruction	The *PYP Agents* books are provided on a unique digital interface for 21st Century explicit, interactive teaching and learning, or shared reading. See pages 21–23 for more details on using the digital tools with a small or larger group.
Small group guided learning	Lesson plans and support documents for explicit literacy instruction (comprehension strategies, fluency support, language and reading skills, and text features) are provided for each of the *PYP Agents* books. See p. 40–43. These are available from the *PYP Agents* website. As a result of classroom trialling, we have also included some topics ideas for writing in response to each of the books.
Short lessons	Free online short lessons are provided on the website for needs-based direct instruction.
Intervention	Research indicates that a core component of intervention is reading material that is highly engaging and curriculum-linked. *PYP Agents* is lovingly designed to meet these two criteria.

Be aware that using low-to-high levelled reading groups may affect students' learning motivation and self-perception of ability, and limit the mutual benefits of peer-discussion in mixed-ability groups.

PYP Agents and shared reading

PYP Agents is a flexible resource that supports multiple approaches to classroom teaching and learning.

It's widely accepted that shared reading is an essential, explicit instructional approach.

The following are the key concepts of an effective shared reading lesson:

- An enlarged text chosen for features that suit your purpose
- A grouping of students, perhaps the whole class or a smaller needs-based group
- A commitment to:
  - reading to and with the students
  - modelling and explicit teaching
  - creating a learning community where students feel at ease, able to articulate their ideas, and listen to the ideas of others.

The digital versions of the *PYP Agents* books are ideal for projecting onto a screen, or using with an interactive whiteboard or large TV, for shared reading
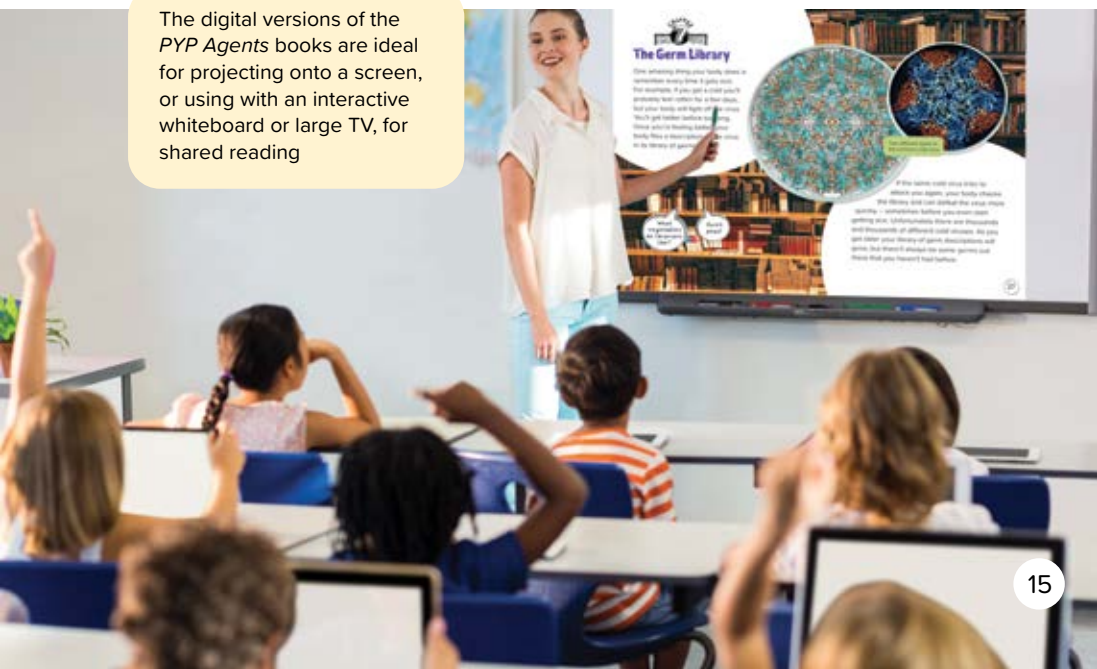
PYP Agents and humour

In each *PYP Agents* book, there are speech bubbles with jokes, puns, and humour alongside the images in the text. Humour promotes engagement – an essential component of learning.

To understand how and why (and *if*!) something is funny, students must bring together their background knowledge and their comprehension of the text so far. From there, the joke may be linked to a play on words, syntax, rhyme, or an inversion of the norm.

The jokes are an incentive to understand the text. To "get" the joke will encourage students to focus more intently on their reading, re-read for comprehension, or discuss their questions with their peers.

Humour:

- encourages students to engage more with the text
- boosts motivation to persevere to the end of the book
- increases overall enjoyment of reading
- encourages discussion, collaboration, and oral language
- relaxes and puts students at ease during challenging texts
- promotes language knowledge and learning.

Understanding the humour of a different culture can be very challenging for students learning another language. Jokes hinge on a shared cultural context and background knowledge, or a thorough grasp of linguistics and wordplay. Participating in a joke and using humour is crucial for forming and maintaining relationships with peers and interacting with others in a variety of social settings.

Consider having English language learners read with a buddy who is a native English speaker. If a joke is confusing, encourage students to discuss it together using their native language or English, or check their understanding with you. This not only encourages collaborative reading and problem-solving, but will help bilingual learners develop social academic language and confidence with understanding and using humour.

Digging deeper with Nat the Ant

Each *PYP Agents* book includes an ant character named Nat, who guides the reader through the book and asks thought-provoking questions about what they have just read.

Each book also comes with a downloadable fold-out "Ant tunnel."

The tunnel allows students to think through what they've read and learned in each chapter. It provides questions about what they've read, which encourages students to check their comprehension and reread the text, if necessary. Finally, it serves to activate background knowledge for the second half of the book, using questions that hint at what students will be reading next.

If students are reading in pairs, encourage them to take turns to read each part of the Ant tunnel aloud.

Keep a record of what things students find confusing. You can use the teacher mini-lessons or the student activities (online) to personalise their learning and target the areas they have less confidence in.

The Ant tunnels are not featured in the lesson plans, but can also be used for small-group discussion during reading.

You might group students together when they reach the Ant tunnel for a discussion, such as:

1. Together, read aloud each of the "what you've learned so far" parts and see how students respond to the questions. If needed, flip back through the text to check responses, and to discuss the text.

2. Ask students to read aloud the questions about the upcoming chapters.

3. Have students predict what they think the chapters will be about and why. Ask: "What part of the text helped you to predict?"

4. Ask students to discuss their understanding of the book so far, especially any difficult parts. Talk about useful skills and strategies they could use to make better sense of the text (see comprehension strategies, pages 26–30). This will help students to enjoy and understand the second half of the book.

Nat the Ant and Asking Questions

Throughout each book, Nat's questions help students to connect with the text on a deeper level, and to consider and express their own opinions and ideas. The questions give students the opportunity to engage in critical thinking and to learn more about language function and forms. Some are funny to encourage student engagement and enjoyment.

Shared reading:	You may wish to digitally display Nat's questions, or part of the Ant tunnel and work collaboratively with the students to discuss and answer the questions and make predictions and determine important ideas.
Guided learning:	Nat's questions are built into the *PYP Agents* lesson plans and can be discussed in small groups with students. You may wish to go around the group and have each student contribute, or have students work in pairs and report back with their ideas.
Partner reading:	If students are reading with learning partners, you might ask them to pause at each of Nat's questions and talk about it together before moving on.
Independent reading:	If students are reading independently, encourage them to pause at the questions and think about how they would answer. You might also have them write down their answers to Nat's questions to discuss later, or check in with them midway and discuss their responses.

PYP Agents digital support

The *PYP Agents* digital books are ideal for interactive shared reading, with all or part of a page projected onto a screen, or offered to students via an interactive whiteboard or a device.

Before using these in your classroom, it's recommended that you familiarise yourself with the digital books and tools.

The table below shows how to use the tools, and how they are useful for teaching and learning.

Tool	How-to	Teaching and learning during shared reading
Mask	1. Click on the "mask" icon. 2. Use the arrows around the mask to size and position it. 3. Click on the magnifying glass icon to zoom in. 4. To close the mask, click on the mask icon again. 5. Click on the "reset" icon to return the page to its original position.	Use the mask to isolate and magnify important text elements during modelling and discussion. For example, isolate and magnify titles and blurbs, headings, photos, captions, tables, and graphs. Also use the mask to isolate individual paragraphs, such as those that contain important ideas and content. Cover the text while predicting from the chapter title.

Glossary	1. Click on any bold word to show a pop-up definition. 2. Click on the red "X" in the top right-hand corner of the popup box to close a definition.	Ask students to "solve" the word in context, and then click on the definition. This is good for developing academic, domain-specific, and general vocabulary/ language.
Drawing tools	1. Click on the "pencil" or "highlighter" icon. 2. Click on the "drawing width" icon, and choose your width. 3. Click on the "colour palette" icon, and choose a colour. 4. Write or draw on the page.	Use the drawing tools to focus the students' attention on a particular text feature. Highlight and identify how you use comprehension strategies and text features. Underline or highlight important ideas. Show where and how you are using a comprehension strategy, or language or text feature.
Digital sticky notes	1. Click on the "note" icon. 2. Click on the page where you want your note to appear. 3. Drag out the red square to the size you want. 4. Type into the note using your keyboard. 5. Click anywhere outside of the note to continue.	Use the sticky note for a reading or writing activity. Perhaps model how to annotate the text to record how you are using comprehension strategies, or use it to summarise then synthesise information.

Eraser	1. Click on the "eraser" icon. 2. Click on the object you want to erase.	Erase any individual drawing you have added to the page.
Trash	Click on the "trash" icon.	Erase ALL the objects you have added to the page.
Save/ Load	Click on the "save" icon to save annotations on a page. Create a file name, and click "save" again. Please note, you need to save each annotated page to keep the annotations. To load previously saved annotations of a page, go to that text and click on the "load" icon. Locate the desired file name and click "load" again. Please note, saved files are housed on your local hard drive. This means if you open the same text on a different computer, you will not have access to your previous annotations.	
Print	To print a page, click on the "printer" icon. This will connect to your local printer and open a print confirmation window.	

For best results, it is recommended that you open the *PYP Agents* digital books using the latest Chrome or Safari browser. An internet connection is needed at all times.

If you did not receive a login to access the digital resources with your purchase, please email info@csi-literacy.com.

PYP Agents pronunciation support

The table below is a helpful guide to pronouncing some of the complex vocabulary in *PYP Agents*. Be aware that accents might mean that words are pronounced slightly differently in some areas.

24 pages		
Building Shapes	Guangzhou Kazakhstan Zollverein	GOOAHNG-DJO **KAH**-ZAHK-STAHN **TSOL**-VAIR-INE
The Shape of the Land	tectonic Pangea Appalachian	TEK-**TON**-IK **PAN**-JEE-AH AH-PAH-**LAH**-CHYIN
Rocks	igneous sedimentary metamorphic pumice gneiss	**IG**-NEE-US SEH-DI-**MEHN**-TEH-REE MEH-TI-**MOR**-FIK PUH-MIS NICE
32 pages		
On the Move	wildebeest Tuareg Bedouin	**WILL**-DEH-BEEST **TWAH**-REG **BEH**-DOO-IN
The Rabbit in the Moon	elixir Tsukimi pareidolia mare	**EH**-LIK-SIR TSOO-KEE-MEE PAH-RAY-**DOH**-LEE-AH **MAH**-RAY
Vikings	Bjørn	BYORN

Flying Through Time	Lilienthal	LI-LEEN-TAL
Wild Cities	macaque	MAH-**KAK**
	langur	LAN-**GOR**
Awesome Organs	stapedius	STA-**PEE**-DEE-US
Catapults	siege	SEEDJ
	mangonel	**MAN**-GOH-NEL
	trebuchet	**TREH**-BYOO-SHAY
Weather Monsters	Hyacinthe	**HI**-AH-SINTH
When Germs Attack	*Pseudomonas aeruginosa*	SOO-DOH-**MOH**-NAS AY-ROO-GEE-**NOH**-SAH
	Acinetobacter baumannii	AY-SIN-**EE**-TOH-BAK-TER BOW-**MA**-NEE-I
	Salmonella	SELL-MOH-**NEL**-LAH
	Escherichia coli	ESH-ER-**EH**-KEE-AH **KOH**-LI
	van Leeuwenhoek	VAN **LAY**-VEN-HOHK
	Hepatitis	HEH-PAH-**TI**-TIS
	prion	**PRI**-ON
	fungi	**FUHN**-DJI
	protozoa	PROH-TOH-**ZOH**-AH
	giardia	DJEE-**AR**-DEE-AH

The pronunciations above are derived from Figure 3.1 "Guide to Pronunciation of English Sounds" in Research-based Methods of Reading Instruction Grades K–3 by Sharon Vaughn and Sylvia Linan-Thompson (2004).

PYP Agents: Reading comprehension strategies

Transitional readers are meeting new challenges that require them to use their decoding skills, develop their fluency and vocabulary, and comprehend new types of texts – particularly informational texts – across the curriculum. Below are the comprehension strategies to support your students.

Making Connections	Making connections to and within the text they are reading is essential if a reader is to comprehend that text. Being able to decode and recognise the words is essential, but not enough. To make meaning, the reader needs to be able to bring their knowledge (often called background or world knowledge) to the text. Reading and learning become more meaningful to readers when they are able to connect their learning to their own lives, experiences, and background knowledge.
	Researchers Stephanie Harvey and Anne Goudvis have identified three types of connections:
	• Text-to-self – connections to the reader's own experience and knowledge
	• Text-to-text – connections to and within texts they have experienced (books, comics, magazines) or media (TV, movies, or digital games)
	• Text-to-world – connections to what the reader already knows of the wider world, including the subjects that they have read about and studied at school.

	Students who learn to actively seek connections as they read understand more. Teachers have many options for explicitly teaching students how to make connections including one-on-one, shared reading to a group, and guided learning with a small group.
Asking Questions	Asking questions promotes engagement with a text, invites prediction, creates reasons to read, and fosters comprehension.
	Harvey and Goudvis write that proficient readers "question the content, the author, the events, the issues, and the ideas in a text."
	Questions also foster discussion and interaction between readers, and between students and the teacher. As Nell K. Duke and P. David Pearson found "students exposed to questioning techniques that deepened their reading experiences are more able to generate high quality talk."
	Anne P. Sweet and Catherine Snow concluded that "Effective teachers asked high level questions requiring students to make inferences and think beyond the text."
	Students who learn to ask such questions are broadening their knowledge, deepening their comprehension of the text and learning about language form and function.
Visualising	Visualising refers to the mind's capacity to imagine what is being suggested by words or symbols on a page or screen, or in a text that is being heard.
	Visualising is a strategy that can help students picture the text vividly in their mind using all their senses. Students who create strong mental pictures as they read have better recall, make more connections, ask more questions, and have deeper comprehension of the text.

	You may find it helpful to have students discuss and point out which words helped them to visualise the most, and to discuss why students might find different words more helpful because of their different background knowledge.
	Encourage students to use strong visualising words and adjectives in their writing to help create a mental picture for their reader.
Drawing Inferences	Drawing inferences is the process of drawing meaning from a text that is not explicitly stated. Sometimes the reader notices clues in the text and uses these to make meaning. Sometimes a reader will draw an inference that the author is surprised by. Susan Zimmerman and Chryse Hutchins say "meaning is created in the mind of the reader."
	It's important to note that inferences can be drawn in both fiction and non-fiction texts. In the *PYP Agents* book *Going, Going, Gone!* the dramatic cover picture speaks for itself, or does it? A body of water is encroaching on the land and washing away a road. But what inference does the reader draw? That the book is about sea-level rise? Or is it about a big one-off storm? Readers are encouraged to link their inferences to evidence in the text, make predictions, and to read on, as they draw and check their inferences.
	Readers who draw inferences are more engaged with the text and have deeper comprehension.
	Predictions are a type of inference, based on evidence. It's helpful to ask students "What was it in the text that caused you to predict that?"

Determining Important Ideas	"Thoughtful readers grasp essential ideas and important information when reading" – Harvey and Goudvis
	Determining important ideas is sometimes referred to as finding the main ideas and supporting detail in a text. It is closely related to the skill of summarising, and is strongly related to the author's purpose for writing.
	As we model this strategy it can help to annotate the text, and to show students that the important ideas in an informational text are often found in the first or last sentence. The supporting details add useful, often interesting, but not essential, information.
	A reader's perspective and experiences can influence which ideas are considered important. Through discussion, students can appreciate that sometimes there are different views about what is important in a text depending on the reader's background, values, and knowledge.
	In informational texts such as *PYP Agents* there are special challenges, as students must consider features such as diagrams, maps, tables, graphs, illustrations, photographs and captions, as well as italics, bold (glossed) words, special fonts, bullet points, and tables of contents. All of these features can convey especially important ideas.
Monitoring Comprehension and Repairing Understanding	Monitoring the meaning they are making while reading is the strategy of strategies, often called metacognition.
	To be able to monitor their understanding, Harvey and Goudvis argue that our students need to stop if and when meaning breaks down and "use a variety of strategies to 'fix up' [their] comprehension."

in a welcome development for us as teachers, researchers Tom Trabusso and Edward Bouchard concluded that "comprehension monitoring ... can be taught through teacher modelling and practise by children during reading"

Further, Michael Pressley says that metacognition "...develops most completely when students practise using comprehension strategies as they read."

We support you in the lesson plans to model by thinking aloud how to monitor comprehension, and to guide students as they apply their knowledge of strategies to the text, to make meaning, and fix up their comprehension when needed.

Summarising, Retelling and Using Evidence	We may think of summarising as related to university-level study, however there is strong evidence to support summarising and retelling for transitional students as a comprehension activity.
	When students recall important ideas and retell a shortened version of what they have read, they must be mindful of the sequence, and will reveal how thoroughly they understood what they were reading.
	Encourage students to use sequence words such as "first, next, then, finally" to structure their retelling.
	Using evidence is when students respond to a text verbally, or in writing, by mentioning specific parts of the text to inform their response.
	It requires students to integrate their knowledge of the text with their purpose for responding, and select evidence that will support their ideas.
	Support students to connect their ideas to the text by asking, "What quote or detail from the text made you think that?"

Intonation Pitch and intonation are used while reading to convey meaning.	• Model the reading, then group the students and read a sentence over and over with different moods (emotions): grumpy, surprised, scared, excited, confused. • Discuss how authors can show their purpose and create tone by using exclamation and question marks. Show how the voice goes up and down, and gets louder and softer when reading. • Demonstrate how saying a sentence loudly or in a soft whisper gives the sentence a different expression. For example, model this sentence in several different volumes: "I have something to tell you."
Emphasis Emphasis and volume given to words to reflect the reader's interpretation of the text.	• Stressed or emphasised words often point to an important idea, opinion, or differing perspective. • Explain the idea of emphasis by using examples. Show that emphasising different words in a sentence changes the meaning each time: "You gave me the cup," "You gave me the cup," or "You gave me the cup." • Say a sentence without any emphasis at all. Then, for comparison, exaggerate how you use volume and speed to give the emphasised word more weight. • Discuss how authors sometimes show emphasis by using italics, boldface, underlining, ALL CAPITALS, or "quote marks."

Pacing Consistency of an appropriate speed during reading.	Model for students how reading a sentence aloud really fast (or very slowly) isn't easy to understand. Model a measured, even pace. Have the students practise pace with a tongue twister, e.g., "She sells seashells by the seashore." First, try it very fast. Next try it agonisingly slowly. Finally, try it at a conversational "ideal" pace. Point out that reading steadily at a slower pace is helpful when there are lots of difficult words, rather than speeding up and slowing down just for the hard parts.
Punctuation (Pausing and phrasing) Smoothness of reading, and phrasing as cued by punctuation.	When reading texts aloud, practise obvious pausing at full stops and commas. To show how important pausing is, read a few sentences with no pausing (without losing your breath!) and show how it is much easier to follow along when there is pausing, guided by punctuation, to separate sentences and clauses. Exaggerate the difference between pauses at commas (short), and pauses at full stops or exclamation points (longer). Mention that sometimes there isn't punctuation to signal a pause, but the phrase might need a pause anyway. These can happen between units of sentences. For example, in the sentence "The cat sat on the mat in the garden" there can be a pause between the two prepositional phrases "on the mat" and "in the garden" for clarity.

PYP Agents: Visual features and language supports

Below are the visual features and language supports from the *PYP Agents* books that are typical of informational texts. Your students are likely to need support to explore, understand, and learn about the use of these visual features and language supports, and the *PYP Agents* lessons and mini-lessons will support you to teach these.

Visual Features

Images	Help students to connect the photographs and illustrations to the words.
	Ask students what information the images give them that adds to what is written in the text.
Diagrams and maps	Help students to "read" the information in these visual features, just as they read words.
	Ask students: "Why do you think a map/diagram was used to show this information? How does it help our understanding?"
Sequences and procedures	Help students to follow the steps of the process in order.
	Connect the sequence format to their background knowledge of other sequences, e.g., recipes, routines, and instructions.
Captions	Explain that captions sit alongside images to give extra information.
	Ask students to discuss what type of information the caption gives.
Glossary	Point out the bolded words in the text and remind students that this signals a glossary entry.
	Model flipping to the back of the book, locating the word alphabetically, reading the definition, and then flipping back to the page you were reading.

Language Supports

Adjectives	Help students to recognise adjectives as describing words – words that add detail and more depth and meaning to the text.
	Use an item from the classroom, and have students brainstorm as many describing words as they can about it. (For example, a globe: colourful, useful, round, detailed, interesting, informative, etc.)
Adverbs	Help students to recognise words that describe how something is done. Adverbs describe verbs.
	Have students walk slowly in a circle around a desk. Read aloud sentences with adverbs in them, and have students copy the actions, (e.g., "The students walked slowly," "The students walked nervously," "The students stomped loudly," etc.).
Nouns	Help students to recognise nouns as words that name people, places, or objects.
	Play a "noun game" using a list of different words with a range of nouns (objects, animals, students' names, place names) mixed in. With students sitting down, read the words out (getting faster), and tell students to put their hands on their head when they hear a noun.
Prepositions*	Help students to recognise prepositions, and understand that they show where something is in relation to other things.
	To introduce prepositions, have students stand up and have them follow "preposition directions" you give, like Simon Says (e.g., "The students are *under* the doorframe," "The students are *on* the chairs," "The students are *in* the hallway").
Sayings	Discuss with students what "sayings" are, and give an example of one that they are familiar with.
	Help students understand the meaning of the saying.
	Point out that every culture, and sometimes people in different areas, have different sayings that they use. Ask if any students want to share a saying they know from their area or from their culture.

Synonyms and antonyms	Discuss that synonyms are when a group of words have a similar meaning, and antonyms are a group of words with an opposite meaning.
	Help students to practise thinking of synonyms and antonyms using easier words at first, and then move onto more advanced examples.
Compound words	Discuss that some words are made up by joining two words together e.g., "whiteboard" and "bookcase".
	Explain that the compound word's meaning is often linked to the words it is made from.
	Have students practise by sharing compound words they know or can find, and what the words mean.
Silent letters	Help students to pronounce words with different silent letters in them, e.g., the "b" in "climb," the "k" in "knife," and the "g" in "light."
	Brainstorm similar sounding words (e.g., knight, sight), or research others with silent letters and have students practise identifying and pronouncing them together.
Homographs	Help students to recognise that homographs are words that are spelled the same, but have different meanings, e.g., bat (baseball) and bat (flying mammal).
	Have students brainstorm or research other words that are homographs, and their different meanings.
Contractions*	Explain that the apostrophe usually replaces the missing letters. Practise expanding and contracting words when your students find them in the text.
Capitals	Discuss what kinds of words take capital letters and why.
	Support your students to use capital letters correctly in their writing, and give feedback on whether they've used them appropriately, and why, or why not.

*These are often the most difficult language components for bilingual learners.

Writing activities for responding to the text

Each *PYP Agents* book has five short writing activities provided for your students to choose from, with your guidance, as a written response to their reading. They are available as activity sheets for download at www.extendeducation.co.uk/pyp-agents

By completing a writing connection after reading, students have the opportunity to show their comprehension, use new vocabulary in context, practise using evidence from the text, and reflect on the ideas they have been introduced to in the book and during group discussion.

The writing activities provided for each book cover five writing types:

| Narrative | Informational | Letter writing | Opinion | Research |

These allow you to personalise your students' learning and to choose which writing type will be of most benefit to them.

Writing activities are good for monitoring progress, making instructional decisions, and formative assessment. You can collect feedback on students' understanding of a text and their ability to respond to the content and language of the text. You can also use the writing activities during teacher-student conferencing to discuss their progress, comprehension, and next steps for learning.

Tech tip!
If students are using the digital books, have them use the digital sticky note tool to write any questions throughout the book.

Support for the writing activities

To get started, you may choose to:

- Display the chosen writing prompt digitally

- Download and print copies of the writing activities sheet

- Have students complete the short writing activities using pen or pencils and paper, or download the file(s), and save in a shared folder for students to access. Have students "save as" with their name, and they can then write digitally from their devices

- Support students to write about the topic using the basic writing conventions of the genre, (e.g., beginning a letter with "Dear …").

As you teach students the steps of the writing process, you might consider using the remaining writing activities for students to develop their writing skills also.

Digitally-based activities

- Have students create an advertisement (a "book-o-mmercial") where they record/video themselves answering these questions about the book:

  – What is the name of the book, and what is it about?

  – Why would you recommend it to a friend?

  – What did you find interesting?

  – Why do you think the author wrote the book?

  – What would you like to find out next?

- Have students create a presentation answering the questions above, using images, and quotes from the book. Next, have students show their presentations in pairs, and compare/contrast their answers.

Lessons: Reading comprehension strategies

Each *PYP Agents* book has a guided lesson focused on reading comprehension strategies.

Lessons are provided as editable documents online, giving you the ability to adapt, save, and print lessons to suit your students' needs.

Comprehension strategy lesson

PYP AGENTS

It's About Time

SAMPLE LESSON

Level	**J (Fountas & Pinnell) or equivalent**
Subject Area	Mathematics
Concepts	Measurement, time, invention
Reading Focus	Students will learn to use the comprehension strategies of Asking Questions and Determining Important Ideas as they read, think, talk and write in response to the text.
Text Type	Informational
Academic Vocabulary	ancient time, calendar, circle, clock, day, hour, minute, number, sand, second, shape, sky, water, week, year

Topic Talk	• This book explores the concepts of time and accuracy of measurement. • Show students the cover of the book and read the title aloud. Ask: "What do you think the phrase 'It's about time' means?" • Have students think, pair, share the meaning of the title, and ask them to think about more than one meaning for the words. • Have students make a prediction about what the book might be about. • Now read the blurb on the back cover together. Have students talk about anything they have learned from the blurb (e.g. that the title can have two meanings).
Contents	• Open to the contents page and read the titles of the chapters aloud. • Explain that contents pages are helpful for finding out what the author's purpose in writing the book is. • Have students think, pair, share what new things they have learned about the book from the contents. • Point out that some of the chapter titles are well-known sayings about time. Re-read the chapter titles "Time's Up!" "Keeping Time," and "Out of Time," and discuss what these sayings mean and when they are used. • Introduce students to "Nat the Ant" at the bottom of the page and read the speech bubble aloud.
Opening Chapters	• Use the Visible Thinking Routine "+1" • Read the chapter title and page 2 aloud. Explain that the chapter is a question. Have students think about the chapter title and the questions *who, what, where, when, why* and *how*. Explain that you will come back to these questions at the end of the book. • Read page 3 aloud. Make sure to read the breakout at the foot of the page as part of reading page 3. Have students write what they think the important ideas are in the text

- Now read the chapter 2 title and pages 4 and 5 aloud. Have them discuss what they learnt, and if they still have questions discuss them with the group.
- Discuss the ant questions as a group.
- Now, read page 6. Point out that these are instructions. Ask students to share with a partner a time they followed instructions to make something. Have some students share with the whole group.
- Have students think, pair, share what would happen if you didn't follow the questions in order (also known as a sequence). Explain that instructions don't always have numbers, but sometimes use words like "next," "then," and "finally" to give you the right order.
- Read pages 7 and 8 together.
- Have students think, pair, share about whether or not these pages added to their knowledge about time.
- Ask students to share whether they have seen or heard about a sundial before. If they have, where was it?
- Set a purpose for reading from chapter 3 to the end of the book:
  - Try to ask questions about what you are reading as you go.
  - Try to find the main idea in parts of the text as you read and look for parts that are supporting details of the main idea.
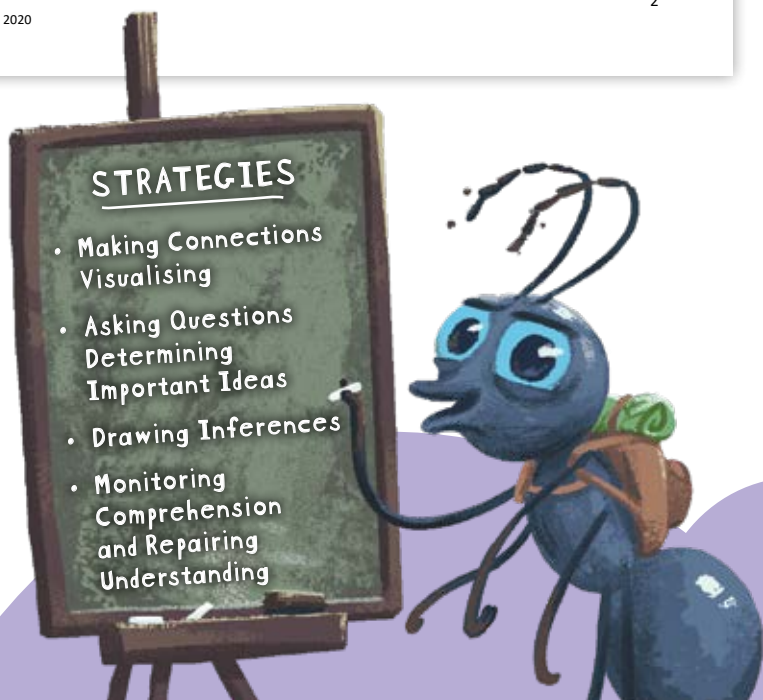 - Pause at the ant questions to answer them and read the Ant Tunnel carefully.

As students read on independently, you can check in with them to discuss the ant questions, or personalize learning by using the *Mini-Lessons* and *Fluency, Language and Text Features* to scaffold parts of the book that might be unfamiliar or challenging.

Bring students together again for reflection using the "After Reading" prompts.

EDITABLE

After Reading	1. Have students think, pair, share about important ideas they wrote down and questions they haven't been able to answer.
	2. Have students retell the journey of invention from the sundial to the digital clock using "first," "next," and "finally".
	3. Ask: "Were there any parts where you were stuck with your understanding, and how did you become unstuck?"
	4. Discuss how important it is to measure time and to know what the time is.
Writing Prompts	*Fiction*	Write a story making up a problem you had when you were late for an important event.
	Informational	Write instructions to explain to someone how to set a digital clock to the correct time. Swap your instructions with a friend, and check the instructions make sense.
	Letter Writing	Write a letter to your school principal convincing him or her to build a sundial, a water clock, or a giant hourglass for the school. Explain why the school should have one.
	Opinion	Do you think it's important to always be on time, or not? Write an article explaining your opinion.

DOWNLOADABLE

2

STRATEGIES

- Making Connections
  Visualising
- Asking Questions
  Determining
  Important Ideas
- Drawing Inferences
- Monitoring
  Comprehension
  and Repairing
  Understanding

Teacher support: Fluency, language, and text features

Each *PYP Agents* book has support for fluency, language and text features important for transitional readers.

There are 20 documents covering a wide range of fluency, language and text features that transitional readers will encounter in *PYP Agents*, including:

- intonation
- emphasis
- pacing
- images
- diagrams and maps
- sequences and procedures
- captions
- glossary
- adjectives
- adverbs
- nouns
- prepositions
- sayings
- synonyms and antonyms
- compound words
- silent letters
- homographs
- contractions
- capitals.

These documents have accompanying Powerpoints and Worksheets, and can be found on the *PYP Agents* website.

It's About Time

Fluency, Language, and Text Features	Idioms, Pacing, Sequences and Procedures, Glossary
Level	J
Content Area	Math
Text Type	Informational text

Teaching points	Notes
Idioms Some of the chapter titles are idioms, or well-known sayings about time. Read the chapter titles "Time's Up!", "Keeping Time", and "Out of Time". Can your students explain the different ways these idioms can be read and understood?	
Pacing Explain that reading as fast as possible isn't always best and that reading too slowly can also make it hard to follow a sentence. Model reading a sentence very quickly and slowly. Discuss what a good reading speed is, why it's good, and how reading at a constant speed helps to understand the text better.	
Sequences and Procedures The instructions on page 6 tell you how to do something. The list of materials say what you will need, they are similar to an ingredients list. The numbers show what order to do things in. Instructions don't always have numbers, but sometimes use words like "next", "then", and "finally" to give you the right order.	
Glossary Words are bolded throughout the book so you know that you can check the glossary for their meaning. Model how to flip to the back of the book to look up the words alphabetically.	SAMPLE

Formative feedback and learning conversations

There are many studies that show how important assessment is for learning – both for teachers and students.

Learning conversations are a good way to check in with students, give feedback about their work, support them to set challenging yet achievable goals, and motivate them to continue trying to improve.

Five steps for a mutually-beneficial learning conversations:

1. Discuss the student's reading, with specific examples, and give descriptive feedback to point out what parts are successful and how other parts might be improved.

2. Ask the student how they feel they are learning and progressing using *PYP Agents* books, and why.

3. Compare where they think they are with their reading, to where you think they are. Explain why.

4. Give the student an opportunity to mention anything they are finding really hard, or to ask questions about their reading.

5. Discuss what the next steps for learning might be (goal setting), and what they can do to try to achieve their goals.

You can use the results of the learning conversations to personalise learning, monitor progress, and to contribute towards the bigger picture of the student's overall progress.

Academic and domain-specific language

One of the specific goals of *PYP Agents* is to build comprehension across subject areas and equip learners for all kinds of reading experiences. By including a rich variety of academic and domain-specific language in cross-curricular texts, students are supported with literacy in other learning situations where the focus is on learning new content, rather than comprehension of new vocabulary.

All academic language terms are Level 1 (Years 1–3). A full list of terms can be found in *Building Academic Vocabulary – Teacher's Manual* by Robert J. Marzano and Debra J. Pickering.

Academic language for each book are listed at the start of that book's comprehension strategy lesson plan. See page 38.

Master glossary

Building Shapes!

architects – people who design buildings

circular – shaped like a circle

designing – drawing and planning

elevator – a machine for carrying people to the different floors of a building

foundation – the base that a building sits on

globe – a sphere, often with a map of the world on it

mines – tunnels under the ground, used for digging up coal, gold, or other minerals

palace – where a king, queen, or emperor lives

reconciliation – becoming friendly again after an argument or a war

rectangular – shaped like a rectangle

reflected – when an image can be seen in a mirror or in water

ruffling – to mess up hair or feathers so they aren't smooth

spherical – shaped like a sphere

stable – steady, not falling over

three-dimensional – having three dimensions: width, length, and depth

It's About Time

accurate – correct and right

ancient – a time long ago in history

Babylonians – a group of people who lived in the Middle East 4,000 years ago

digital – showing the time using numbers (digits) in a row

divide – to cut up into pieces

electronics – things that use electricity

emperors – leaders who are in charge of more than one country

mechanical – using gears

military – the army, navy, coastguards, air force, and marines

orbit – the movement of one thing around another thing (like a planet moving around a star)

tower – a tall, narrow building

Rocks

erupted – exploded, like a volcano

extrusive – a type of rock that is made from lava

geologists – people who study rocks

igneous – a type of rock that is made by a volcano

intrusive – a type of rock that is made from magma underground

lava – molten rock that comes out of a volcano

magma – molten rock that is underground

metamorphic – rock that is formed when other types of rock are squashed or heated enough for their inside structure to change

molten – melted

pressure – force that squashes something

sedimentary – a type of rock that is made from many layers compacted over time

sedimentation – the laying down of layers of material over time, like at the mouth of a river

volcano – an opening in Earth's surface through which molten lava, rock fragments, ashes, dust, and gases can erupt

weathering – the wearing down of rocks due to wind, rain, and other natural processes

The Golden Age of Pirates

captive – taken as a prisoner or slave

cargo – things that a ship is taking from one place to another

democratic – when everyone can vote in an election

desert – run away from

elections – when people vote for their leaders

equal – the same

GPS – global positioning system

hanged – put to death

hostages – people who are taken prisoner until someone pays money

looted – stole

maroon – abandon

myths – stories that are passed down through generations

navigation – planning and following a path to take

nickname – another name given to a person that tells something about them
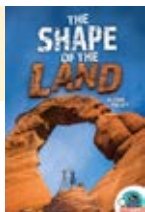
plundered – raided

scale – a line on a map to show what the distance is in real life

sentenced – given a punishment

surrendered – gave up

weevils – very small beetles that like to lay their eggs in food

The Shape of the Land

caldera – the crater left in a volcano after it erupts

canyons – deep, steep-sided valleys

continents – the seven huge areas of land on Earth

core – the middle of something

desert – a very dry place

forces – things that cause a change in the movement of objects

glaciers – slow moving rivers of ice

landslide – large amounts of dirt and stones that fall down a hill

magma – molten rock under Earth's crust

molten – melted

quadrillion – 1,000,000,000,000,000

volcanic activity – when molten rock erupts out of a volcano

volcano – a hole in Earth's crust that lets molten rock out from inside Earth

Going, Going, Gone!

debris – loose rocks, soil, and other natural material

delta – a triangle-shaped area of land at a river mouth

downstream – down a river, the way water flows

drought – when it doesn't rain for a very long time, so the soil becomes too dry

fertile – good for growing plants in

glacier – a huge pile of ice that slowly slides down a valley

landscape – what an area of land looks like

levees – banks built to keep rivers from overflowing

plains – large areas of flat land

riverbanks – the sides of rivers

soil – the loose surface material of Earth in which plants grow

tons – unit of weight. One ton weighs about the same as two big horses.

torrent – a large amount of water that moves very quickly

Killer Plants

carnivorous – able to trap and eat animals

continent – one of seven large landmasses around the world: Europe, Asia, Africa, North America and South America, Australia, and Antarctica

digest – break down food for it to be absorbed and used in the body

dissolve – become mixed into a liquid

equator – the dividing line around the middle of Earth that separates north and south

flypaper – sticky paper that is coated in poison to catch and kill flies

greenhouses – glass or plastic buildings in which you can grow plants in warm, protected conditions

husk – the dry outer covering, in this case, of a dead insect

nectar – a syrup of sugar that plants use to attract insects

pollen – a powder that is needed to create new plants

prey – a living thing that is hunted or eaten by a killer plant

shrews – small animals that look like squirrels with long noses

succulents – plants that store a lot of water, like a cactus

tentacles – very bendy arms, like an octopus or squid has

vacuum – a space with no air inside it

On the Move

currents – water flowing in the same direction

free-ranging – able to walk around a large area to find food

graze – eat grass

habitat – the place where an animal normally lives

keystone species – a species that is very important to its habitat and the other species in that habitat

life cycles – the changes that living things go through from the beginning of their lives until their deaths

mass – a large number or amount of something

mate – when animals pair up to produce babies

obstacles – objects that you have to go around, over, or through

phase – the visible shape of the moon, which changes during the month

The Rabbit in the Moon

astronomers – scientists who study stars, planets, and other objects in space

crane – a type of bird that has a long neck and long legs, and lives near water

lava – melted rock from a volcano

mortar – a deep bowl in which things are crushed to powder using a hard tool called a pestle

pestle – a hard tool with a rounded end that is used for crushing things to powder in a deep bowl called a mortar

plague – a disease that causes death and spreads quickly to a large number of people

Vikings

archaeologists – people who study human history

bartering – exchanging goods or services for other goods or services without using money

chieftains – the leaders of a group of people or a clan

clans – groups of interrelated families

expedition – a trip taken by people who want to explore, find out about something, or go to war

heathen – a person who is not religious

iron – a strong, hard metal often used in the form of steel

longhouse – a long, box-shaped house with a sloping thatched or turf roof. Longhouses were often built out of wood, stone, or turf.

mead – a strong drink made with honey

monastery – a building occupied by a group of monks

Norse – Scandinavians from ancient or medieval times

oral – spoken rather than written; verbal

raids – attacking quickly and by surprise

sagas – long, detailed stories

sailors – people who sail boats

Scandinavia – a cultural region that includes what is now Sweden, Norway, and Denmark

spit – a long metal rod pushed through meat so it can be roasted over a fire

Dragons

betray – hurt someone who trusts you

damsel – a young, unmarried woman

emperor – leader

fearsome – very frightening

glory – public praise, honor, and fame

helium – a very light gas (like you get in balloons that float in the air)

ignite – set on fire

lair – the place where a wild animal sleeps

landforms – natural features of Earth's surface (such as mountains or valleys)

mining – digging a deep hole or tunnel to find things like coal, gold, or diamonds

myth – an old story, often with a mixture of truth and imagination

quest – a journey in search of something

similar – almost the same as something else

springs – water coming up from the ground

Flying Through Time

drag – the force from the wind as it works to slow something down

English Channel – the body of water between England and France

freight – things that are moved by boats, planes, trains, or trucks

gravity – the force that pulls things down to the ground

jet engine – a powerful engine that shoots out hot gas to cause forward movement

lift – the force produced when air moves over a wing

passengers – people that are moved, for example, by boats, planes, trains, cars, or buses

replica – an exact copy of something

solar-powered – powered by energy from the sun

spokes – wires that go from the middle of a wheel to the outside, holding it together

strategy – a plan

theory – an idea to explain something

witnesses – people who saw something happen

Money, Money, Money!

barter – trading one thing for another, without using money

blanks – something that doesn't have anything on it, like a blank piece of paper

counterfeiting – to make a fake copy of something

die – a piece of metal with a shape cut into it, used for stamping a design into something

fertilizer – something that is added to dirt to make it better for growing things

printing plates – big metal sheets that have a design cut into them, kind of like a rubber stamp

serial number – a number that is printed on a banknote, so that every note has a different number

watermarks – a faint design that is pressed into paper

Wild Cities

antlers – horns

buffet – a meal where you can take what you like from many choices

calves – baby moose

colony – a group of animals living in one place

escalators – moving stairs that carry people up or down a floor in a building

Hindu – to do with Hinduism, the main religion of India

Houses of Parliament – where politicians in England work (like the House and the Senate in the US)

predators – animals that prey on other animals

primate – a group of animals that includes monkeys, apes, and humans

skyscraper – a very tall building

suburbs – areas where people live outside of a large city

Awesome Organs

arteries – tubes that carry blood out from your heart and around your body

chyme – acidic fluid made of stomach juices and half digested food

digesting – breaking down the food you eat into tiny parts that can be used by your body

enzymes – chemicals that help to speed up a natural process

filter – taking something out of a liquid

ligaments – tough pieces of tissue in your body that hold bones together or keep an organ in place

nutrients – substances that plants, animals, bacteria, and fungi need to live and grow

regenerate – grow back after being lost, damaged, or removed

tendons – tough pieces of tissue in your body that connect a muscle to a bone

tissue – the material that forms the parts in a plant or animal

veins – tubes that carry blood from all over your body back to your heart

Catapults

aircraft carriers – warships that have many planes on board

**ancient** – a time long ago in history

battlements – walls with small holes to shoot through

castles – large buildings with high walls and towers, built to protect against attacks

counterweight – a weight that balances another weight

crossbows – bows that are used to shoot arrows, and that are used flat instead of upright

energy – power that can be used to do work or make things move
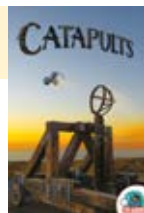
gunpowder – a chemical mixture that can explode

lead – a type of metal that is heavy

missile – an object that is thrown, shot, or launched to try to hit something

moats – deep trenches around a castle, usually filled with water

robbers – people who steal things

rulers – people such as kings or queens who are in charge of a group of people

sling – a flexible strap used to launch stones or other missiles

Healthy and Delicious

barley – a grain used for making malt, bread, stews, and other foods

connective tissue – a support structure joining different parts of the body together

invincible – too strong to be defeated

minerals – substances that plants and animals absorb and that we need to eat to stay healthy

nutrients – minerals, proteins, vitamins, and other things we need to eat to stay healthy

nutritious – good for you, healthy

processed – food that isn't fresh, such as potato chips, frozen pizza, or hotdogs

protein – a nutrient that is used to build muscles and other parts of your body

remedies – medicine or treatments for an illness

vitamins – substances that plants and animals make, and that we need to eat to stay healthy

Signs of Life

astronomers – scientists who study the stars and outer space

bacteria – tiny organisms that live almost everywhere on Earth

black holes – collapsed stars with so much gravity that even light can't escape

canals – waterways made by people

data – information

eroded – worn down by natural forces, like wind and rain

extraterrestrial – from outside of the planet Earth

lenses – curved pieces of glass that focus light

Martians – creatures from the planet Mars

Milky Way – a wide band of stars across the night sky

orbiting – circling around a star or planet, held there by gravity

organisms – living things, like plants, animals, or bacteria

poles – the top and bottom of planets

polished – rubbed until it is smooth and shiny

radio telescopes – big radio receivers, used for listening to transmissions from space

solar system – a star and the planets that orbit it

transmissions – signals that are sent from one place and picked up somewhere else

Weather Monsters

brute – a violent person or animal

chaos – confusion

evaporates – turns from a liquid into a vapor

funnel – a tube that's wide at the top and narrow at the bottom

heatstroke – a disease caused by heat, which makes you feel sick and dizzy, and can kill people

mudslides – when wet dirt slides off the side of a hill

outlook – what people think will happen in the future

simmer – to boil gently

smother – to cover something so it can't breathe

soaker – something that makes you very wet

vapor – gas

whiteout – when there's snow on the ground and in the air, so that all you can see is white

When Germs Attack

antibodies – proteins in your blood that help your body to destroy germs

digest – break down into smaller pieces

disease – illness that is caused by germs

injections – medicine that is put into your body through a needle

mucus – slimy fluid made by the body to protect itself from germs

organisms – individual living things

outbreak – a sudden spread of disease

proteins – the building blocks of our bodies

red blood cells – cells in the blood that carry oxygen through the body

reproduce – to make more versions of themselves

white blood cells – small blood cells with no colour that help protect the body against germs

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