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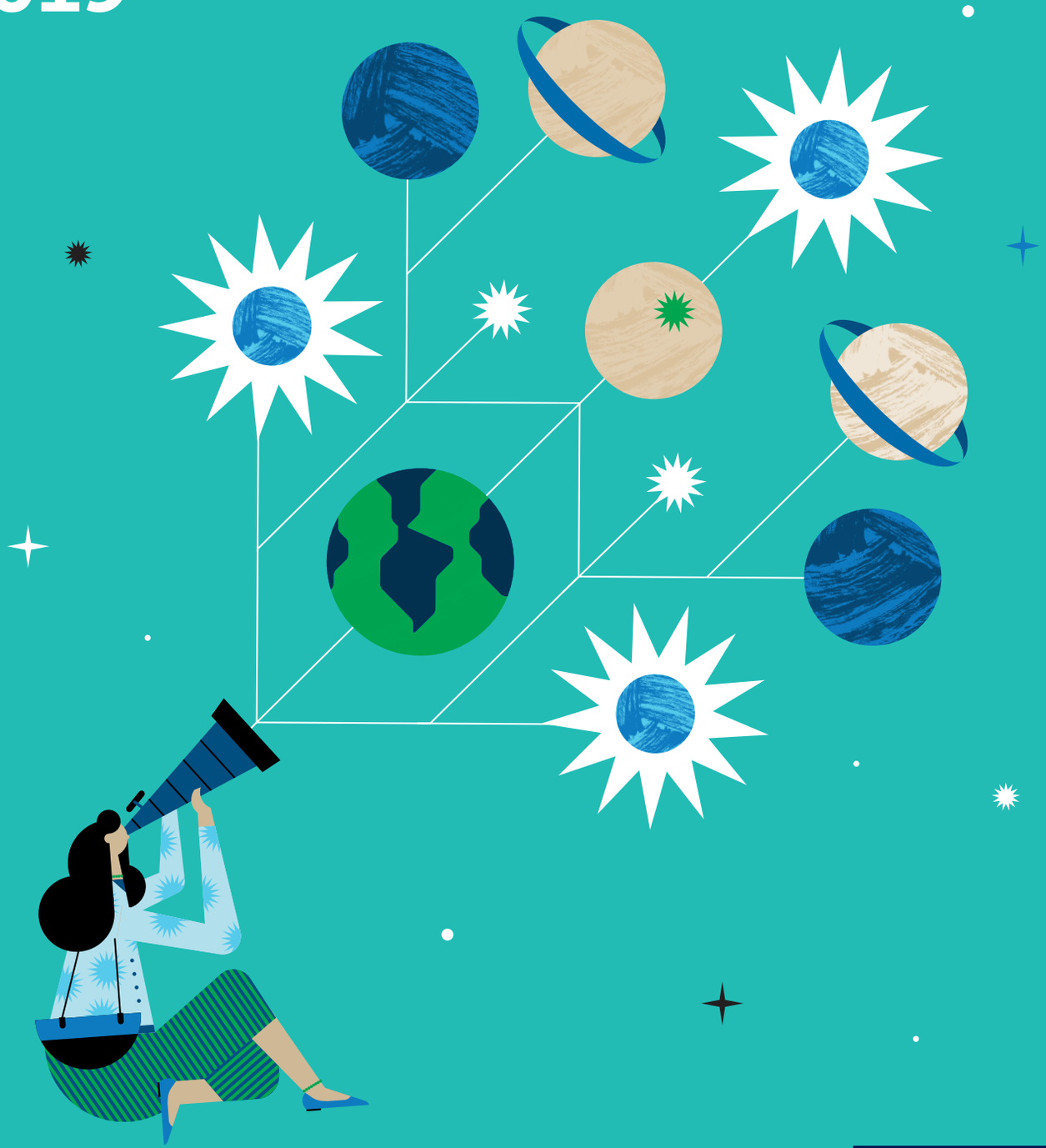
2019



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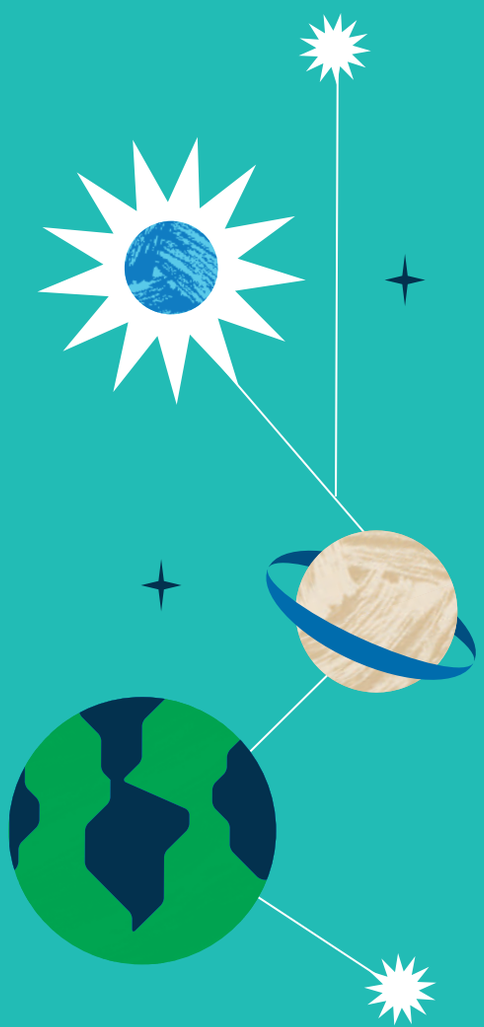

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We know why you came into teaching; you wanted to improve the lives of young people. As part of one of the world's greatest universities – we share that mission with you. It is why we help to invest back into education and research, championing a love of learning across the world.

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Table of Contents

IB Diploma Programme

IB Middle Years Programme

IB Primary Years Programme

DP

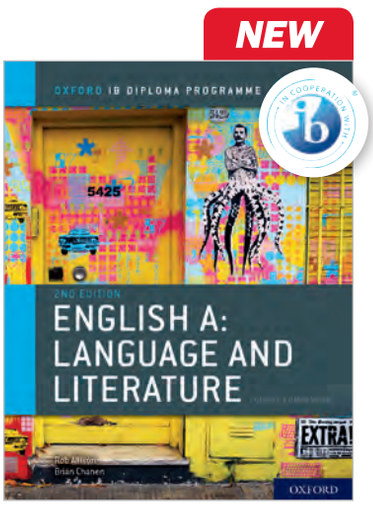
Studies in Language and Literature

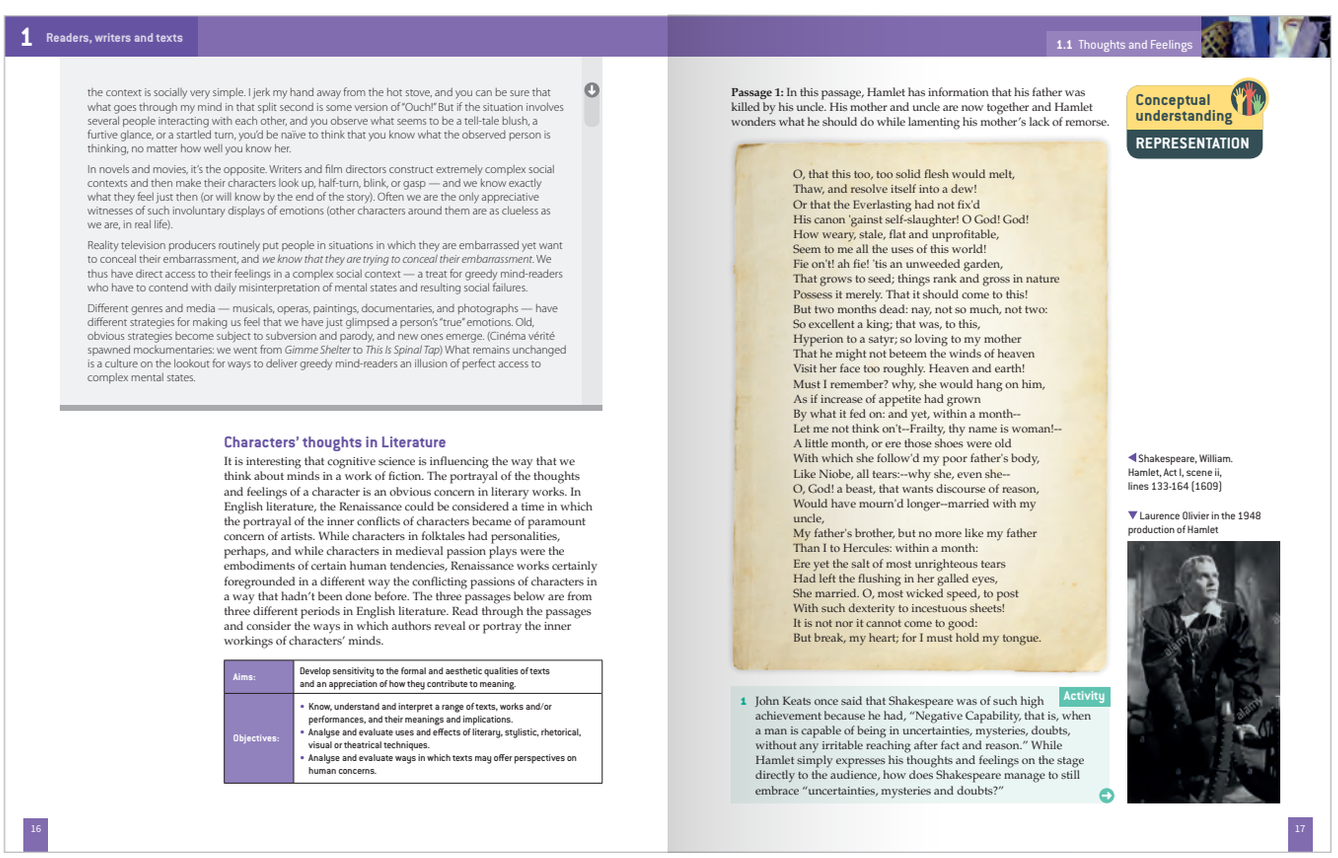
English A: Language and Literature

Discover clear, accessible support

Developed in cooperation with the IB, this concept-based Course Book fully reflects the new English A guide, for first teaching in 2019.

- Address all aspects of the new syllabus, including the new areas of exploration, conceptual understandings and global concerns
- Encourage reflection, inquiry and critical thinking through integrated support for TOK and ATL, plus guidance on the new learner portfolio
- Thoroughly prepare students for IB assessment via overviews of all components, exam-style practice questions and support for the new IA




1 Readers, writers and texts

the context is socially very simple. I jerk my hand away from the hot stove, and you can be sure that what goes through my mind in that split second is some version of "Ouch!" But if the situation involves several people interacting with each other, and you observe what seems to be a tell-tale blush, a furtive glance, or a startled turn, you'd be naïve to think that you know what the observed person is thinking, no matter how well you know her.

In novels and movies, it's the opposite. Writers and film directors construct extremely complex social contexts and then make their characters look up, half-turn, blink, or gasp — and we know exactly what they feel just then (or will know by the end of the story). Often we are the only appreciative witnesses of such involuntary displays of emotions (other characters around them are as clueless as we are, in real life).

Reality television producers routinely put people in situations in which they are embarrassed yet want to conceal their embarrassment, and *we know that they are trying to conceal their embarrassment*. We thus have direct access to their feelings in a complex social context — a treat for greedy mind-readers who have to contend with daily misinterpretation of mental states and resulting social failures.

Different genres and media — musicals, operas, paintings, documentaries, and photographs — have different strategies for making us feel that we have just glimpsed a person's "true" emotions. Old, obvious strategies become subject to subversion and parody, and new ones emerge. (Cinéma vérité spawned mockumentaries: we went from *Gimme Shelter* to *This Is Spinal Tap*) What remains unchanged is a culture on the lookout for ways to deliver greedy mind-readers an illusion of perfect access to complex mental states.

Characters' thoughts in Literature

It is interesting that cognitive science is influencing the way that we think about minds in a work of fiction. The portrayal of the thoughts and feelings of a character is an obvious concern in literary works. In English literature, the Renaissance could be considered a time in which the portrayal of the inner conflicts of characters became of paramount concern of artists. While characters in folktales had personalities, perhaps, and while characters in medieval passion plays were the embodiments of certain human tendencies, Renaissance works certainly foregrounded in a different way the conflicting passions of characters in a way that hadn't been done before. The three passages below are from three different periods in English literature. Read through the passages and consider the ways in which authors reveal or portray the inner workings of characters' minds.

Aims:	Develop sensitivity to the formal and aesthetic qualities of texts and an appreciation of how they contribute to meaning.
Objectives:	• Know, understand and interpret a range of texts, works and/or performances, and their meanings and implications. • Analyse and evaluate uses and effects of literary, stylistic, rhetorical, visual or theatrical techniques. • Analyse and evaluate ways in which texts may offer perspectives on human concerns.

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1.1 Thoughts and Feelings

Passage 1: In this passage, Hamlet has information that his father was killed by his uncle. His mother and uncle are now together and Hamlet wonders what he should do while lamenting his mother's lack of remorse.

Conceptual understanding
REPRESENTATION

O, that this too, too solid flesh would melt,
Thaw, and resolve itself into a dew!
Or that the Everlasting had not fix'd
His canon 'gainst self-slaughter! O God! God!
How weary, stale, flat and unprofitable,
Seem to me all the uses of this world!
Fie on't! ah fie! 'tis an unweeded garden,
That grows to seed; things rank and gross in nature
Possess it merely. That it should come to this!
But two months dead: nay, not so much, not two:
So excellent a king; that was, to this,
Hyperion to a satyr; so loving to my mother
That he might not beteem the winds of heaven
Visit her face too roughly. Heaven and earth!
Must I remember? why, she would hang on him,
As if increase of appetite had grown
By what it fed on: and yet, within a month--
Let me not think on't--Frailty, thy name is woman!--
A little month, or ere those shoes were old
With which she follow'd my poor father's body,
Like Niobe, all tears:--why she, even she--
O, God! a beast, that wants discourse of reason,
Would have mourn'd longer--married with my uncle,
My father's brother, but no more like my father
Than I to Hercules: within a month:
Ere yet the salt of most unrighteous tears
Had left the flushing in her galled eyes,
She married. O, most wicked speed, to post
With such dexterity to incestuous sheets!
It is not nor it cannot come to good:
But break, my heart; for I must hold my tongue.

◀ Shakespeare, William. Hamlet, Act I, scene ii, lines 133-164 (1609)

▼ Laurence Olivier in the 1948 production of Hamlet

Activity

1 John Keats once said that Shakespeare was of such high achievement because he had, "Negative Capability, that is, when a man is capable of being in uncertainties, mysteries, doubts, without any irritable reaching after fact and reason." While Hamlet simply expresses his thoughts and feelings on the stage directly to the audience, how does Shakespeare manage to still embrace "uncertainties, mysteries and doubts?"

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English A: Language and Literature Course Book (2nd edition)

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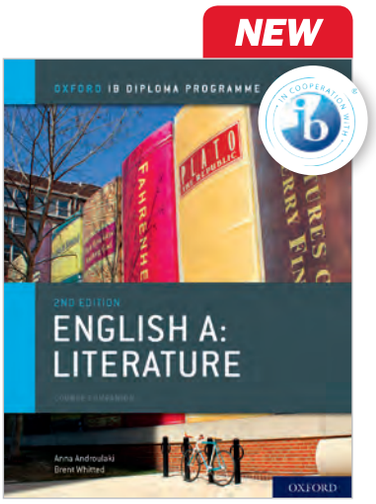
English A: Literature



Deliver a rich, concept-based approach

Developed in cooperation with the IB, this rigorous Course Book provides a clear route through the new English A guide, for first teaching in 2019.

- Address all aspects of the syllabus via in-depth coverage of the new course structure and content, with plenty of engaging extracts and activities
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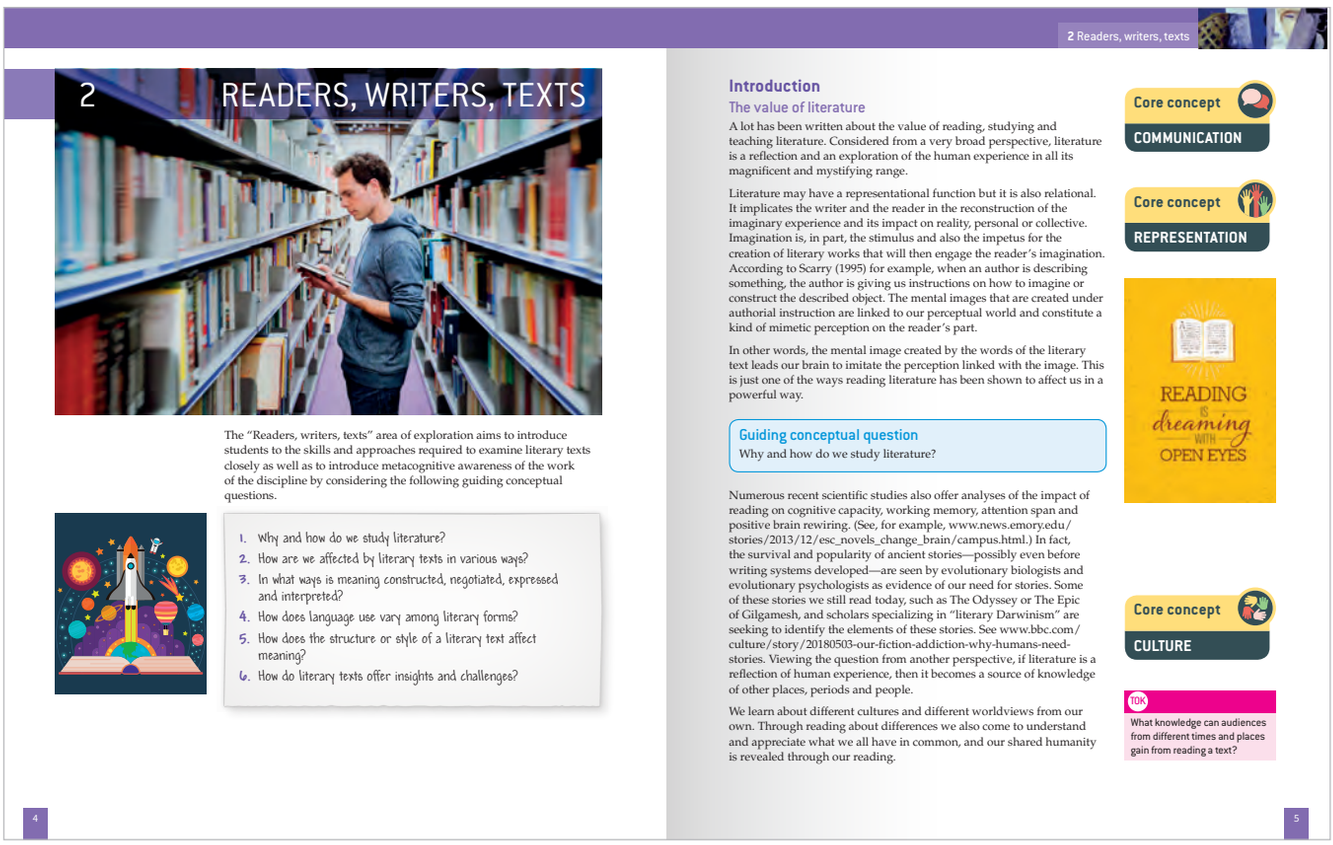

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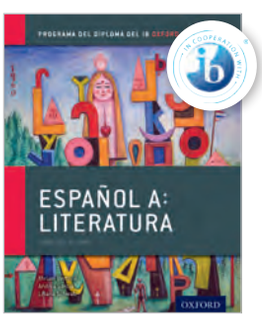

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Engage and inspire learners

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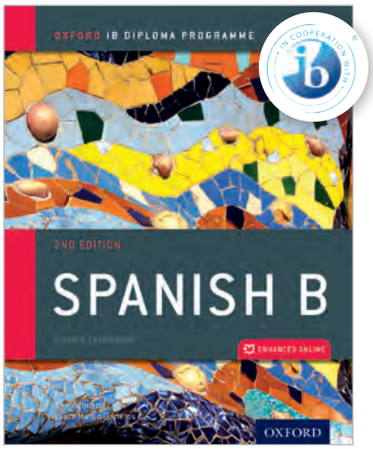
Studies in Language and Literature

English, French and Spanish B



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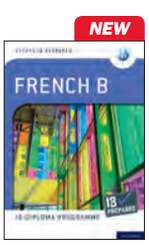
French B	 **Print and Enhanced Online Course Book Pack** 978 019 842237 2 £45.99	 **Print** 978 019 842471 0 £27.99 **Online** 978 019 843437 5 £27.99 **Available Late 2019**
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David Ripley, English B Consultant

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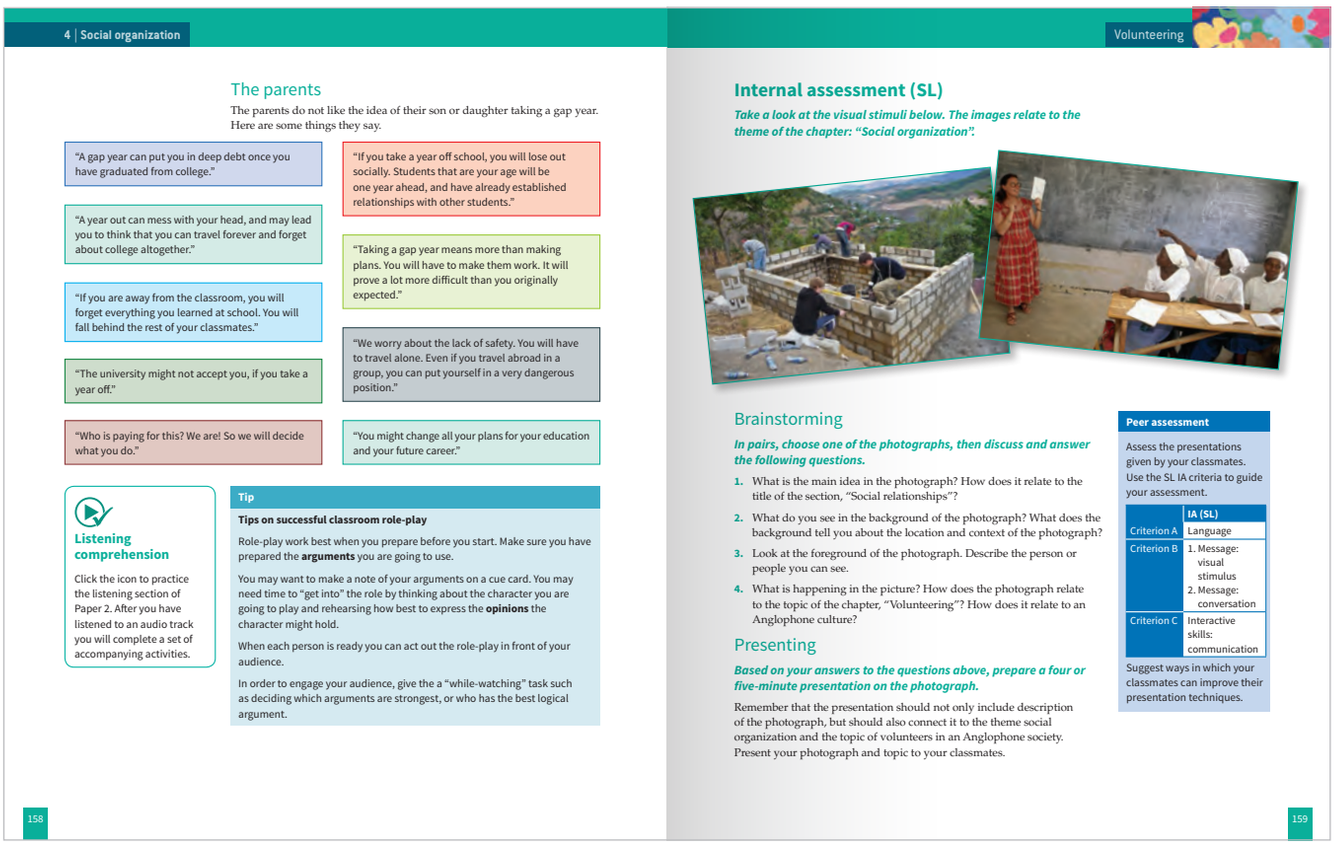

4 | Social organization

The parents

The parents do not like the idea of their son or daughter taking a gap year. Here are some things they say.

"A gap year can put you in deep debt once you have graduated from college."

"If you take a year off school, you will lose out socially. Students that are your age will be one year ahead, and have already established relationships with other students."

"A year out can mess with your head, and may lead you to think that you can travel forever and forget about college altogether."

"Taking a gap year means more than making plans. You will have to make them work. It will prove a lot more difficult than you originally expected."

"If you are away from the classroom, you will forget everything you learned at school. You will fall behind the rest of your classmates."

"We worry about the lack of safety. You will have to travel alone. Even if you travel abroad in a group, you can put yourself in a very dangerous position."

"The university might not accept you, if you take a year off."

"Who is paying for this? We are! So we will decide what you do."

"You might change all your plans for your education and your future career."

Listening comprehension

Click the icon to practice the listening section of Paper 2. After you have listened to an audio track you will complete a set of accompanying activities.

Tip

Tips on successful classroom role-play

Role-play work best when you prepare before you start. Make sure you have prepared the **arguments** you are going to use.

You may want to make a note of your arguments on a cue card. You may need time to "get into" the role by thinking about the character you are going to play and rehearsing how best to express the **opinions** the character might hold.

When each person is ready you can act out the role-play in front of your audience.

In order to engage your audience, give the a "while-watching" task such as deciding which arguments are strongest, or who has the best logical argument.

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Volunteering

Internal assessment (SL)

Take a look at the visual stimuli below. The images relate to the theme of the chapter: "Social organization".

Brainstorming

In pairs, choose one of the photographs, then discuss and answer the following questions.

1. What is the main idea in the photograph? How does it relate to the title of the section, "Social relationships"?
2. What do you see in the background of the photograph? What does the background tell you about the location and context of the photograph?
3. Look at the foreground of the photograph. Describe the person or people you can see.
4. What is happening in the picture? How does the photograph relate to the topic of the chapter, "Volunteering"? How does it relate to an Anglophone culture?

Presenting

Based on your answers to the questions above, prepare a four or five-minute presentation on the photograph.

Remember that the presentation should not only include description of the photograph, but should also connect it to the theme social organization and the topic of volunteers in an Anglophone society. Present your photograph and topic to your classmates.

Peer assessment

Assess the presentations given by your classmates. Use the SL IA criteria to guide your assessment.

	IA (SL)
Criterion A	Language
Criterion B	1. Message: visual stimulus 2. Message: conversation
Criterion C	Interactive skills: communication

Suggest ways in which your classmates can improve their presentation techniques.

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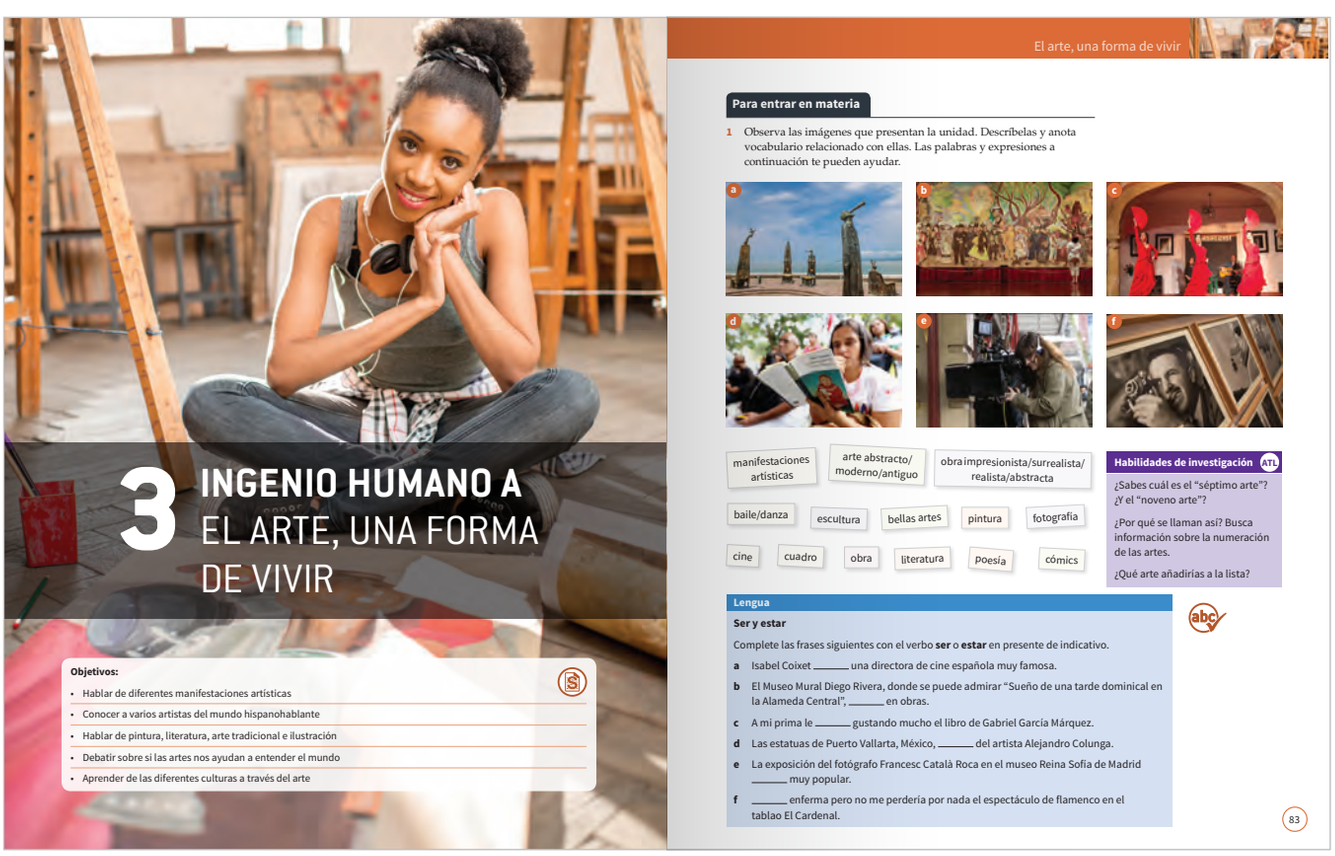
DP

Language Acquisition

IB English B Print and Enhanced Online Course Book Pack

Explore overarching themes and concepts



3 INGENIO HUMANO A
EL ARTE, UNA FORMA DE VIVIR

Objetivos:

- Hablar de diferentes manifestaciones artísticas
- Conocer a varios artistas del mundo hispanohablante
- Hablar de pintura, literatura, arte tradicional e ilustración
- Debatir sobre si las artes nos ayudan a entender el mundo
- Aprender de las diferentes culturas a través del arte

El arte, una forma de vivir

Para entrar en materia

1 Observa las imágenes que presentan la unidad. Describelas y anota vocabulario relacionado con ellas. Las palabras y expresiones a continuación te pueden ayudar.

a b c d e f

manifestaciones artísticas | arte abstracto/moderno/antiguo | obra impresionista/surrealista/realista/abstracta

baile/danza | escultura | bellas artes | pintura | fotografía

cine | cuadro | obra | literatura | poesía | cómics

Habilidades de investigación ATL

¿Sabes cuál es el "séptimo arte"? ¿Y el "noveno arte"?

¿Por qué se llaman así? Busca información sobre la numeración de las artes.

¿Qué arte añadirías a la lista?

Lengua

Ser y estar

Complete las frases siguientes con el verbo **ser** o **estar** en presente de indicativo.

a Isabel Coixet _____ una directora de cine española muy famosa.

b El Museo Mural Diego Rivera, donde se puede admirar "Sueño de una tarde dominical en la Alameda Central", _____ en obras.

c A mi prima le _____ gustando mucho el libro de Gabriel García Márquez.

d Las estatuas de Puerto Vallarta, México, _____ del artista Alejandro Colunga.

e La exposición del fotógrafo Francesc Català Roca en el museo Reina Sofía de Madrid _____ muy popular.

f _____ enferma pero no me perdería por nada el espectáculo de flamenco en el tablao El Cardenal.

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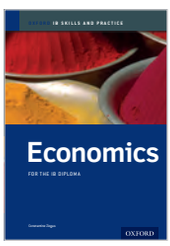
IB Spanish B Print and Enhanced Online Course Book Pack



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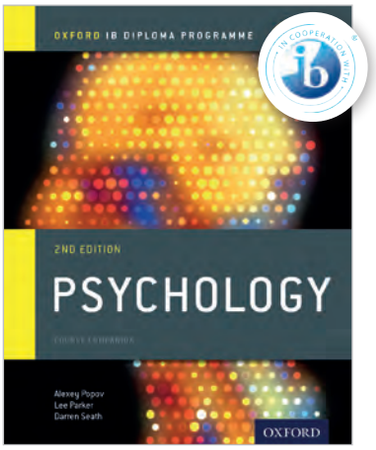

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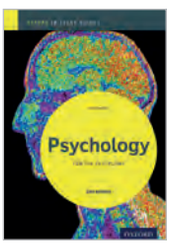

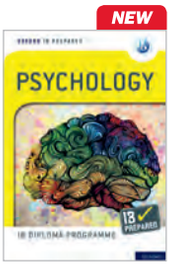

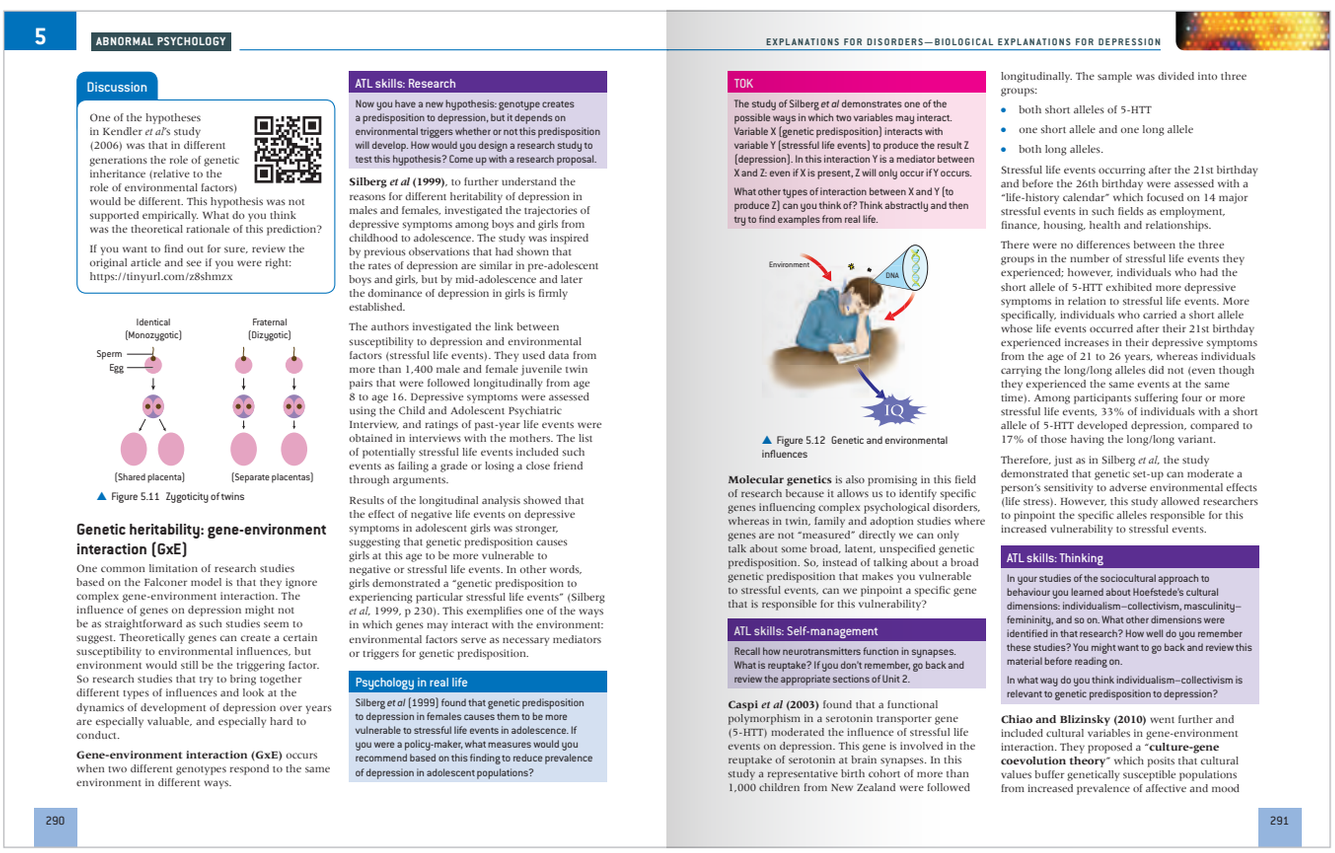

5 ABNORMAL PSYCHOLOGY

Discussion

One of the hypotheses in Kendler *et al*'s study (2006) was that in different generations the role of genetic inheritance (relative to the role of environmental factors) would be different. This hypothesis was not supported empirically. What do you think was the theoretical rationale of this prediction?

If you want to find out for sure, review the original article and see if you were right: https://tinyurl.com/z8shmzx

Identical (Monozygotic) Fraternal (Dizygotic)
Sperm
Egg
(Shared placenta) (Separate placentas)

▲ Figure 5.11 Zygoticity of twins

Genetic heritability: gene-environment interaction (GxE)

One common limitation of research studies based on the Falconer model is that they ignore complex gene-environment interaction. The influence of genes on depression might not be as straightforward as such studies seem to suggest. Theoretically genes can create a certain susceptibility to environmental influences, but environment would still be the triggering factor. So research studies that try to bring together different types of influences and look at the dynamics of development of depression over years are especially valuable, and especially hard to conduct.

Gene-environment interaction (GxE) occurs when two different genotypes respond to the same environment in different ways.

ATL skills: Research

Now you have a new hypothesis: genotype creates a predisposition to depression, but it depends on environmental triggers whether or not this predisposition will develop. How would you design a research study to test this hypothesis? Come up with a research proposal.

Silberg *et al* (1999), to further understand the reasons for different heritability of depression in males and females, investigated the trajectories of depressive symptoms among boys and girls from childhood to adolescence. The study was inspired by previous observations that had shown that the rates of depression are similar in pre-adolescent boys and girls, but by mid-adolescence and later the dominance of depression in girls is firmly established.

The authors investigated the link between susceptibility to depression and environmental factors (stressful life events). They used data from more than 1,400 male and female juvenile twin pairs that were followed longitudinally from age 8 to age 16. Depressive symptoms were assessed using the Child and Adolescent Psychiatric Interview, and ratings of past-year life events were obtained in interviews with the mothers. The list of potentially stressful life events included such events as failing a grade or losing a close friend through arguments.

Results of the longitudinal analysis showed that the effect of negative life events on depressive symptoms in adolescent girls was stronger, suggesting that genetic predisposition causes girls at this age to be more vulnerable to negative or stressful life events. In other words, girls demonstrated a "genetic predisposition to experiencing particular stressful life events" (Silberg *et al*, 1999, p 230). This exemplifies one of the ways in which genes may interact with the environment: environmental factors serve as necessary mediators or triggers for genetic predisposition.

Psychology in real life

Silberg *et al* (1999) found that genetic predisposition to depression in females causes them to be more vulnerable to stressful life events in adolescence. If you were a policy-maker, what measures would you recommend based on this finding to reduce prevalence of depression in adolescent populations?

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EXPLANATIONS FOR DISORDERS—BIOLOGICAL EXPLANATIONS FOR DEPRESSION

TOK

The study of Silberg *et al* demonstrates one of the possible ways in which two variables may interact. Variable X (genetic predisposition) interacts with variable Y (stressful life events) to produce the result Z (depression). In this interaction Y is a mediator between X and Z: even if X is present, Z will only occur if Y occurs.

What other types of interaction between X and Y (to produce Z) can you think of? Think abstractly and then try to find examples from real life.

Environment
DNA
IQ

▲ Figure 5.12 Genetic and environmental influences

Molecular genetics is also promising in this field of research because it allows us to identify specific genes influencing complex psychological disorders, whereas in twin, family and adoption studies where genes are not "measured" directly we can only talk about some broad, latent, unspecified genetic predisposition. So, instead of talking about a broad genetic predisposition that makes you vulnerable to stressful events, can we pinpoint a specific gene that is responsible for this vulnerability?

ATL skills: Self-management

Recall how neurotransmitters function in synapses. What is reuptake? If you don't remember, go back and review the appropriate sections of Unit 2.

Caspi *et al* (2003) found that a functional polymorphism in a serotonin transporter gene (5-HTT) moderated the influence of stressful life events on depression. This gene is involved in the reuptake of serotonin at brain synapses. In this study a representative birth cohort of more than 1,000 children from New Zealand were followed longitudinally. The sample was divided into three groups:

- both short alleles of 5-HTT
- one short allele and one long allele
- both long alleles.

Stressful life events occurring after the 21st birthday and before the 26th birthday were assessed with a "life-history calendar" which focused on 14 major stressful events in such fields as employment, finance, housing, health and relationships.

There were no differences between the three groups in the number of stressful life events they experienced; however, individuals who had the short allele of 5-HTT exhibited more depressive symptoms in relation to stressful life events. More specifically, individuals who carried a short allele whose life events occurred after their 21st birthday experienced increases in their depressive symptoms from the age of 21 to 26 years, whereas individuals carrying the long/long alleles did not (even though they experienced the same events at the same time). Among participants suffering four or more stressful life events, 33% of individuals with a short allele of 5-HTT developed depression, compared to 17% of those having the long/long variant.

Therefore, just as in Silberg *et al*, the study demonstrated that genetic set-up can moderate a person's sensitivity to adverse environmental effects (life stress). However, this study allowed researchers to pinpoint the specific alleles responsible for this increased vulnerability to stressful events.

ATL skills: Thinking

In your studies of the sociocultural approach to behaviour you learned about Hoefstede's cultural dimensions: individualism–collectivism, masculinity–femininity, and so on. What other dimensions were identified in that research? How well do you remember these studies? You might want to go back and review this material before reading on.

In what way do you think individualism–collectivism is relevant to genetic predisposition to depression?

Chiao and Blizinsky (2010) went further and included cultural variables in gene-environment interaction. They proposed a "**culture-gene coevolution theory**" which posits that cultural values buffer genetically susceptible populations from increased prevalence of affective and mood

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Psychology

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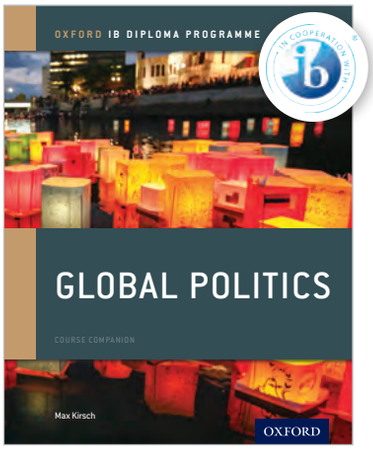

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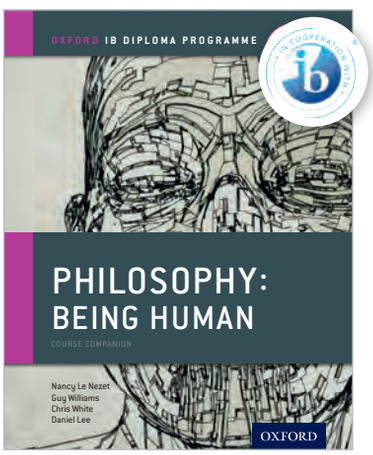

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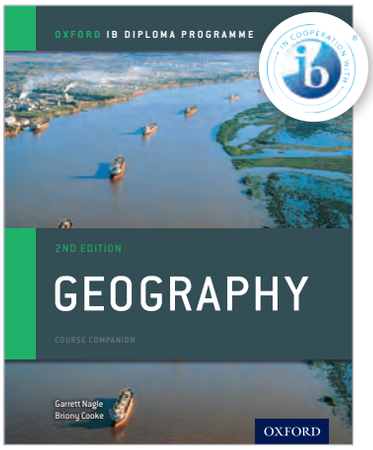

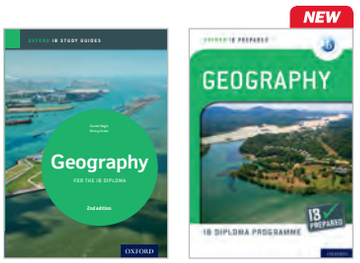

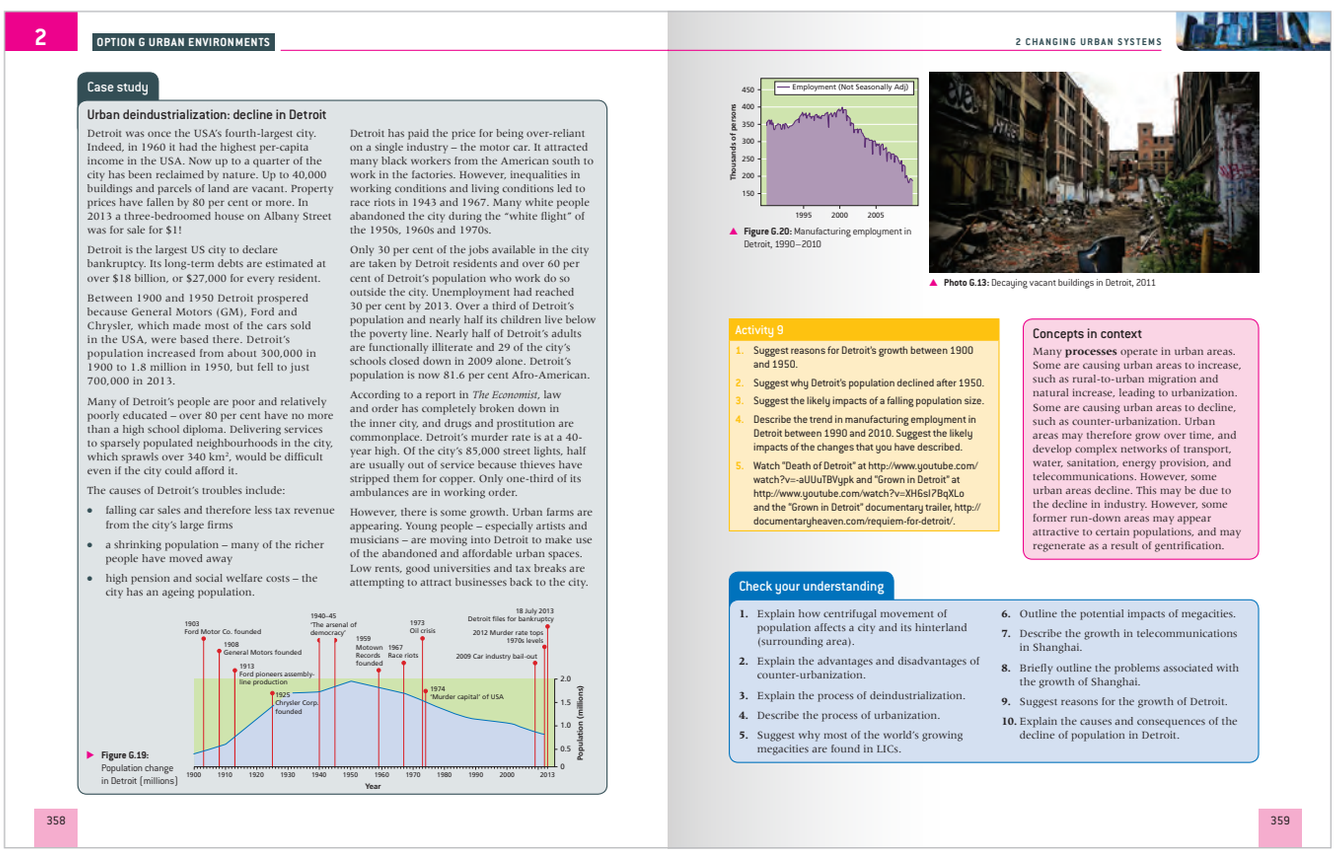

2 OPTION G URBAN ENVIRONMENTS

Case study

Urban deindustrialization: decline in Detroit

Detroit was once the USA's fourth-largest city. Indeed, in 1960 it had the highest per-capita income in the USA. Now up to a quarter of the city has been reclaimed by nature. Up to 40,000 buildings and parcels of land are vacant. Property prices have fallen by 80 per cent or more. In 2013 a three-bedroomed house on Albany Street was for sale for $1!

Detroit is the largest US city to declare bankruptcy. Its long-term debts are estimated at over $18 billion, or $27,000 for every resident.

Between 1900 and 1950 Detroit prospered because General Motors (GM), Ford and Chrysler, which made most of the cars sold in the USA, were based there. Detroit's population increased from about 300,000 in 1900 to 1.8 million in 1950, but fell to just 700,000 in 2013.

Many of Detroit's people are poor and relatively poorly educated – over 80 per cent have no more than a high school diploma. Delivering services to sparsely populated neighbourhoods in the city, which sprawls over 340 km², would be difficult even if the city could afford it.

The causes of Detroit's troubles include:

- falling car sales and therefore less tax revenue from the city's large firms
- a shrinking population – many of the richer people have moved away
- high pension and social welfare costs – the city has an ageing population.

Detroit has paid the price for being over-reliant on a single industry – the motor car. It attracted many black workers from the American south to work in the factories. However, inequalities in working conditions and living conditions led to race riots in 1943 and 1967. Many white people abandoned the city during the "white flight" of the 1950s, 1960s and 1970s.

Only 30 per cent of the jobs available in the city are taken by Detroit residents and over 60 per cent of Detroit's population who work do so outside the city. Unemployment had reached 30 per cent by 2013. Over a third of Detroit's population and nearly half its children live below the poverty line. Nearly half of Detroit's adults are functionally illiterate and 29 of the city's schools closed down in 2009 alone. Detroit's population is now 81.6 per cent Afro-American.

According to a report in *The Economist*, law and order has completely broken down in the inner city, and drugs and prostitution are commonplace. Detroit's murder rate is at a 40-year high. Of the city's 85,000 street lights, half are usually out of service because thieves have stripped them for copper. Only one-third of its ambulances are in working order.

However, there is some growth. Urban farms are appearing. Young people – especially artists and musicians – are moving into Detroit to make use of the abandoned and affordable urban spaces. Low rents, good universities and tax breaks are attempting to attract businesses back to the city.

Figure G.19: Population change in Detroit (millions)

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2 CHANGING URBAN SYSTEMS

Figure G.20: Manufacturing employment in Detroit, 1990–2010

Photo G.13: Decaying vacant buildings in Detroit, 2011

Activity 9

1. Suggest reasons for Detroit's growth between 1900 and 1950.
2. Suggest why Detroit's population declined after 1950.
3. Suggest the likely impacts of a falling population size.
4. Describe the trend in manufacturing employment in Detroit between 1990 and 2010. Suggest the likely impacts of the changes that you have described.
5. Watch "Death of Detroit" at http://www.youtube.com/watch?v=-aUUuTBVypk and "Grown in Detroit" at http://www.youtube.com/watch?v=XH6sl7BqXLo and the "Grown in Detroit" documentary trailer, http://documentaryheaven.com/requiem-for-detroit/.

Concepts in context

Many **processes** operate in urban areas. Some are causing urban areas to increase, such as rural-to-urban migration and natural increase, leading to urbanization. Some are causing urban areas to decline, such as counter-urbanization. Urban areas may therefore grow over time, and develop complex networks of transport, water, sanitation, energy provision, and telecommunications. However, some urban areas decline. This may be due to the decline in industry. However, some former run-down areas may appear attractive to certain populations, and may regenerate as a result of gentrification.

Check your understanding

1. Explain how centrifugal movement of population affects a city and its hinterland (surrounding area).
2. Explain the advantages and disadvantages of counter-urbanization.
3. Explain the process of deindustrialization.
4. Describe the process of urbanization.
5. Suggest why most of the world's growing megacities are found in LICs.
6. Outline the potential impacts of megacities.
7. Describe the growth in telecommunications in Shanghai.
8. Briefly outline the problems associated with the growth of Shanghai.
9. Suggest reasons for the growth of Detroit.
10. Explain the causes and consequences of the decline of population in Detroit.

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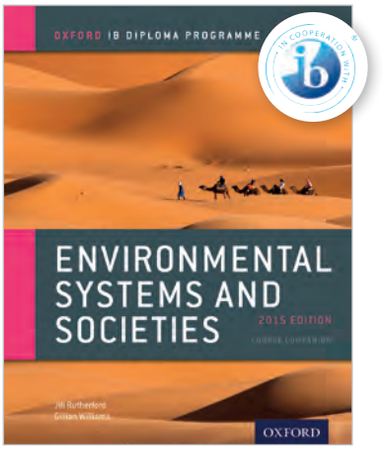

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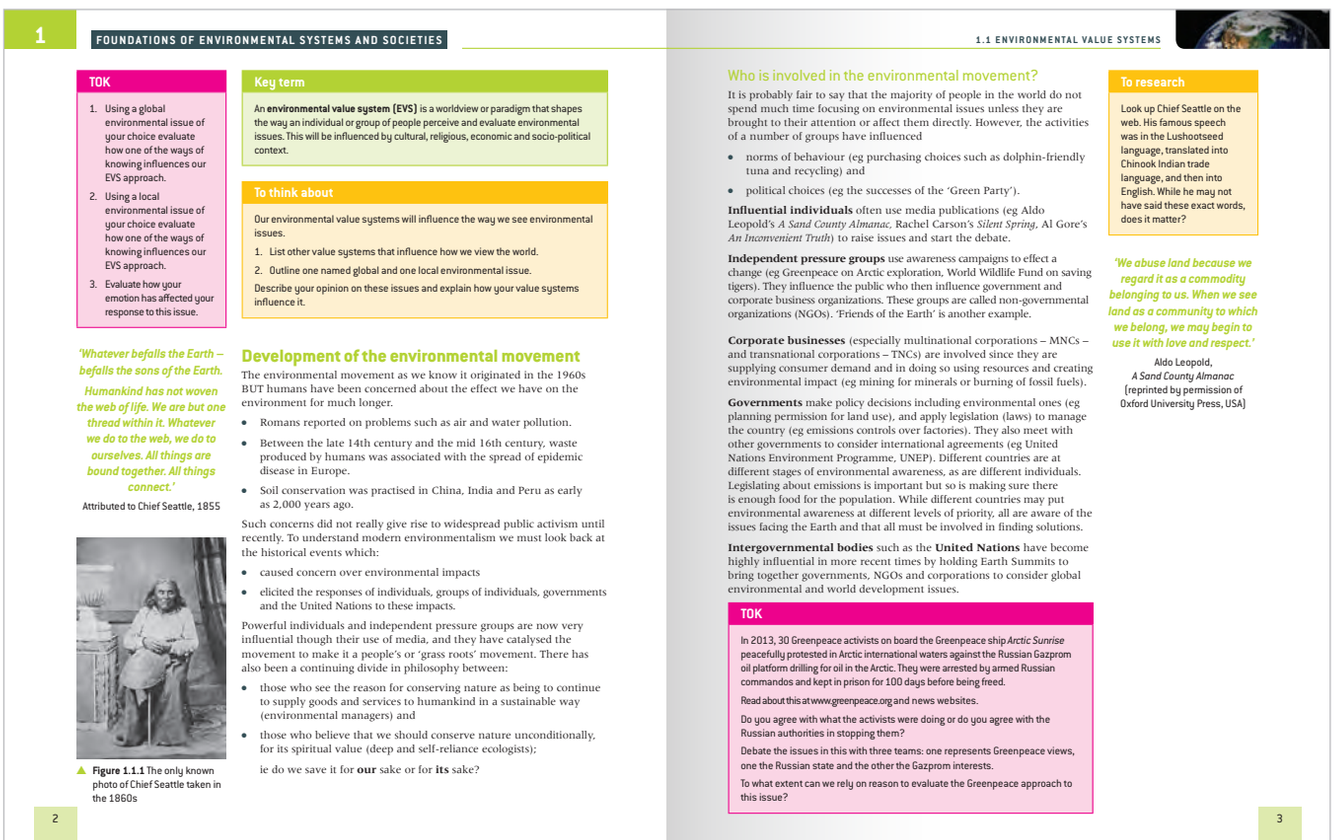
Individuals and Societies



1 FOUNDATIONS OF ENVIRONMENTAL SYSTEMS AND SOCIETIES

TOK

1. Using a global environmental issue of your choice evaluate how one of the ways of knowing influences our EVS approach.
2. Using a local environmental issue of your choice evaluate how one of the ways of knowing influences our EVS approach.
3. Evaluate how your emotion has affected your response to this issue.

Key term

An **environmental value system (EVS)** is a worldview or paradigm that shapes the way an individual or group of people perceive and evaluate environmental issues. This will be influenced by cultural, religious, economic and socio-political context.

To think about

Our environmental value systems will influence the way we see environmental issues.

1. List other value systems that influence how we view the world.
2. Outline one named global and one local environmental issue.

Describe your opinion on these issues and explain how your value systems influence it.

'Whatever befalls the Earth – befalls the sons of the Earth. Humankind has not woven the web of life. We are but one thread within it. Whatever we do to the web, we do to ourselves. All things are bound together. All things connect.'

Attributed to Chief Seattle, 1855

▲ **Figure 1.1.1** The only known photo of Chief Seattle taken in the 1860s

Development of the environmental movement

The environmental movement as we know it originated in the 1960s BUT humans have been concerned about the effect we have on the environment for much longer.

- Romans reported on problems such as air and water pollution.
- Between the late 14th century and the mid 16th century, waste produced by humans was associated with the spread of epidemic disease in Europe.
- Soil conservation was practised in China, India and Peru as early as 2,000 years ago.

Such concerns did not really give rise to widespread public activism until recently. To understand modern environmentalism we must look back at the historical events which:

- caused concern over environmental impacts
- elicited the responses of individuals, groups of individuals, governments and the United Nations to these impacts.

Powerful individuals and independent pressure groups are now very influential though their use of media, and they have catalysed the movement to make it a people's or 'grass roots' movement. There has also been a continuing divide in philosophy between:

- those who see the reason for conserving nature as being to continue to supply goods and services to humankind in a sustainable way (environmental managers) and
- those who believe that we should conserve nature unconditionally, for its spiritual value (deep and self-reliance ecologists);

ie do we save it for **our** sake or for **its** sake?

2

1.1 ENVIRONMENTAL VALUE SYSTEMS

Who is involved in the environmental movement?

It is probably fair to say that the majority of people in the world do not spend much time focusing on environmental issues unless they are brought to their attention or affect them directly. However, the activities of a number of groups have influenced

- norms of behaviour (eg purchasing choices such as dolphin-friendly tuna and recycling) and
- political choices (eg the successes of the 'Green Party').

Influential individuals often use media publications (eg Aldo Leopold's *A Sand County Almanac*, Rachel Carson's *Silent Spring*, Al Gore's *An Inconvenient Truth*) to raise issues and start the debate.

Independent pressure groups use awareness campaigns to effect a change (eg Greenpeace on Arctic exploration, World Wildlife Fund on saving tigers). They influence the public who then influence government and corporate business organizations. These groups are called non-governmental organizations (NGOs). 'Friends of the Earth' is another example.

Corporate businesses (especially multinational corporations – MNCs – and transnational corporations – TNCs) are involved since they are supplying consumer demand and in doing so using resources and creating environmental impact (eg mining for minerals or burning of fossil fuels).

Governments make policy decisions including environmental ones (eg planning permission for land use), and apply legislation (laws) to manage the country (eg emissions controls over factories). They also meet with other governments to consider international agreements (eg United Nations Environment Programme, UNEP). Different countries are at different stages of environmental awareness, as are different individuals. Legislating about emissions is important but so is making sure there is enough food for the population. While different countries may put environmental awareness at different levels of priority, all are aware of the issues facing the Earth and that all must be involved in finding solutions.

Intergovernmental bodies such as the **United Nations** have become highly influential in more recent times by holding Earth Summits to bring together governments, NGOs and corporations to consider global environmental and world development issues.

TOK

In 2013, 30 Greenpeace activists on board the Greenpeace ship *Arctic Sunrise* peacefully protested in Arctic international waters against the Russian Gazprom oil platform drilling for oil in the Arctic. They were arrested by armed Russian commandos and kept in prison for 100 days before being freed.

Read about this at www.greenpeace.org and news websites.

Do you agree with what the activists were doing or do you agree with the Russian authorities in stopping them?

Debate the issues in this with three teams: one represents Greenpeace views, one the Russian state and the other the Gazprom interests.

To what extent can we rely on reason to evaluate the Greenpeace approach to this issue?

To research

Look up Chief Seattle on the web. His famous speech was in the Lushootseed language, translated into Chinook Indian trade language, and then into English. While he may not have said these exact words, does it matter?

'We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect.'

Aldo Leopold,
A Sand County Almanac
(reprinted by permission of Oxford University Press, USA)

3

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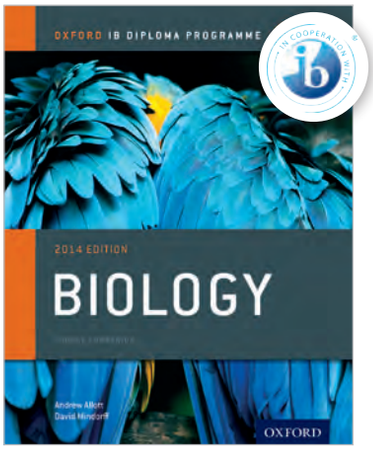

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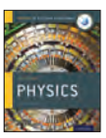
Course Books	 **Course Book** 978 019 839211 8 £44.99 **Online Course Book** 978 019 830771 6 £44.99 **Print and Online Pack** 978 019 830774 7 £59.99	 **Course Book** 978 019 839212 5 £44.99 **Online Course Book** 978 019 830772 3 £44.99 **Print and Online Pack** 978 019 830775 4 £59.99	 **Course Book** 978 019 839213 2 £44.99 **Online Course Book** 978 019 830773 0 £44.99 **Print and Online Pack** 978 019 830776 1 £59.99
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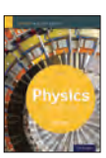
Study Guides	 978 019 839351 1 £26.99	 978 019 839353 5 £26.99	 978 019 839355 9 £26.99
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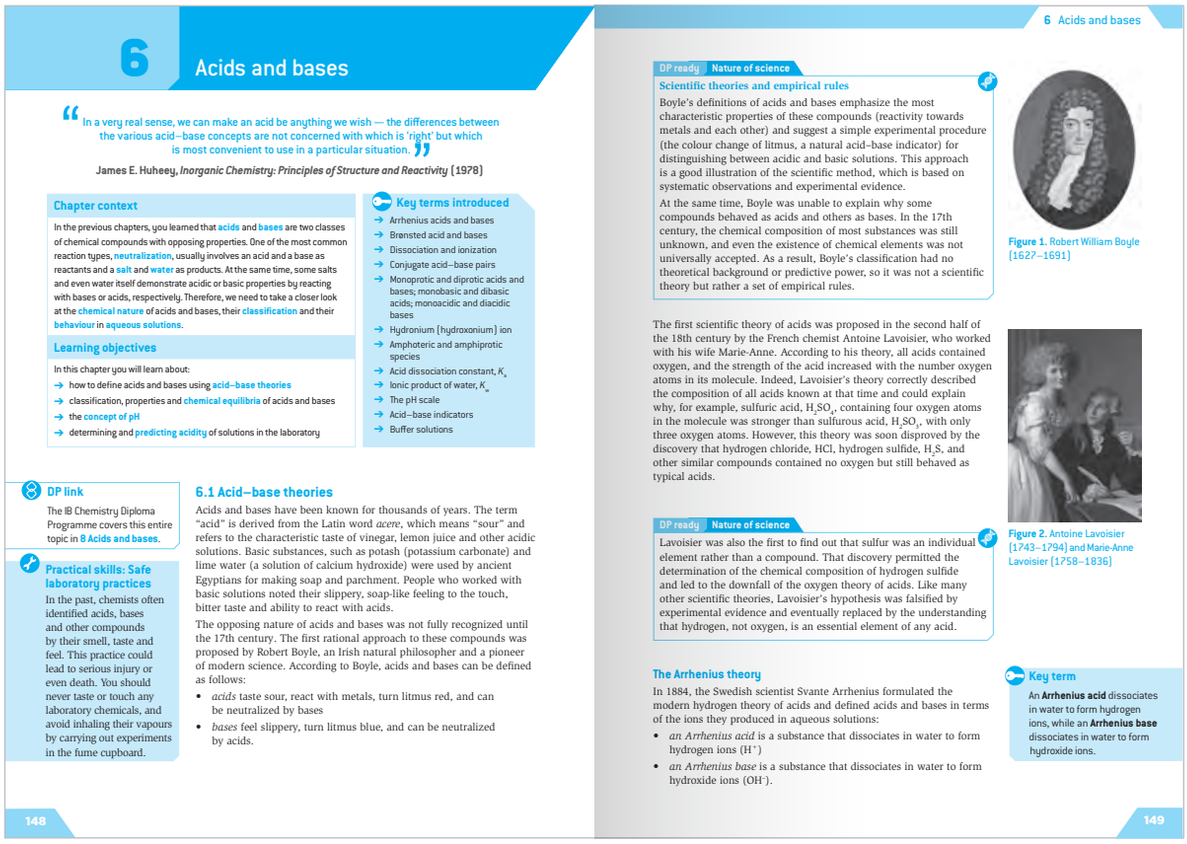

6 Acids and bases

"In a very real sense, we can make an acid be anything we wish — the differences between the various acid–base concepts are not concerned with which is 'right' but which is most convenient to use in a particular situation."

James E. Huheey, *Inorganic Chemistry: Principles of Structure and Reactivity* (1978)

Chapter context

In the previous chapters, you learned that acids and bases are two classes of chemical compounds with opposing properties. One of the most common reaction types, neutralization, usually involves an acid and a base as reactants and a salt and water as products. At the same time, some salts and even water itself demonstrate acidic or basic properties by reacting with bases or acids, respectively. Therefore, we need to take a closer look at the chemical nature of acids and bases, their classification and their behaviour in aqueous solutions.

Learning objectives

In this chapter you will learn about:

- how to define acids and bases using acid–base theories
- classification, properties and chemical equilibria of acids and bases
- the concept of pH
- determining and predicting acidity of solutions in the laboratory

Key terms introduced

- Arrhenius acids and bases
- Brønsted acid and bases
- Dissociation and ionization
- Conjugate acid–base pairs
- Monoprotic and diprotic acids and bases; monobasic and dibasic acids; monoacidic and diacidic bases
- Hydronium (hydroxonium) ion
- Amphoteric and amphiprotic species
- Acid dissociation constant, K_a
- Ionic product of water, K_w
- The pH scale
- Acid–base indicators
- Buffer solutions

DP link

The IB Chemistry Diploma Programme covers this entire topic in 8 Acids and bases.

Practical skills: Safe laboratory practices

In the past, chemists often identified acids, bases and other compounds by their smell, taste and feel. This practice could lead to serious injury or even death. You should never taste or touch any laboratory chemicals, and avoid inhaling their vapours by carrying out experiments in the fume cupboard.

6.1 Acid–base theories

Acids and bases have been known for thousands of years. The term "acid" is derived from the Latin word *acere*, which means "sour" and refers to the characteristic taste of vinegar, lemon juice and other acidic solutions. Basic substances, such as potash (potassium carbonate) and lime water (a solution of calcium hydroxide) were used by ancient Egyptians for making soap and parchment. People who worked with basic solutions noted their slippery, soap-like feeling to the touch, bitter taste and ability to react with acids.

The opposing nature of acids and bases was not fully recognized until the 17th century. The first rational approach to these compounds was proposed by Robert Boyle, an Irish natural philosopher and a pioneer of modern science. According to Boyle, acids and bases can be defined as follows:

- *acids* taste sour, react with metals, turn litmus red, and can be neutralized by bases
- *bases* feel slippery, turn litmus blue, and can be neutralized by acids.

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6 Acids and bases

DP ready Nature of science

Scientific theories and empirical rules

Boyle's definitions of acids and bases emphasize the most characteristic properties of these compounds (reactivity towards metals and each other) and suggest a simple experimental procedure (the colour change of litmus, a natural acid–base indicator) for distinguishing between acidic and basic solutions. This approach is a good illustration of the scientific method, which is based on systematic observations and experimental evidence.

At the same time, Boyle was unable to explain why some compounds behaved as acids and others as bases. In the 17th century, the chemical composition of most substances was still unknown, and even the existence of chemical elements was not universally accepted. As a result, Boyle's classification had no theoretical background or predictive power, so it was not a scientific theory but rather a set of empirical rules.

Figure 1. Robert William Boyle (1627–1691)

The first scientific theory of acids was proposed in the second half of the 18th century by the French chemist Antoine Lavoisier, who worked with his wife Marie-Anne. According to his theory, all acids contained oxygen, and the strength of the acid increased with the number oxygen atoms in its molecule. Indeed, Lavoisier's theory correctly described the composition of all acids known at that time and could explain why, for example, sulfuric acid, H_2SO_4, containing four oxygen atoms in the molecule was stronger than sulfurous acid, H_2SO_3, with only three oxygen atoms. However, this theory was soon disproved by the discovery that hydrogen chloride, HCl, hydrogen sulfide, H_2S, and other similar compounds contained no oxygen but still behaved as typical acids.

Figure 2. Antoine Lavoisier (1743–1794) and Marie-Anne Lavoisier (1758–1836)

DP ready Nature of science

Lavoisier was also the first to find out that sulfur was an individual element rather than a compound. That discovery permitted the determination of the chemical composition of hydrogen sulfide and led to the downfall of the oxygen theory of acids. Like many other scientific theories, Lavoisier's hypothesis was falsified by experimental evidence and eventually replaced by the understanding that hydrogen, not oxygen, is an essential element of any acid.

The Arrhenius theory

In 1884, the Swedish scientist Svante Arrhenius formulated the modern hydrogen theory of acids and defined acids and bases in terms of the ions they produced in aqueous solutions:

- *an Arrhenius acid* is a substance that dissociates in water to form hydrogen ions (H^+)
- *an Arrhenius base* is a substance that dissociates in water to form hydroxide ions (OH^-).

Key term

An **Arrhenius acid** dissociates in water to form hydrogen ions, while an **Arrhenius base** dissociates in water to form hydroxide ions.

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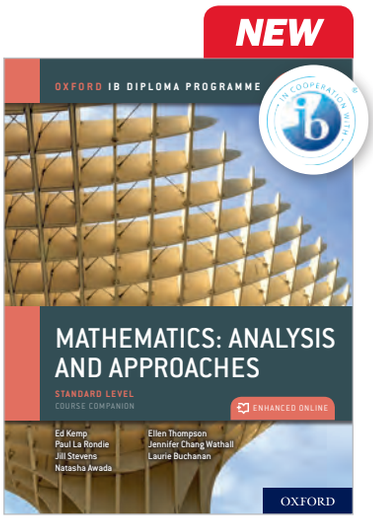

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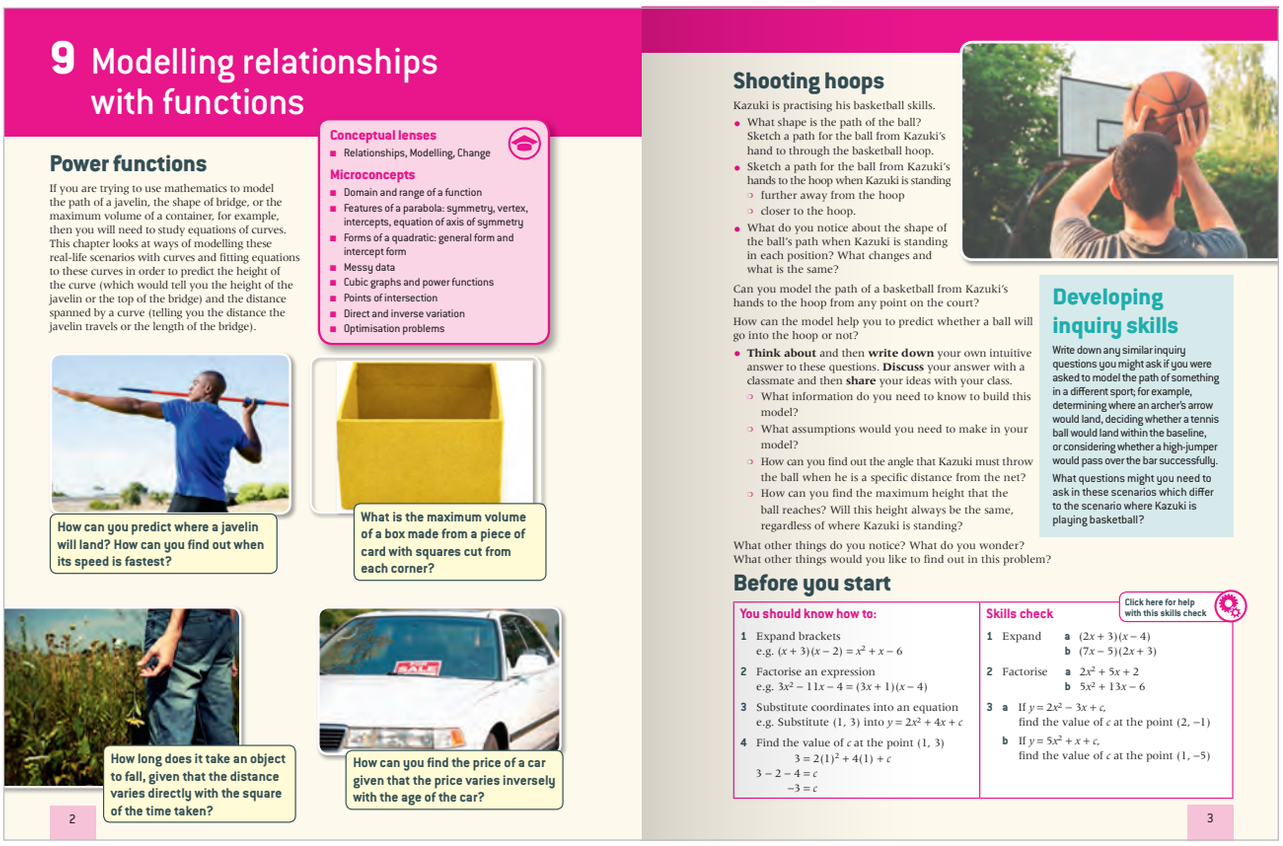

9 Modelling relationships with functions

Power functions

If you are trying to use mathematics to model the path of a javelin, the shape of bridge, or the maximum volume of a container, for example, then you will need to study equations of curves. This chapter looks at ways of modelling these real-life scenarios with curves and fitting equations to these curves in order to predict the height of the curve (which would tell you the height of the javelin or the top of the bridge) and the distance spanned by a curve (telling you the distance the javelin travels or the length of the bridge).

Conceptual lenses
- Relationships, Modelling, Change

Microconcepts
- Domain and range of a function
- Features of a parabola: symmetry, vertex, intercepts, equation of axis of symmetry
- Forms of a quadratic: general form and intercept form
- Messy data
- Cubic graphs and power functions
- Points of intersection
- Direct and inverse variation
- Optimisation problems

How can you predict where a javelin will land? How can you find out when its speed is fastest?

What is the maximum volume of a box made from a piece of card with squares cut from each corner?

How long does it take an object to fall, given that the distance varies directly with the square of the time taken?

How can you find the price of a car given that the price varies inversely with the age of the car?

2

Shooting hoops

Kazuki is practising his basketball skills.

- What shape is the path of the ball? Sketch a path for the ball from Kazuki's hand to through the basketball hoop.
- Sketch a path for the ball from Kazuki's hands to the hoop when Kazuki is standing
  - further away from the hoop
  - closer to the hoop.
- What do you notice about the shape of the ball's path when Kazuki is standing in each position? What changes and what is the same?

Can you model the path of a basketball from Kazuki's hands to the hoop from any point on the court?

How can the model help you to predict whether a ball will go into the hoop or not?

- **Think about** and then **write down** your own intuitive answer to these questions. **Discuss** your answer with a classmate and then **share** your ideas with your class.
  - What information do you need to know to build this model?
  - What assumptions would you need to make in your model?
  - How can you find out the angle that Kazuki must throw the ball when he is a specific distance from the net?
  - How can you find the maximum height that the ball reaches? Will this height always be the same, regardless of where Kazuki is standing?

What other things do you notice? What do you wonder? What other things would you like to find out in this problem?

Developing inquiry skills

Write down any similar inquiry questions you might ask if you were asked to model the path of something in a different sport; for example, determining where an archer's arrow would land, deciding whether a tennis ball would land within the baseline, or considering whether a high-jumper would pass over the bar successfully.

What questions might you need to ask in these scenarios which differ to the scenario where Kazuki is playing basketball?

Before you start

Click here for help with this skills check

You should know how to:

1 Expand brackets
e.g. $(x + 3)(x - 2) = x^2 + x - 6$

2 Factorise an expression
e.g. $3x^2 - 11x - 4 = (3x + 1)(x - 4)$

3 Substitute coordinates into an equation
e.g. Substitute $(1, 3)$ into $y = 2x^2 + 4x + c$

4 Find the value of c at the point $(1, 3)$
$3 = 2(1)^2 + 4(1) + c$
$3 - 2 - 4 = c$
$-3 = c$

Skills check

1 Expand **a** $(2x + 3)(x - 4)$ **b** $(7x - 5)(2x + 3)$

2 Factorise **a** $2x^2 + 5x + 2$ **b** $5x^2 + 13x - 6$

3 **a** If $y = 2x^2 - 3x + c$, find the value of c at the point $(2, -1)$

b If $y = 5x^2 + x + c$, find the value of c at the point $(1, -5)$

3

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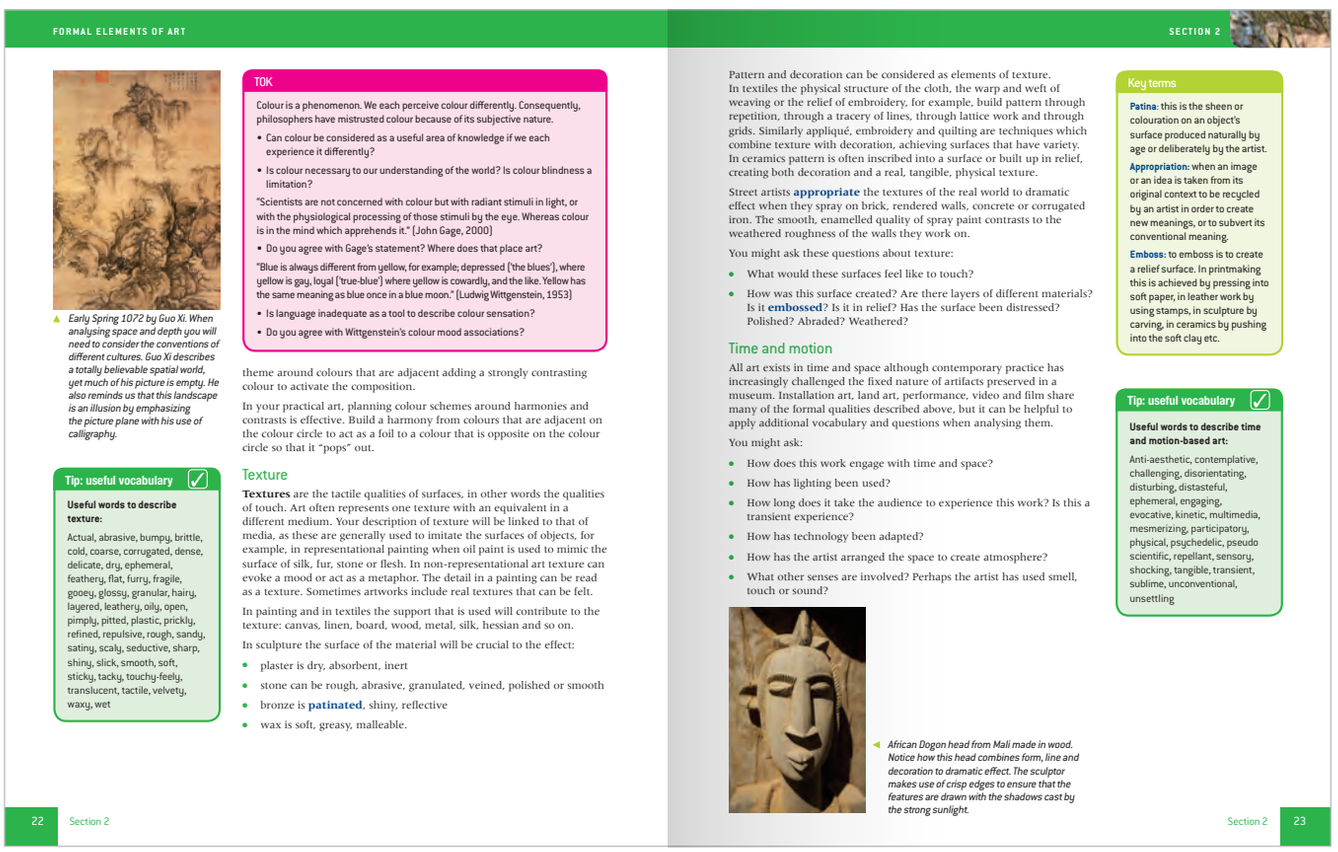
- Fully embed the IB approach to learning with TOK and ATL links throughout the text



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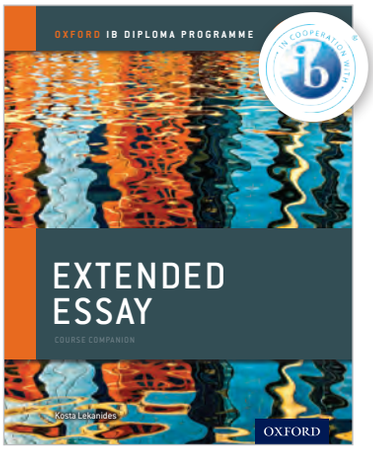

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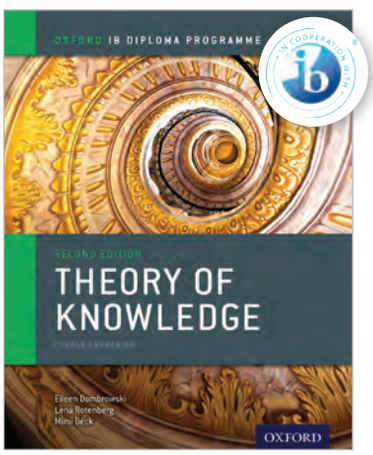

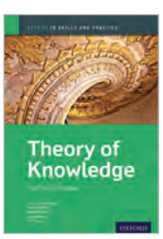

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Sciences

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- Fully adopt the MYP approach via clear, structured support for all aspects of the MYP framework and eAssessment
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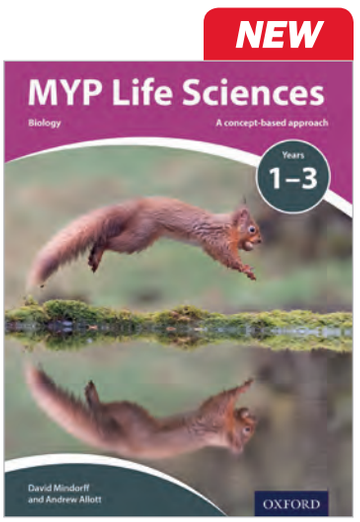
- Develop the transdisciplinary skills that are vital to success at MYP level and progression to DP via regular ATL features



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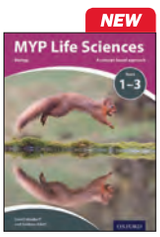

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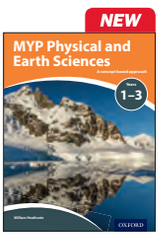

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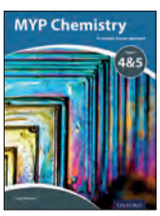

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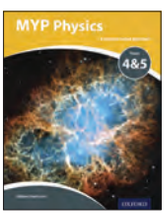

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Deliver engaging, relevant material

TRANSFORMATION

FORCES

What is pressure?

Anyone who has stepped on a sharp object knows that it hurts. The reason for this is not due to an increased force, as your weight which is pushing you down onto the object remains the same; it hurts because all your weight is acting through a small area. What has increased, and is causing the pain, is pressure.

Pressure is the measure of how much force acts per unit area (e.g. per square meter). It can be calculated using the equation:

$$P = \frac{F}{A}$$

where P is the pressure, F is the force and A is the area over which the force is applied. There are many different units of pressure, but the SI unit is the Pascal (Pa) which is one newton per square meter ($1\,N\,m^{-2}$).

▼ Walking barefoot along a shingle beach hurts your feet much more than walking across sand. The contact area between your feet and the sharp stones is less than the area between your feet and the sand and so the pressure is greater on the stones. Why does a small child find it easier to walk across a stony beach than an adult?

Worked example: Calculating pressure

Question

A drawing pin is pushed with a force of 10N. The blunt end of the drawing pin has a diameter of 0.9cm and the sharp end has a diameter of 0.25mm. Calculate the pressure at each end of the drawing pin.

Answer

First find the area of each end using the equation for the area of a circle:

$$A = \pi r^2.$$

The radius is half of the diameter so the radii are 4.5×10^{-3}m and 1.25×10^{-4}m. (Note that centimeters and millimeters have been converted into meters.)
Hence the areas are $6.36 \times 10^{-5}\,m^2$ and $4.91 \times 10^{-8}\,m^2$.

The force is 10 N, so the pressure can then be calculated using the equation:

$$P = \frac{F}{A}$$

This gives pressures of 1.57×10^5 and 2.04×10^8Pa or 157kPa and 204MPa.

Experiment

Measuring the pressure you exert on the ground

You will need some weighing scales and some squared paper.

To calculate the pressure that you exert on the ground, you need to find the force you exert and the area over which you exert it.

Place one foot on the squared paper and draw round it. By counting the squares, find the area of your foot. Convert this area into square meters ($1\,m^2 = 10{,}000\,cm^2$) then double it to account for both feet.

Weigh yourself on the scales. Convert your mass into weight using the equation $F = mg$.

Now find the pressure you exert on the ground using the equation:

$$P = \frac{F}{A}$$

Data-based question: The Eiffel Tower

The total mass of the Eiffel Tower is about 10,000tonnes. The base of the tower consists of four feet, each of which is a square of side 25m. The tower is very efficient in its use of materials – if all the metal in the tower were melted down and placed on one of the bases, it would only be about 1.5m high. As a result of its light weight and large area of its footprint, it exerts a low pressure on the ground and so does not require deep foundations.

1. Calculate the weight of the Eiffel Tower.
2. Calculate the total area of the base.
3. Calculate the pressure that the Eiffel Tower exerts on the ground.

▶ The Eiffel Tower opened in 1889 and was the tallest building in the world for over 40 years. It has come to symbolize the Industrial Revolution in France

MYP Physics 4 & 5 Student Book

Integrate concepts into learning

CONSEQUENCES

Key concept: Change

Related concept: Consequences

Global context: Globalization and sustainability

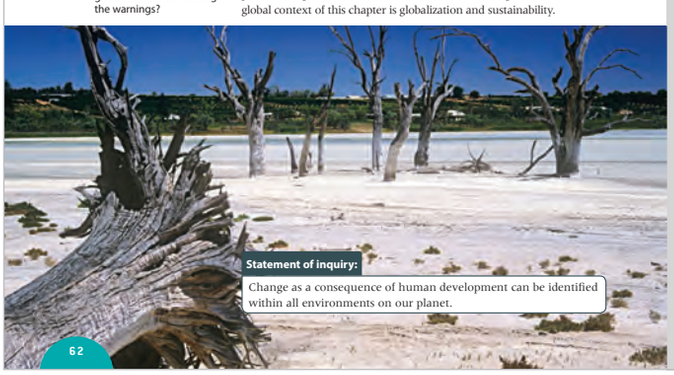
Introduction

Consequences are defined as the observable or quantifiable effects, results, or outcomes correlated with an earlier event or events. All actions have consequences, both positive and negative; our actions from the past have consequences today and in the same way our actions today will have consequences tomorrow, and some of today's actions (especially collective actions) will have consequences further into the future.

Science has long understood the concept of cause and effect, also known as causality. However, a consequence could be the result of several different factors acting together, meaning it is not always possible to establish causality. For example, the life expectancy of people living in countries such as Japan, Switzerland, Australia, Singapore, Spain and Italy is over 80 years old. This can be attributed to a number of contributing factors including access to clean water, sufficient healthy food and improved access to medicines. While changes in the last half-century have resulted in an overall increase in the quality of life, there have also been less desirable consequences.

Within the scientific community there is little debate about the occurrence of global warming (the increase in the Earth's average surface temperature) or climate change (the long term change in the Earth's climate and patterns of weather), as there is a wealth of scientific evidence proving that these phenomena are occurring. Understanding what causes them and how to mitigate their effects on the future of our planet is a significant concern for current and future generations. The global context of this chapter is globalization and sustainability.

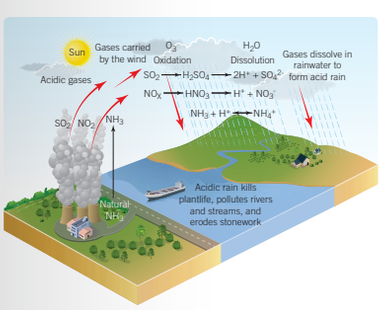
▼ Salt accumulation in the soil and water can have devastating consequences on the environment: these red gum trees in Southern Australia were killed by the rising salinity in irrigated land. The science behind the human impact on the environment is often well understood, and analyzing the data it provides could help us minimize negative impact. What are the consequences of communities and governments not heeding the warnings?



Statement of inquiry:

Change as a consequence of human development can be identified within all environments on our planet.

Since the 19th century, our planet's rapidly developing societies have become increasingly and irreversibly linked to the refining and combustion of fossil fuels. The acidification of our atmosphere is one of the resulting consequences. Non-renewable fossil fuels, such as coal, are burned in power stations on a massive scale to produce electricity for cities and industry. By-products of this combustion reaction include sulfur dioxide, SO_2, and nitrogen dioxide, NO_2. In the atmosphere and under the influence of sunlight, these compounds combine with water to form acid rain and acid snow, which fall back to the surface of our planet.



◀ The Earth's atmosphere does not observe the geographical boundaries that exist for different countries. The atmosphere belongs to all countries, its inhabitants and the plant and animal kingdoms. Acid deposition is a global consequence of industrialization and modernization

ATL **Critical thinking skills**

Analyzing and evaluating issues and ideas

Often in the media, we read and hear governments, organizations and individuals calling for a reduction in the consumption of non-renewable energy sources, such as fossil fuels. Sometimes people call for a complete ban on the use of carbon-based fuels. Scientists and governments recognise the diversity of products that are made from crude oil, a type of fossil fuel. How many different crude-oil based compounds and their functions can you name?

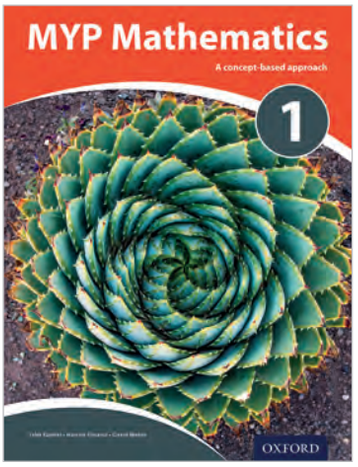
- Use your critical literacy skills to perform research within a small group, or individually, on the products that are made from crude oil components.
- Construct a list of products and make an informed decision about whether these products are essential or non-essential in society. How could you communicate the level of importance your group placed on each item?
- Discuss within your group the issues that society could face when minimizing or totally eliminating the use of crude-oil products.

MYP Chemistry 4 & 5 Student Book

MYP

Sciences

Mathematics



Fully adopt the MYP approach

Supporting the MYP curriculum framework, these resources strengthen mathematical understanding and develop conceptual awareness.

- Enable critical exploration of mathematical content, framed within key and related concepts and global contexts
- Promote independent thinking via factual, conceptual and debatable questions and ATL features throughout each unit
- Secure comprehension via clear summaries, worked solutions and extensive practice, reinforced by Oxford MyiMaths

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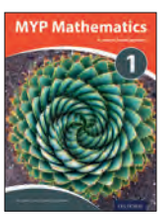

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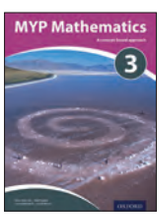

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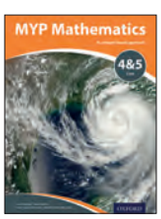

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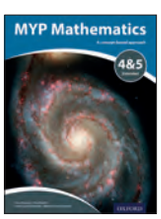

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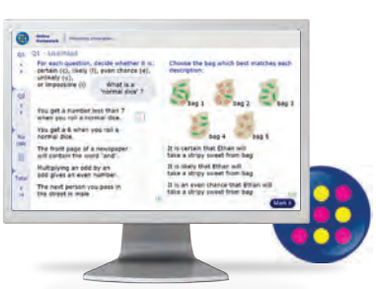


Embed understanding through practice

Reflect and discuss 9

- Which form – percentage, decimal or fraction – do you prefer when ordering numbers?
- What are the advantages and disadvantages of each form? Make a list for each one.
- How are fractions, decimals and percentages equivalent forms?

Activity 6 – Conversion bingo

Draw a 4 by 4 grid and fill it in with a combination of fractions, decimals and percentages, at least four of each. Here is an example.

Your teacher will give you the specific guidelines for what numbers you can put in your grid. (For example, you may be told that you can use any percentages that are a multiple of 10. So you must come up with decimals, fractions and percentages that as a percentage are a multiple of 10.) You cannot include two equivalent numbers in different forms (e.g. 20% and 0.2).

Once you have written the numbers in your grid, the game will begin. Your teacher will call out a number in one of the three forms and you can cross it off your grid if you have that number in any of the three forms. The winner is the first student to get four in a row, column, or major diagonal.

20%	0.4	30%	$\frac{17}{20}$
$\frac{1}{4}$	0.75	0.05	45%
10%	16%	$\frac{1}{15}$	90%
$\frac{6}{35}$	70%	0.68	$\frac{3}{5}$

Formative assessment – Food for refugees

criteria C, D

The United Nations High Commissioner for Refugees (UNHCR) recommends that a refugee should consume at least 2100 calories per day. Yet in many refugee camps, refugees get less than this. For example, in one Tanzanian refugee camp, refugees were given only about 1400 calories per day.

1 What percentage of the minimum daily calories were the refugees in the Tanzanian camp given?

2 In many refugee camps, refugees end up trading their food for other non-food supplies that they need. If a refugee was eating only a third of the minimum daily calorie recommendation, how many calories per day would that be?

Continued on next page

The table shows approximately what a Syrian refugee might eat *per day* in a Jordanian refugee camp. Remember that the UNHCR recommends that a person should have at least 2100 calories daily.

Food	Grams (approx.)	Calories (approx.)	Type of nutrient
rice	274	1100	carbohydrate
flour	57	230	carbohydrate
lentils	24	97	protein
dried chickpeas	12	49	protein
sardines	18	71	protein
canned kidney beans	57	229	protein
vegetable oil	43	386	fat

3 What is the number of total daily calories in this refugee diet?

4 What percentage of a refugee's calories come from protein?

5 What percentage of a refugee's calories come from carbohydrates?

6 What percentage of a refugee's calories come from fat?

7 Make a similar list of the foods that you eat in a typical day.

8 Using an online source, calculate the approximate number of calories for every item on your list and state the type of nutrient.

9 Calculate the total number of calories you consume in one day. Calculate how many calories you consume daily of fat, protein, and carbohydrates.

10 What percentage of your calories come from each of these three nutrient groups?

11 Explain the degree of accuracy of your results in step **10**. Describe whether or not your results in step **10** make sense.

12 How does your diet differ from the refugee diet? How is it similar? (Compare the number of calories, breakdown of food groups, etc.)

ATL1 13 How do you think refugees feel, having to follow this diet? Explain.

Applications of percentages

There are many practical applications involving percentages which you will see on a regular basis, such as finding the discount on an item for sale in a store or calculating the tax when purchasing an item. Remembering that percentages and fractions are really just equivalent forms can help you to solve these types of problems.

MYP Mathematics 1 Student Book

Build inquiry and problem-solving skills

5.1 Are you saying I'm irrational?

FORM

Objectives

- Simplifying irrational numerical expressions
- Approximating radicals
- Applying rules of radicals to simplify them
- Performing operations on radicals to simplify expressions that contain radicals

Inquiry questions

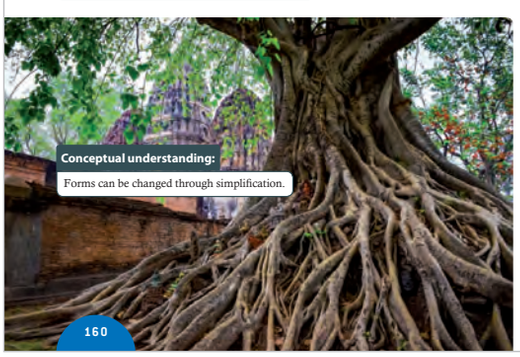
F
- What is the difference between a rational number and an irrational number?
- What is a radical (surd)?
- How do you approximate a radical?

C
- How are the rules of radicals related to the rules for combining terms in algebra?
- How is simplifying radicals similar to simplifying fractions?

D
- Can irrational numbers be combined to form rational numbers?

ATL Communication

Draw reasonable conclusions and generalizations



5.1 10.3 E5.1

You should already know how to:

- identify radicals and understand what they represent

1 Simplify each expression.

a $\sqrt{9+16}$ b $\sqrt{9}+\sqrt{16}$

c $\sqrt{3}\times\sqrt{3}$ d $11+\sqrt{11}$

e $\sqrt{3}\times\sqrt{6}\times\sqrt{8}$ f $\frac{\sqrt{1}}{\sqrt{9}}$

F Reviewing radicals (surds)

- What is the difference between a rational number and an irrational number?
- What is a radical (surd)?
- How do you approximate a radical?

A **square root** (also known as a **radical** or **surd**) of a positive number x is a number which, when multiplied by itself, gives the original number x. Any positive number has two square roots: one positive and one negative.

The **principal square root** of a positive number x is the *positive* square root of x, and is written as $\sqrt{x}$.

In general, 'the square root' means the *positive* square root.

For example, $\sqrt{25}=5$, but the square root of 25 can also be -5. This is normally written down as $-\sqrt{25}=-5$.

Muhammad ibn Musa al-Khwarizmi (c. 780–c. 850 AD) referred to rational numbers as *audible*, and irrational numbers as *inaudible*. This later led to the Arabic word 'أصم' (asamm, meaning 'deaf' or 'dumb') for irrational number, which was then translated into Latin as 'surdus'.

Exploration 1

Here are some examples of what we call 'rational numbers':

$\frac{1}{2}$ 1.45 7.262626… -3 $\frac{5}{6}$ 18.2 $\sqrt{9}$

And here are some examples of what we call 'irrational numbers':

π 2.39841… 17.41002368… 0.83126674…

1 State the differences between a 'rational number' and an 'irrational number'.

2 Define each of them in your own words.

3 How would you classify a number like $\sqrt{5}$? Explain your reasoning.

A **rational number** is a number that can be written as a fraction $\frac{p}{q}$ where $p, q \in \mathbb{Z}$ and $q \neq 0$. For example: $\frac{1}{2}, \frac{5}{6}, \frac{9}{5}, 4, -\frac{12}{51}$ 1.2, $-0.\dot{3}$, and 0 are all rational numbers.

An **irrational number** is a number that cannot be written as a fraction. Irrational numbers *cannot* be represented as terminating or repeating decimals. $\sqrt{2}$ and π are examples of irrational numbers.

We have given names to only a few special irrationals, like π, φ, and Euler's number, e.

MYP Mathematics 4 & 5 Standard Student Book

English Language Acquisition

Build fluency and confidence

Supporting the current MYP curriculum framework, these stretching, concept-based texts strengthen and progress key knowledge and skills.

- Deliver a rigorous, inquiry-based approach to language acquisition
- Explore language through key and related concepts and global contexts, developing learners' awareness of the big picture
- Support preparation for MYP eAssessment and the transition to DP studies with regular summative assessment tasks

"Finally. A book that perfectly matches to all aspects of the MYP... The selections are meaningful to the students, connect currently to the international world, and you can be assured they met all IB requirements."

IB Curriculum Coordinator, Colorado, USA

MYP English: Language Acquisition Phase 3			**MYP English: Language Acquisition Phase 4**		
Student Book	978 019 839802 8	£33.99	Student Book	978 019 839798 4	£34.99
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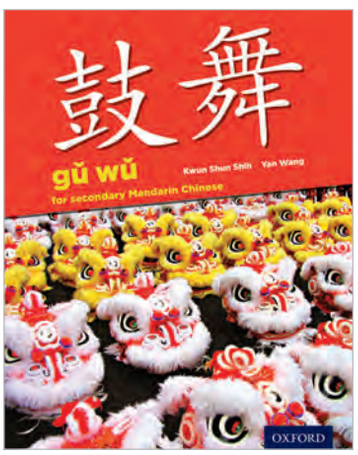
Print and Online Pack	978 019 839804 2	£44.99	Print and Online Pack	978 019 839800 4	£45.99

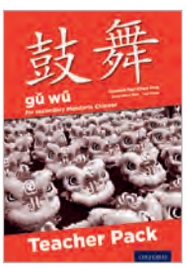
Chinese Language Acquisition

Achieve in Secondary Mandarin Chinese

Suitable for MYP Language Acquisition (Phases 1-3) and IB DP Ab Initio frameworks, this thematic Student Book is accompanied by a Teacher Pack.

- Build and evaluate language skills with clear grammatical explanations, glossaries, theme-based activities and assessment tasks
- Tailor your teaching to the MYP framework with lesson resources, differentiation ideas and syllabus-specific support, via the Teacher Pack





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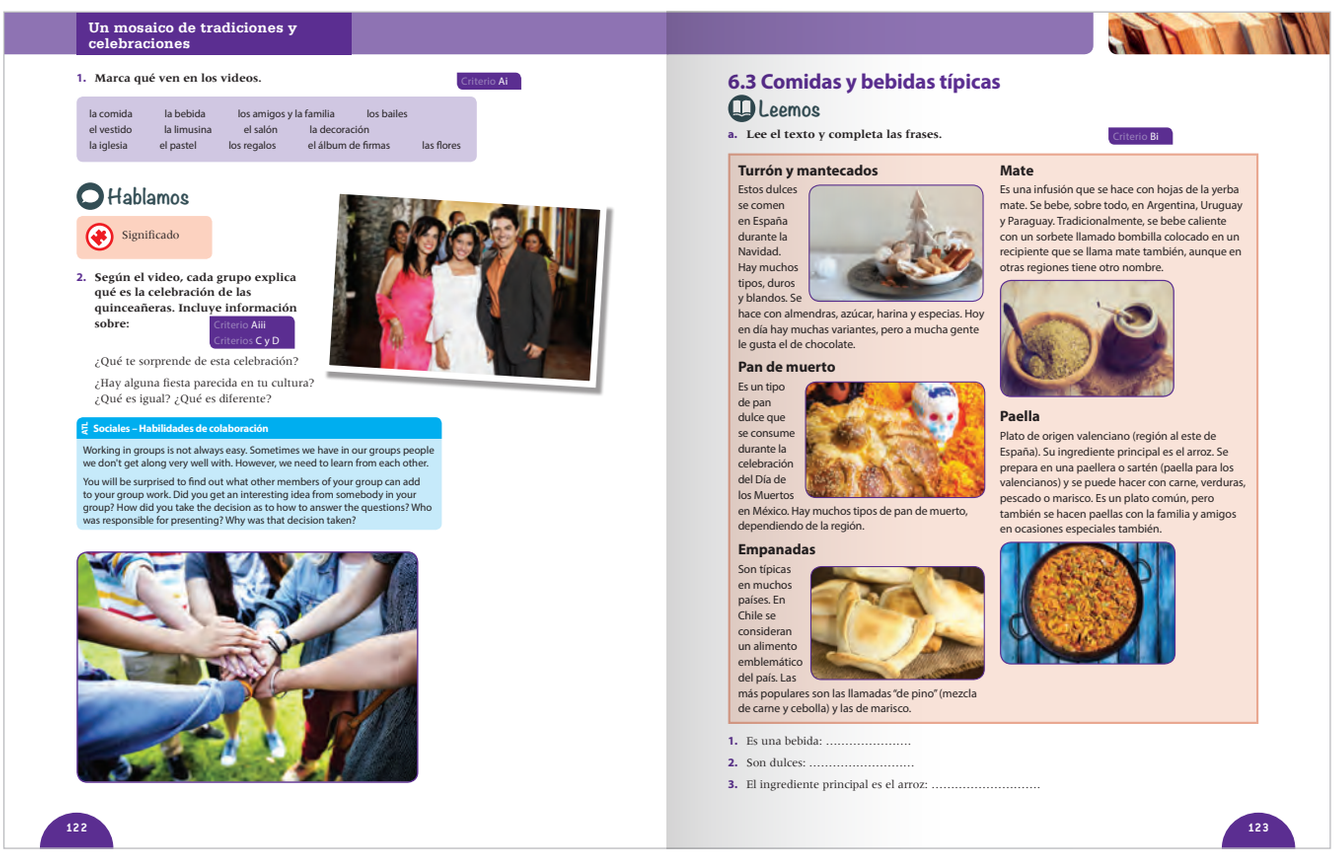
Spanish Language Acquisition

Support and stretch learners

Fully-aligned to the MYP curriculum framework, these inquiry-based resources lay the foundations for long-term linguistic confidence and achievement.

- Build a strong language base via colorful, phase-appropriate explanations and activities that develop linguistic skills
- Embrace the MYP approach with clear coverage of global contexts, key and related concepts and ATL, promoting independent thought and reflection
- Support achievement through regular formative and summative assessment tasks



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PYP

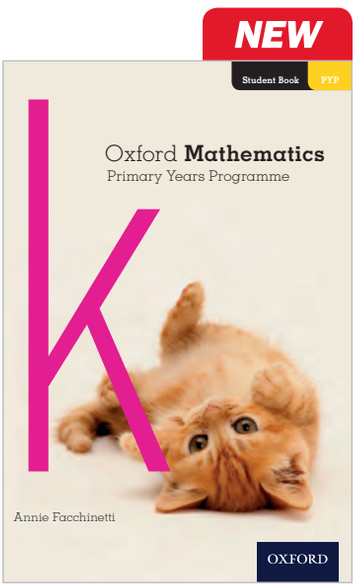
Mathematics

Mathematics

Explore inquiry-based resources

Fully supporting the PYP approach, these inquiry-based resources provide comprehensive coverage of the PYP Mathematics scope and sequence.

- Cover the five strands of mathematics using the PYP methodology of constructing, transferring and applying meaning
- Build knowledge and skills and explore the PYP transdisciplinary themes via inquiry-based activities that are rooted in relevant, real-life contexts
- Ensure all learners are supported with guidance on differentiation, suggestions for group activities, and pre- and post-assessments for every topic



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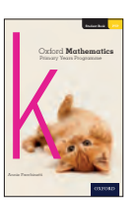
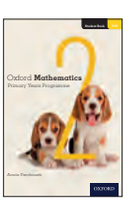
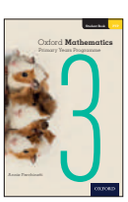
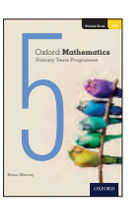
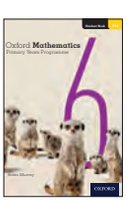
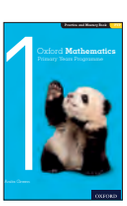
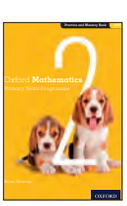
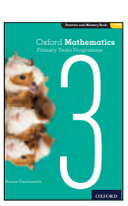
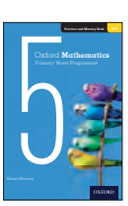
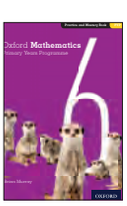
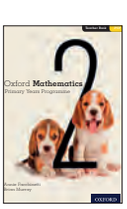
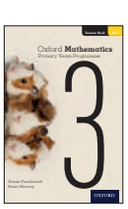
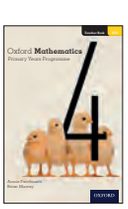
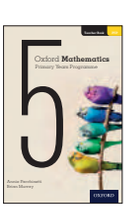
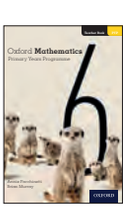
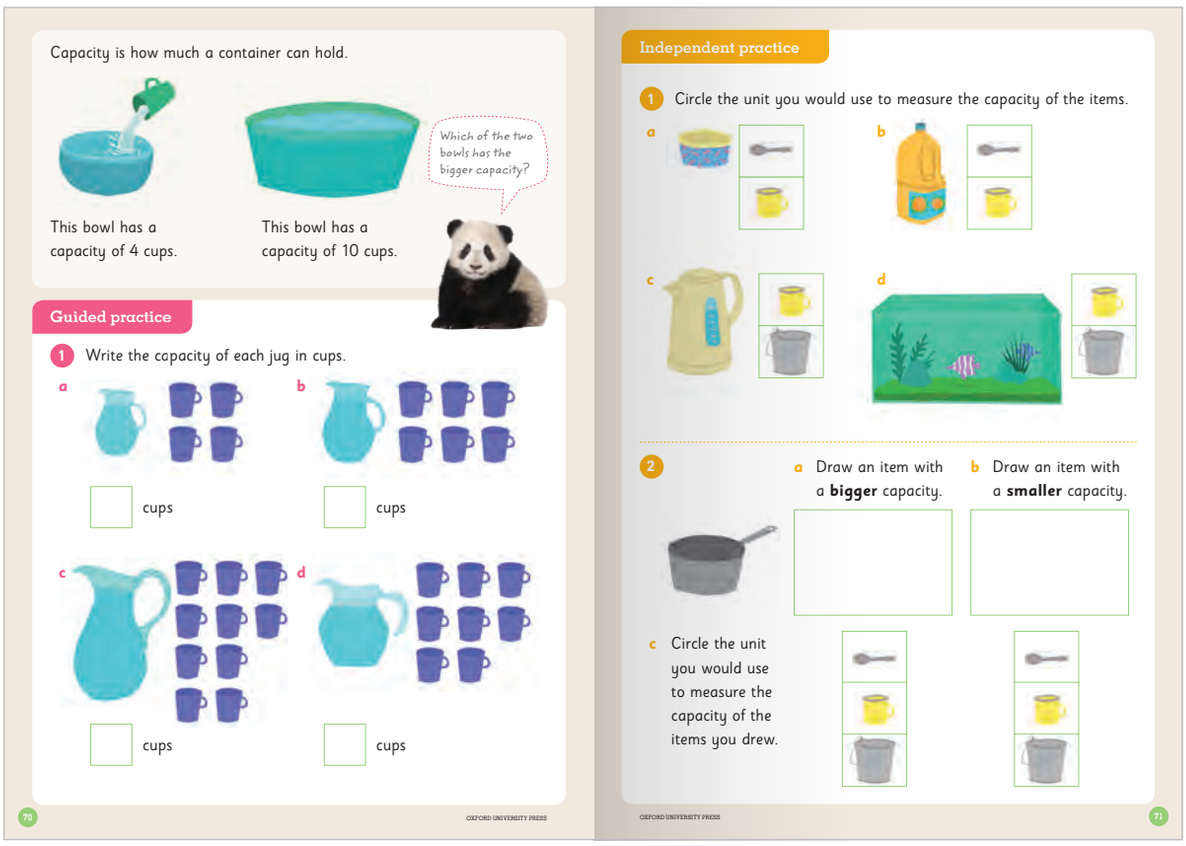
Student Books	 978 019 031219 0 £15.99	 978 019 031220 6 £15.99	 978 019 031221 3 £15.99	 978 019 031222 0 £15.99	 978 019 031223 7 £15.99	 978 019 031224 4 £15.99	 978 019 031225 1 £15.99
Practice and Mastery Books		 978 019 031226 8 £8.99	 978 019 031227 5 £8.99	 978 019 031228 2 £8.99	 978 019 031229 9 £8.99	 978 019 031230 5 £8.99	 978 019 031231 2 £8.99
Teacher Books	 978 019 031232 9 £29.99	 978 019 031233 6 £29.99	 978 019 031234 3 £29.99	 978 019 031235 0 £29.99	 978 019 031236 7 £29.99	 978 019 031237 4 £29.99	 978 019 031238 1 £29.99

Nurture independent, confident learners



Capacity is how much a container can hold.

This bowl has a capacity of 4 cups.

This bowl has a capacity of 10 cups.

Which of the two bowls has the bigger capacity?

Guided practice

1 Write the capacity of each jug in cups.

a ☐ cups

b ☐ cups

c ☐ cups

d ☐ cups

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Independent practice

1 Circle the unit you would use to measure the capacity of the items.

a

b

c

d

2 a Draw an item with a **bigger** capacity.

b Draw an item with a **smaller** capacity.

c Circle the unit you would use to measure the capacity of the items you drew.

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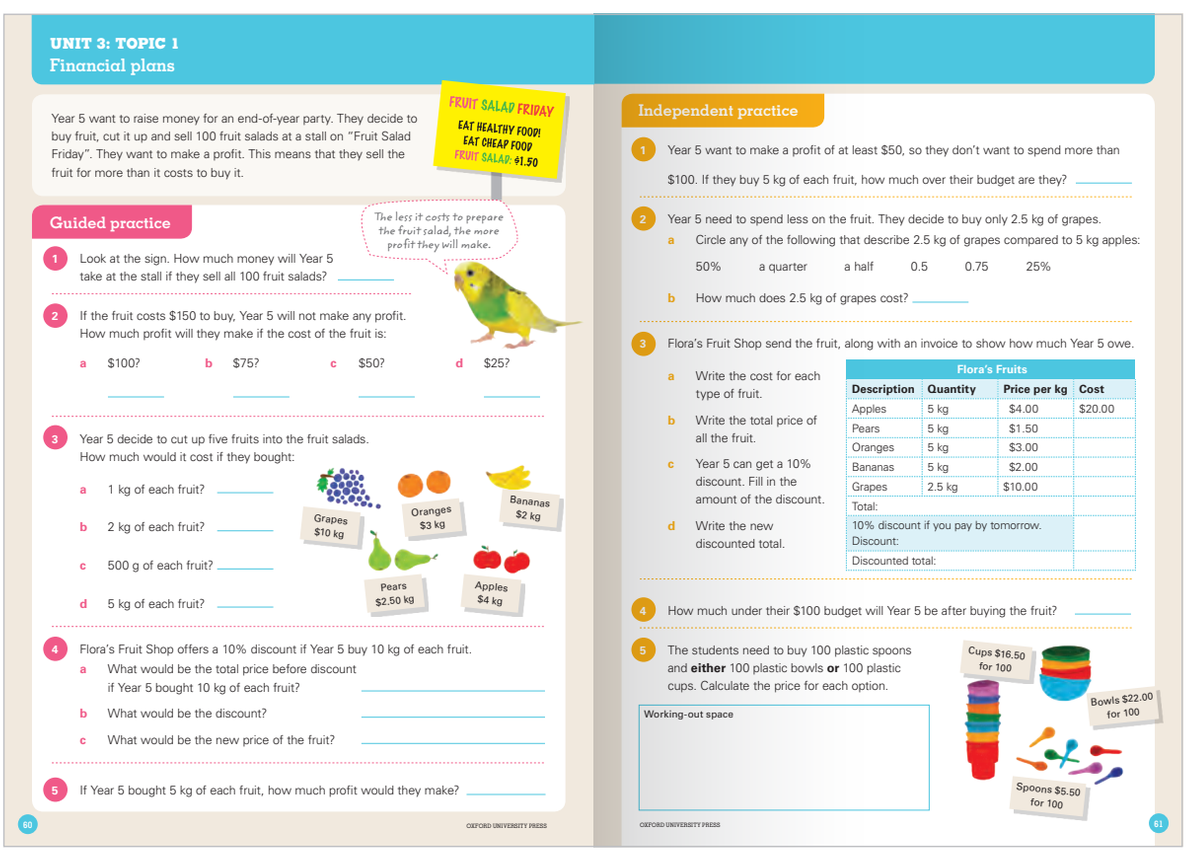
Oxford Mathematics Primary Years Programme Student Book 1

Construct, transfer and apply understanding



UNIT 3: TOPIC 1
Financial plans

Year 5 want to raise money for an end-of-year party. They decide to buy fruit, cut it up and sell 100 fruit salads at a stall on "Fruit Salad Friday". They want to make a profit. This means that they sell the fruit for more than it costs to buy it.

FRUIT SALAD FRIDAY
EAT HEALTHY FOOD!
EAT CHEAP FOOD
FRUIT SALAD: $1.50

Guided practice

The less it costs to prepare the fruit salad, the more profit they will make.

1 Look at the sign. How much money will Year 5 take at the stall if they sell all 100 fruit salads? _____

2 If the fruit costs $150 to buy, Year 5 will not make any profit. How much profit will they make if the cost of the fruit is:

a $100? _____ b $75? _____ c $50? _____ d $25? _____

3 Year 5 decide to cut up five fruits into the fruit salads. How much would it cost if they bought:

a 1 kg of each fruit? _____

b 2 kg of each fruit? _____

c 500 g of each fruit? _____

d 5 kg of each fruit? _____

Grapes $10 kg; Oranges $3 kg; Bananas $2 kg; Pears $2.50 kg; Apples $4 kg

4 Flora's Fruit Shop offers a 10% discount if Year 5 buy 10 kg of each fruit.

a What would be the total price before discount if Year 5 bought 10 kg of each fruit? _____

b What would be the discount? _____

c What would be the new price of the fruit? _____

5 If Year 5 bought 5 kg of each fruit, how much profit would they make? _____

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Independent practice

1 Year 5 want to make a profit of at least $50, so they don't want to spend more than $100. If they buy 5 kg of each fruit, how much over their budget are they? _____

2 Year 5 need to spend less on the fruit. They decide to buy only 2.5 kg of grapes.

a Circle any of the following that describe 2.5 kg of grapes compared to 5 kg apples:

50% a quarter a half 0.5 0.75 25%

b How much does 2.5 kg of grapes cost? _____

3 Flora's Fruit Shop send the fruit, along with an invoice to show how much Year 5 owe.

a Write the cost for each type of fruit.

b Write the total price of all the fruit.

c Year 5 can get a 10% discount. Fill in the amount of the discount.

d Write the new discounted total.

Flora's Fruits			
Description	**Quantity**	**Price per kg**	**Cost**
Apples	5 kg	$4.00	$20.00
Pears	5 kg	$1.50	
Oranges	5 kg	$3.00	
Bananas	5 kg	$2.00	
Grapes	2.5 kg	$10.00	
Total:			
10% discount if you pay by tomorrow. Discount:			
Discounted total:			

4 How much under their $100 budget will Year 5 be after buying the fruit? _____

5 The students need to buy 100 plastic spoons and **either** 100 plastic bowls **or** 100 plastic cups. Calculate the price for each option.

Working-out space

Cups $16.50 for 100; Bowls $22.00 for 100; Spoons $5.50 for 100

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Oxford Mathematics Primary Years Programme Student Book 5

PYP

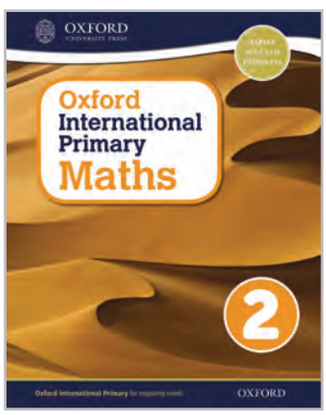
Mathematics

Science

Engage learners in scientific inquiry

- Empower learners to consider big ideas and ask questions throughout the learning process
- Actively engage students with a rich variety of activities and games, including digital resources
- Encourage learners to reflect upon, and extend, their learning via 'think about…' features and extension activities

Oxford International Primary Science
6 Student Workbooks, 6 Workbooks, 6 Digital Resource Packs, 6 Teacher's Guides and 1 Assessment Pack

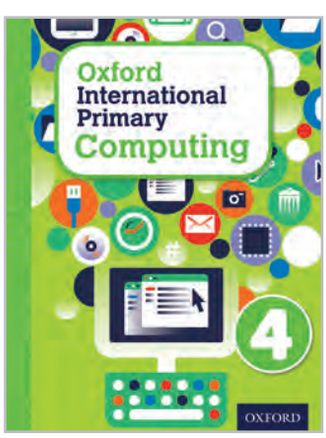


Mathematics

Develop problem-solving skills

- Encourage learners to explore and discuss problems in the context of big questions
- Clarify mathematical concepts by relating them to examples from everyday life
- Motivate learners with a range of colorful activities and interactive digital resources

Oxford International Primary Maths
6 Student Workbooks, 6 Workbooks, 6 Digital Resource Packs, 6 Teacher's Guides and 1 Assessment Pack

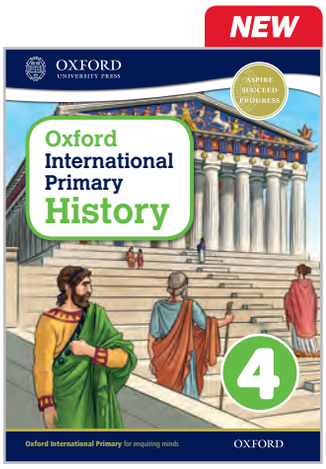


Computing

Apply knowledge to real-life scenarios

- Provide learners with the knowledge and skills needed to undertake their own projects
- Facilitate reflection on progress through teacher and student assessment tools and activities that enable collaborative learning
- Encourage learners to investigate and discuss the role and implications of computers in society

Oxford International Primary Computing
6 Student Books, 2 Teacher's Guides and free online project files

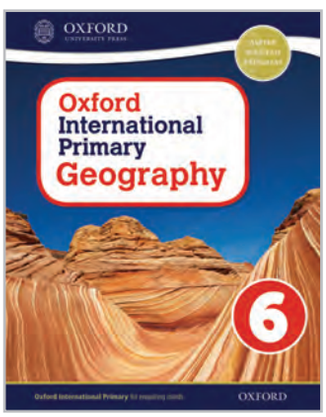


History

Develop a spirit of inquiry

- Hone essential critical thinking skills as students learn to approach, evaluate and present historical sources
- Deliver a balanced perspective on international and local history, using suggested topics and thematic studies to prompt reflection
- Draw transdisciplinary links between history and geography – promoting an awareness of wider connections and concepts

Oxford International Primary History
6 Student Books, 6 Workbooks and 1 Teacher's Guide

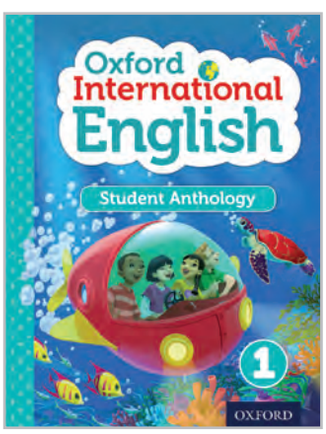


Geography

Nurture a global perspective

- Help learners to relate their local environment to a wider global context
- Facilitate cross-curricular projects through suggestions and guidelines on research topics
- Use real-life, international examples to bring key aspects of geography to life

Oxford International Primary Geography
6 Student Books, 6 Workbooks and 1 Teacher's Guide



English

Promote exploration and reflection

- Introduce learners to a wide range of ideas and cultures, using age-appropriate fiction and non-fiction from around the world
- Develop reading, writing, speaking and listening skills via varied and colorful activities
- Encourage confident reflection with plenty of opportunities for discussion and inquiry

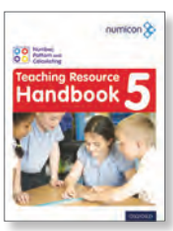
Oxford International English
6 Student Books, 2 Activity Books, 4 Workbooks, 2 Anthologies and 6 Teacher's Guides

Mathematics

Take a hands on approach

Facilitating an active, multi-sensory approach, Numicon allows learners to explore mathematics using structured imagery, apparatus and step-by-step activities.

- Build learners' confidence when problem-solving by showing how and why they arrived at their answers
- Develop understanding by applying real-life contexts to activities
- Effectively monitor learners' progress using flexible assessment tools



Numicon apparatus in use

Find out more

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Visit **www.oxfordprimary.com/pyp** to download a guide that explores how to use Numicon to teach the PYP Mathematics scope and sequence

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