

18 August 2020
Stages 4 & 5 Science
Professional Development Workshop

Working Scientifically in everyday life

Ways to integrate current topics

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OXFORD INSIGHT SCIENCE

FOR NSW STAGE 4

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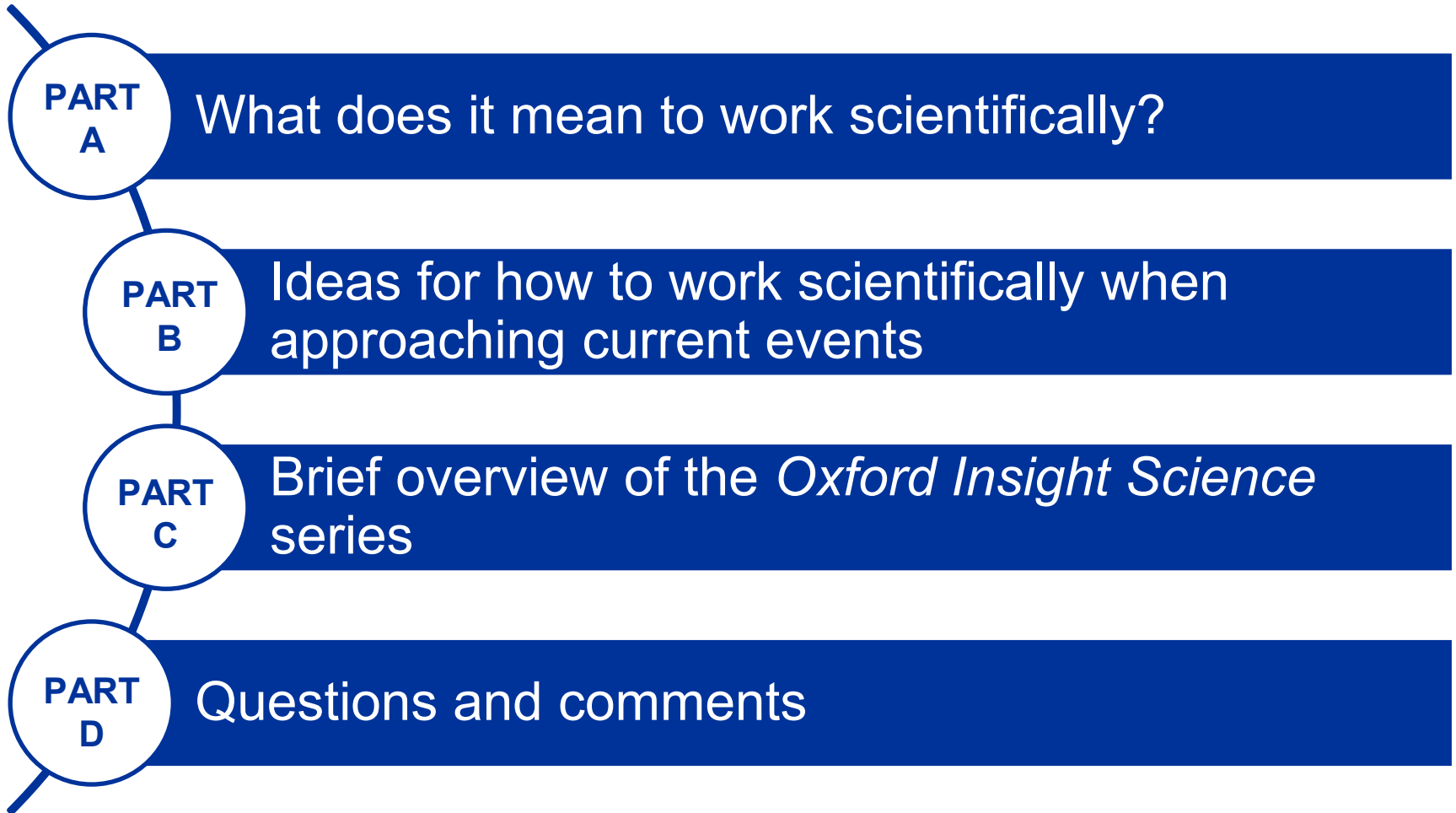
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Welcome to today's workshop



Working Scientifically skills

	Stage 4	Stage 5	Stage 6
Questioning and predicting	Identifies questions and problems that can be tested or researched and makes predictions based on scientific knowledge	Develops questions or hypotheses to be investigated scientifically	develops and evaluates questions and hypotheses for scientific investigation
Planning investigations	Collaboratively and individually produces a plan to investigate questions and problems	Produces a plan to investigate identified questions, hypotheses or problems, individually and collaboratively	designs and evaluates investigations in order to obtain primary and secondary data and information
Conducting investigations	Follows a sequence of instructions to safely undertake a range of investigation types, collaboratively and individually	Undertakes first-hand investigations to collect valid and reliable data and information, individually and collaboratively	conducts investigations to collect valid and reliable primary and secondary data and information
Processing and analysing data and information	Processes and analyses data from a first-hand investigation and secondary sources to identify trends, patterns and relationships and draw conclusions	Processes, analyses and evaluates data from first-hand investigations and secondary sources to develop evidence-based arguments and conclusions	selects and processes appropriate qualitative and quantitative data and information using a range of appropriate media
			analyses and evaluates primary and secondary data and information
Problem solving	Selects and uses appropriate strategies, understanding and skills to produce creative and plausible solutions to identified problems	Applies scientific understanding and critical thinking skills to suggest possible solutions to identified problems	solves scientific problems using primary and secondary data, critical thinking skills and scientific processes
Communicating	Presents science ideas, findings and information to a given audience using appropriate scientific language, text types and representations	Presents science ideas and evidence for a particular purpose and to a specific audience, using appropriate scientific language, conventions and representations	communicates scientific understanding using suitable language and terminology for a specific audience or purpose

**What does it
mean to work
scientifically?**



Working scientifically in the Living World

HSC examiner feedback 2019

Students need to improve evaluating secondary sources for validity and reliability and applying knowledge to solve problems in unfamiliar scenarios



Working scientifically in the Living World



This feedback links to the following Stage 5 WS Skills:

- SC5-7WS: Processing and analysing data and information
g. critically analysing the validity of information from secondary sources
- SC5-8WS: Problem Solving
f. applying critical thinking in considering suggested proposals, solutions and conclusions, including a consideration of risk

Approaching these skills in the Living World: Lesson plan

Student success criteria

1. Students will be able to critically analyse the validity of claims
2. Students will be able to evaluate the difference between both the Ebola and Covid-19 diseases and explain why there was a different approach to the Ebola *epidemic* and the current Covid-19 *pandemic*



Epidemic



Pandemic

Living world: lesson plan

Conduct an icebreaker activity to encourage student engagement

Conduct a *THINK-PAIR-SHARE* activity by asking students to list all the ways scientists can find out if a fact is true or not.

For extension students, you can ask:
If facts are the truth, why do scientific theories about the world change over time?



Living world: lesson plan

Class activity

1. Provide student with a click-bait style article about a 'cure' that is based on pseudoscience (e.g. pain relief by using crystals). Alongside this provide an example of an accessible scientific journal (Hint: check with your local library to see what journals they have access to)
2. Explain tools, such as the following questions, that students can use to analyse the validity of a secondary source such as:

Where is the article published?

Is the heading making a surprising claim?

What is the original source for the information?

Who conducted the research?

Who, or what, did the scientists study?



Working scientifically in the Living World

Oxford Insight Science links

Oxford Insight Science supports the development of working scientifically skills throughout all chapters. It is important to remember that these skills apply to each of the knowledge and understanding areas.

An example that supports this lesson plan is

- Stage 5 Skills book, Chapter 9 Body systems and responses, Activity 9E – evaluating different approaches to a problem.
- Stage 5 Student book, Chapter 16 (WS7) – Skill Builder: Processing and analysing data and information *On a green chemical dry cleaning article from a newspaper*

The skills that this lesson plan teaches, apply to each area of science. Students will be able to critically think about issues such as:

- SpaceX 2020
- Interaction of non-renewable resources and Climate Change
- The role of pathogens in pandemics
- Vaccines

Working scientifically in the Physical world

HSC examiner feedback 2019

Students need to communicate scientific understanding using suitable language and terminology for a specific audience or purpose

This feedback links to the following Stage 4 and 5 WS Skills:

- SC4-9WS: Presents science ideas, findings and information to a given audience using appropriate scientific language, text types and representations
- SC5-9WS: Presents science ideas and evidence for a particular purpose and to a specific audience, using appropriate scientific language, conventions and representations

Approaching these skills in the Physical World: Lesson plan

Student success criteria

1. Students can outline advantages and disadvantages of using nuclear energy
2. Students can write a persuasive essay to convince the reader to accept their point of view on using the nuclear energy.



Physical world: lesson plan

Conduct an icebreaker activity to encourage student engagement

1. As a class watch a short related video about renewable and non-renewable resources.
2. Use the following as prompts for a class discussion
 - What are renewable and non-renewable sources of energy?
 - Why is it important to use renewable sources of energy?
 - What is nuclear energy? Is it a renewable or non renewable source?
 - What do you think about using nuclear energy?

Physical world: lesson plan

Class activity



1. Students need to find 3 valid sources to investigate what nuclear energy is and then outline the advantages and disadvantages of nuclear energy
2. Students must then write a persuasive essay to convince the government to use or not to use nuclear energy
3. Once the essay is written, this is given to another student for Peer Feedback. The feedback must be constructive.

(Explain to students what constructive feedback is)

Working scientifically in the Physical world

Oxford Insight Science links

An example that supports this lesson plan is

- Workbook chapter 5, energy efficiency (writing activity)
- Workbook chapter 2, Forces (vocabulary)
- Chapter 3 stage 4 textbook, skill builder (communicating)

The skills that this lesson plan teaches apply to each area of knowledge and understanding. Students will be able to communicate to a specific audience about:

- The advantages or disadvantages of using nuclear energy
- The impact of humans on climate change
- The changing R_{eff} number in a pandemic
- Evaluating claims about certain products in the media

Working scientifically in the Chemical World

HSC examiner feedback 2019

Students need to understand the validity and reliability of an investigation



Working scientifically in the Chemical World

This feedback links to the following Stage 5 WS Skills:

- WS5 Students identify data to be collected in an investigation by:
 - c. locating possible sources of data and information, including secondary sources, relevant to the investigation
- WS7.2 Students analyse data and information by:
 - a. checking the reliability of gathered data and information by comparing with observations or information from other sources
 - c. identifying data which supports or discounts a question being investigated or a proposed solution to a problem
 - d. using scientific understanding to identify relationships and draw conclusions based on students' data or secondary sources

Approaching these skills in the Chemical World: lesson plan

Student success criteria

1. Define reliability and validity of an investigation
2. Assess the reliability and validity of secondary sources
3. Assess the reliability and validity of secondary sources
4. Discuss the importance of conducting reliable and valid first hand and secondary investigations

Chemical world: lesson plan

Pose the following question as an icebreaker activity

Can I conclusively say that girls run faster than boys without conducting an unbiased investigation?



Chemical world: lesson plan

Class activity

Ask students to...

- Define reliability, validity and accuracy, and to relate these to secondary investigations
- Then ask them to discuss why this is important for primary and secondary investigations
- Link this back to the original icebreaker question and ask students how they could use this to determine that girls run faster than boys

Working scientifically in the Chemical World

Oxford Insight Science links

An Oxford Insight Science example that supports this lesson plan is

- Stage 4, Skills book, Chapter 16 Elements and compounds – Identifying Secondary sources and evaluating claims using scientific knowledge.
- Stage 5, Skills book, Chapter 13 Inside the atom – Accessing information online

Working scientifically in the Chemical World

How can this be applied to external topics?

- Society is exposed to a lot of misleading and inaccurate information that make scientific claims which can easily be accepted as fact.
- As scientists, it is important to think critically about the information presented. Scientist should evaluate scientific claims and the credibility of the sources.
- When evaluating a claim consider the following:
 - Is the publication a reputable source with strict guidelines and accountability? Some sources publish information that is not checked for accuracy
 - Is the headline consistent with the information presented in the article or is it exaggerated to catch the reader's attention?
 - Do other sources verify if other sources verify the claim?
 - Is there scientific evidence to back up the claim?

A quick tour of the new Student Books



- Check your learning questions aligned to Bloom's taxonomy
- Skill builder questions in every section to scaffold skill development
- Investigations, Challenges and Skills lab provide practical opportunities
- Margin glossary definitions for literacy support
- Worked examples for better application
- **Working Scientifically** chapter targets skill acquisition and development
- **Student Research Project** chapter supports students to complete this assessment

A quick tour of the new Student Skills books



- **Working Scientifically** chapter introduces each of the six skills and provides opportunities for practice (one activity per skill, per chapter)
- **Literacy builders** open each chapter (practice speaking, vocab, writing, comprehension etc.)
- **Skills labs** conclude the chapters with a practical activity that requires students to engage with aim, method, materials etc.
- Consolidation of science understanding and knowledge in each activity.

Digital resources and purchasing options



obook

obook is a fully interactive digital version of every student book with note-taking, highlighting and dictionary support included. Every obook contains links to additional resources, such as videos, interactive modules and worksheets.



assess

assess is an online assessment platform that provides access to tens of thousands of additional auto-correcting questions designed to support student understanding and progression across all subjects.



Teacher support

Additional teacher notes, answers, tests, and assessments and differentiated learning advice is all included for teachers. Teacher obook assess also allows teachers to assign work electronically, track progress, and manage results and assessment.

Oxford Insight Science for NSW is supported by a range of additional digital resources, including:

- obook
- assess
- **Teacher support.**

Digital resources and purchasing options

obook is visually integrated with the printed Student book, enabling students to move seamlessly between print and digital products. It provides a range of additional teacher and student resources including:

- Teacher notes
- Answers
- Practical worksheets (for each Investigation, Challenge or Skills lab)
- Lab tech notes and risk assessments
- Mock data and answers for each practical activity
- Video tutorials
- Revision notes for students
- Quizlet quizzes
- Markbook
- Differentiated worksheets to ensure every student is supported.

These are all designed to help you feel confident that your students will be prepared for their internal and external assessment.

2.2 An unbalanced force causes change

Key ideas

In this topic, you will learn that:

- when forces acting on an object are balanced, the object's motion does not change
- forces acting on an object are unbalanced when there is a change to the speed, direction of motion, or shape of an object.

Forces always come in pairs. Forces are balanced when they are pushing or pulling equally in opposite directions. If one of the push or pull forces is larger than the other, the object will change its speed, direction of motion or shape. When this happens, the forces are said to be **unbalanced**.

Balanced forces

Pushing on a brick wall does not usually cause the brick wall to move. This does not mean your force did not exist. There are many forces around us, but most of them do not cause any change in motion. This is because the forces are balanced. It means they are equal in size but opposite in direction. If the forces of the two people in Figure 1 balance each other, the people stay still. This is because they are pushing or pulling with equal and opposite forces. **Balanced forces** are very important. Two tug-of-war teams will be balanced if they pull with the same amount of force but in opposite directions.

balanced forces
two forces equal in size and opposite in direction

unbalanced forces
two or more forces that are unequal in size and direction and therefore change an object's speed, direction or shape

CHALLENGE

2.2 Design a ball whacker
Go to page 16

If a ball is resting on the ground, then all the forces acting on it are balanced. If two people are pushing equally on a stationary object in opposite directions, then the forces are balanced and the object does not move. If one person starts pushing harder, then the object will start to move. There is a change in motion because the forces are unbalanced.

Consider a soccer ball rolling towards the goal. If the goalkeeper kicks it away, then the ball will change direction because the goalkeeper's kick unbalanced the forces.

Playdough sitting on the bench will not change unless you add a push force with your finger. The evidence for this unbalanced force



Worksheet
Predicting the effect of forces

contact forces
forces that occur when two

Evidence of an unbalanced

book assess Library Classes Help

Insight Science for NSW Stage 4 SAMPLE

BOOK RESOURCES MARKBOOK

Go to page...

Chapter 2 Forces

2.1 A force is a push or a pull

[2.2 An unbalanced force causes change](#)

2.3 Forces can be added together

2.4 Friction slows down moving objects

2.5 Seatbelts and safety helmets save lives

Chapter 2 Review

Skills lab 2.1

Challenge 2.2

Investigation 2.4

Other resources



2.2 An unbalanced force causes change



2.2 An unbalanced force causes change



2.2 An unbalanced force causes change



Challenge 2.2 Design a ball whacker



Chapter 2 Forces

2.2 An unbalanced force causes change

Pages 4–5

Get started

Teacher support includes:

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- answers to **EVERY** question and activity in the Student book
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- **editable class tests** (with suggested answers)

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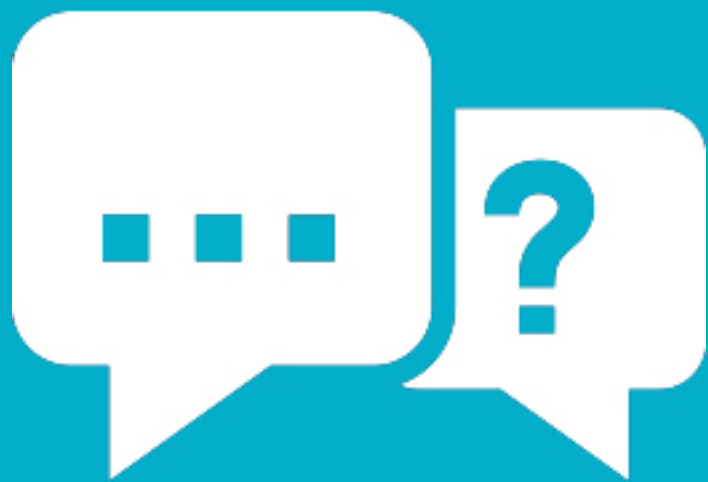
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Q & A



What's next?



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Thank you for attending

