



STATE LIBRARY⁷
QUEENSLAND

Year 9

Physical Sciences

Student research guide

Cover: [People participating in archery.](#), c. 1946–1976, [W. A. Jones & Co photographs](#), State Library of Queensland,
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Copyright information for teachers

This research guide is designed for individual use by students.

Please note, due to licensing arrangements, State Library of Queensland's subscription databases and ebooks are for private research and study purposes only. They may not be used as teaching resources in classroom environments in schools or other educational institutions and students must not be required to access specific databases or ebooks as part of the curriculum.

Teachers can advise students on State Library's resources and encourage their use to help with their studies and research. Students are encouraged to access State Library's resources at school, but not during class time.

Teachers are most welcome to advise students what is available via State Library, and to encourage students to make use of ebooks and databases to help with their studies. It is permissible for a teacher to demonstrate the use of State Library's catalogue, and to point out how various online material can be accessed.

It is also permissible for students to access State Library's online resources at school – but this must not be during class time. An example of permitted use might be where students have a spare period when they work on assignments or homework, and they are accessing databases as private members of State Library. Information about joining State Library is [here](#).

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For more information about the use of copyright materials visit [Understanding copyright](#).

Overview

As Queensland's leading research library, State Library is a great place to find information to complete your research-based assessments.

State Library's One Search catalogue is the gateway to an extensive suite of national and international journals, databases, ebooks, encyclopedias, newspaper archives, and collections of thousands of historical images, letters, artworks, diaries, and artefacts to interrogate as sources.

Before you get started

- [Become a member](#) of State Library of Queensland (it's free!).
- Once you have joined State Library, log in to your account in [One Search](#) so you can use the links in this research guide to access the featured collection items.
- Complete the [Student research with State Library](#) module for a guide to navigating State Library's resources. Or visit the [One Search help page](#) for tips & tricks for searching One Search.
- You can search our [OneSearch catalogue](#) or begin exploring by clicking on some of the featured items contained in this research guide.

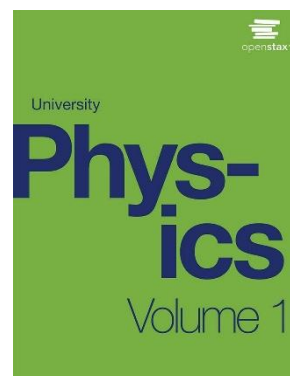
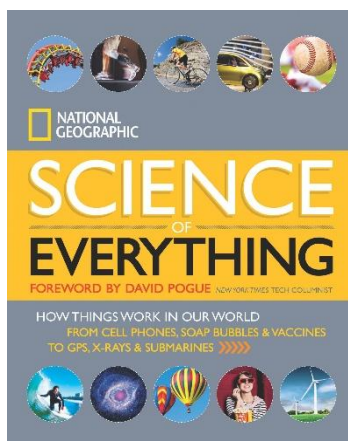
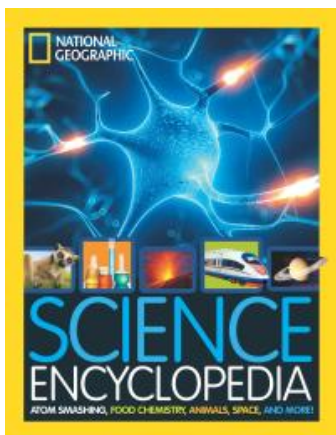
Student research with State Library

Feel more confident navigating State Library's resources to find high quality information sources for your assessments.

[Start module](#) 



Featured ebooks



This is an advanced reading resource

[Queensland Museum](#) provide Learning Resources website students with many activities, fact sheets, images, and videos.

A screenshot of the Queensland Museum Learning Resources website. The header includes the 'QUEENSLAND MUSEUM' logo and 'Learning Resources' text. Navigation links for 'Home', 'About', and 'Save list' are visible. The main section is titled 'Explore our resources' and includes a search bar and several filter dropdowns: '10 - 12', 'Physics', 'All types', and 'All museums'. A 'Clear filter' link is also present. Below the filters, a paragraph describes the website's purpose: 'Queensland Museum's Learning Resources website provides teachers and educators with practical, high-quality, and engaging resources to use in the classroom. While targeted at educators, there are many activities, fact sheets, images, videos, and loans kits relevant to parents, carers and many other members of the community.' At the bottom, it says 'Showing 6 of 6 resources' and displays three thumbnail images of museum exhibits.

Conservation of Energy

Apply the law of conservation of energy to analyse system efficiency in terms of energy inputs, outputs, transfers and transformations.

- Explaining that the law of conservation of energy explains that total energy is maintained in energy transfer and transformation in a system.
- Explaining efficiency and recognising that in energy transfer and transformation a variety of processes can occur, so that the amount of usable energy is reduced and the system is not 100% efficient.
- Using and critiquing representations such as Sankey diagrams to show energy inputs, changes and outputs in a system.
- Investigating the efficiency of ground ovens used by First Nations Australians.
- Comparing the efficiency of electricity generation from coal and other sources such as nuclear, hydroelectricity, gas, solar and wind.
- Examining the meaning of energy star ratings given to appliances such as refrigerators and washing machines and criteria used to determine these ratings.
- Examining how improving efficiency in energy transfer and transformations in sporting activities such as pole vaulting or archery improves athletic performance.

Featured databases

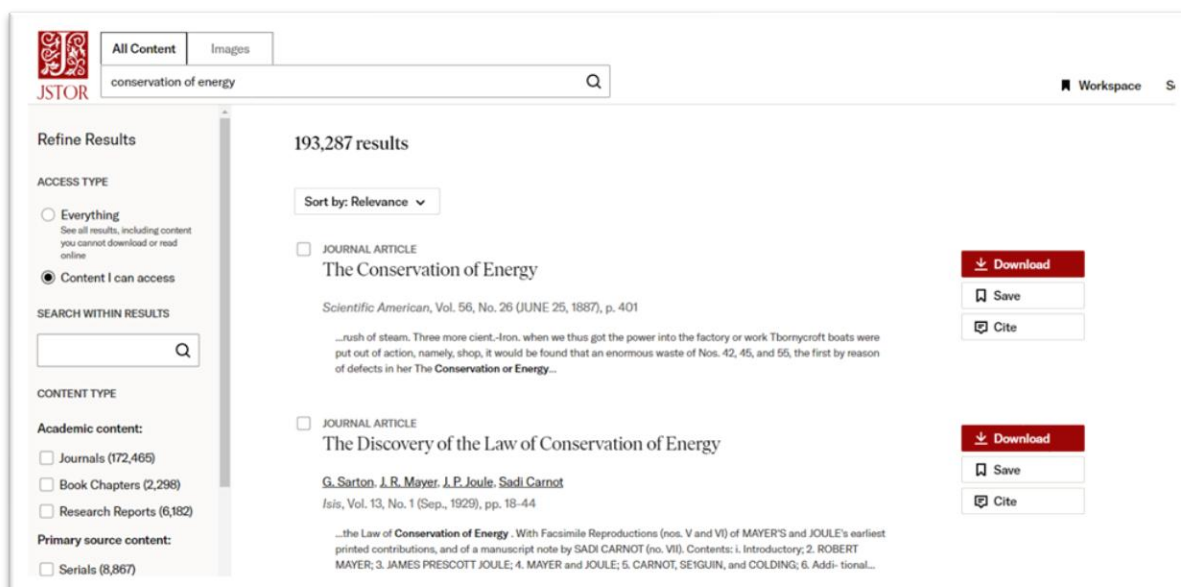
[Oxford Reference](#) spans 25 different subject areas, bringing together 2 million digitised entries across Oxford University Press's dictionaries, companions, and encyclopedias.

The screenshot shows the Oxford Reference website interface. At the top, the 'Oxford Reference' logo is on the left, and a search bar is on the right. Below the logo, there are tabs for 'Subject' and 'Reference Type'. The main heading is 'Oxford Reference Search Results'. On the left, a sidebar shows the user is signed in as 'State Library of Queensland' and offers options to narrow choices and refine terms. The main content area displays 'You are looking at 1-20 of 990 entries for: conservation of energy'. It includes a 'Did you mean' suggestion for 'conservation of mechanical energy, conservation of energy law' and a 'clear all' link. Below this, there are filters for '990 ENTRIES' and '6 BOOKS', and a 'View' section with options for 'Items per page' (20) and 'Sort by' (Relevance). The 'OVERVIEW' section for 'conservation of energy' shows the subject as 'Science and technology, Psychology' and provides a brief definition: 'When all the forces acting on a system are conservative forces, $E_k + E_p = \text{constant}$, where E_k ...'.

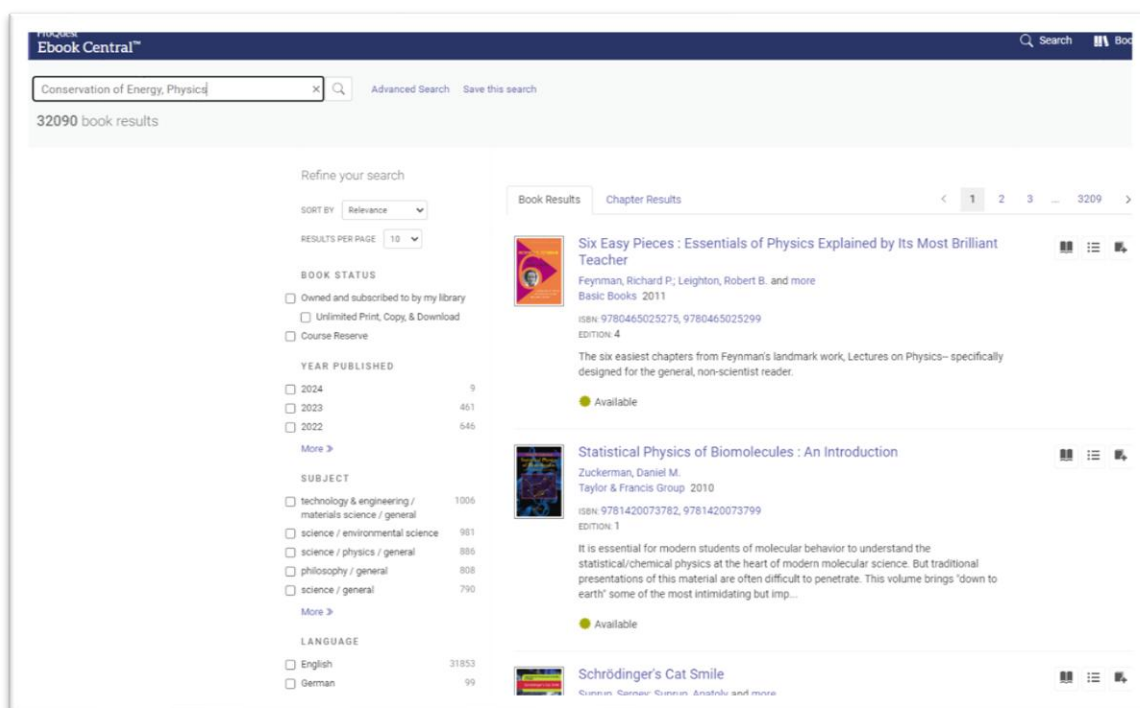
The [Britannica Library](#) has articles, images and more, with a selection of resources especially for teenagers.

The screenshot shows the Britannica Library website interface. At the top, the 'Britannica Library' logo is on the left, and a search bar is on the right. Below the logo, there are tabs for 'Teens', 'Your Britannica Resources', 'Research Tools and Materials', 'Help', and 'My Britannica'. The main heading is 'You searched for "law of conservation of energy"'. Below this, it says 'DISPLAYING 1 - 10 OF 3,825 RESULTS'. There are filters for 'Reading Level' (1, 2, 3) and an 'Advanced Search' link. The main content area shows a list of results, with the first result being 'conservation of energy (physics)'. It includes a brief definition: 'energy, conservation of | All of the changes that happen in the universe depend on energy. To cause a change to occur, energy may change form. For example, ...'. Below this, there is another result for 'energy (physics)' with a brief definition: 'energy | A rock falling off a cliff is different from the same rock lying on the ground below. A rubber band pulled taut is different from the same rubber ...'. At the bottom, there is a section for 'images related to this search' with a 'See all images' link.

[JSTOR](#) provides access to more than 12 million scholarly journal articles and ebooks, and is especially good for primary sources.



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Waves and Particles

Use wave and particle models to describe energy transfer through different mediums and examine the usefulness of each model for explaining phenomena.

- Describing the processes underlying convection and conduction of heat in terms of the particle model.
- Modelling the transfer of sound energy as waves using slinky springs and relating to the medium through which the sound is transferred.
- Examining how the particle model of electricity explains static electricity and electrical current and relating this to voltage, conductors and insulators.
- Discussing the wave and particle models of energy transfer, including the concept of photons, and how they are useful for understanding aspects of light and other forms of electromagnetic radiation.
- Investigating aspects of heat transfer and conservation in the design of First Nations Australians' bedding and clothing in the various climatic regions of Australia.
- Investigating the impact of material selection on the transfer of sound energy in First Nations Australians' traditional musical, hunting and communication instruments.
- Examining the forms of electromagnetic radiation that are used in different modern communication technologies and identifying any limitations.

[Oxford Reference](#) spans 25 different subject areas, bringing together 2 million digitised entries across Oxford University Press's dictionaries, companions, and encyclopedias.

The screenshot shows the Oxford Reference website interface. At the top, the 'Oxford Reference' logo is on the left, and a search bar is on the right. Below the logo, there are tabs for 'Subject' and 'Reference Type'. The main heading is 'Oxford Reference Search Results'. On the left sidebar, it shows the user is signed in as 'State Library of Queensland' and provides options to narrow choices and refine terms. The search results section indicates 'You are looking at 1-20 of 304 entries for: All: wave, particle, physics'. It shows 304 entries and 1 book. The results are sorted by 'Relevance' with 20 items per page. The first result is for the term 'string', with a reference type of 'Overview Page' and a subject of 'Science and technology, Physics'. The description states: 'A one-dimensional object used in theories of elementary particles and in cosmology (cosmic string). String theory replaces the idea of a pointlike elementary particle (used in quantum field theory) ...'.

The [Britannica Library](#) has articles, images and more, with a selection of resources especially for teenagers.

The screenshot shows the Britannica Library website interface. At the top, the 'Physics' header is displayed, followed by 'DISPLAYING 1 - 10 OF 1,239 RESULTS.' Below this, there are tabs for 'Reading Level' (1, 2, 3) and 'Advanced Search'. The main content area shows search results for 'light (physics)', indicating 'TOP 3 RESULTS, 5 MORE RESULTS IN LIGHT.' The results include articles such as 'Light— Wave or Particle?', 'Light: Wave and Particle', and 'Transverse Waves Explain Polarization'. A section titled 'physics (science)' provides a brief overview of physics. At the bottom, there is a section 'images related to this search:' featuring four images: a cosmic scene, a diagram of a blackbody, a diagram of a wave, and a diagram of a string. A 'See all images' link is provided.

[National Geographic Virtual Library](#) is a powerful tool for research offering access to over 100+ years of magazines and hundreds of books, maps, videos, and images.

The screenshot shows the National Geographic Virtual Library interface. At the top is the National Geographic logo and a search bar containing 'particle, Physics'. Below the search bar, it says 'SHOWING RESULTS FOR' and lists content types: 'All Content Types' (selected), 'Featured Articles (2)', 'Books (4)', and 'Brief Articles (2)'. Under 'ALL CONTENT TYPES', it shows 'Search Terms: Keyword: particle, Physics' and a 'Revise Search' link. The 'FEATURED ARTICLES (2)' section displays two articles:

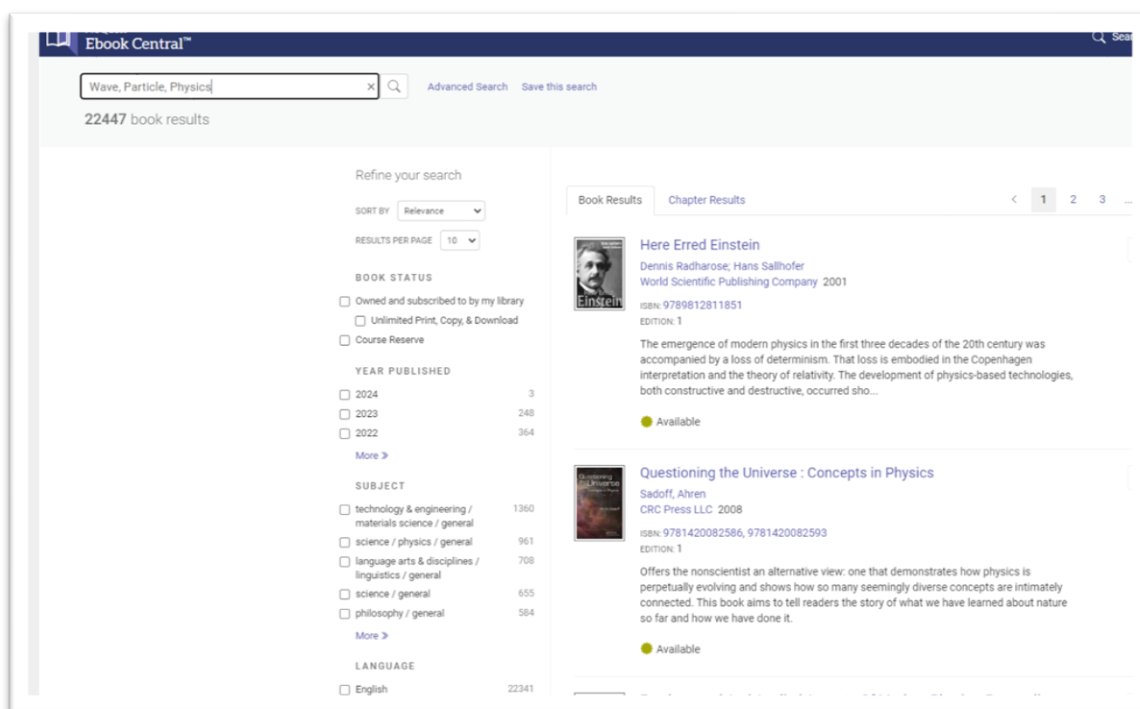
- At the Heart of All Matter: The God Particle**
 Authors: Joel Achenbach and Peter Ginter
 Publication: National Geographic Magazine
 Mar. 2008 Volume 213, Issue 3 p. 90 Article
 Found in National Geographic Archive 1995+
- Worlds Within the Atom**
 Authors: Davis Meltzer, David Jeffery, Kevin Fleming, John Boslough, and Barron Storey
 Publication: National Geographic Magazine
 May 1985 Volume 167, Issue 5 p. 634 Article
 Found in National Geographic Archive 1888-1994

[JSTOR](#) provides access to more than 12 million scholarly journal articles and ebooks, and is especially good for primary sources.

The screenshot shows the JSTOR search results page. On the left is a 'Refine Results' sidebar with options for 'ACCESS TYPE' (Everything, Content I can access), 'SEARCH WITHIN RESULTS', and 'CONTENT TYPE' (Academic content: Journals, Book Chapters, Research Reports; Primary source content: Serials, Documents). The main results area shows '18,129 results' and a 'Sort by: Relevance' dropdown. Two results are displayed, both titled 'Waves and Particles' by George P. Thomson:

- Waves and Particles**
 George P. Thomson
 Science, New Series, Vol. 70, No. 1823 (Dec. 6, 1929), pp. 541-546
 ...Waves and Particles : PROFESSOR GEORGE P. THOMSON 541 Scientific Apparatus and Laboratory Methods: "Vitality" Stains: ROBERTS RUGH. An Ichthy- The American Association for the Advancement of ometec: WARREN P. SPENCER: 556 T-e American A--sociation for the Adva--nceme--nt of "ometer: WARREN P. SPENCER...
- Waves and Particles**
 George P. Thomson
 Scientific American, Vol. 143, No. 1 (July 1930), pp. 38-41
 ...C A M E R I C A N July 1930 Waves and Particles stresses in the ether." Now the ether has had a long and checkered history. "Ethers of a sort were common in early By Professor George P. Thomson t physica--rather too common. But the ether first acquired an assured...

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