Suggested teaching program

**Chapter 8: Gravity**

Time allocation: 2 weeks

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| **Context and overview** |
| In year 7, students develop their understanding of how systems are shaped interactions due to forces, and develop the ability to quantify changes and relative amounts. Students make accurate measurements and control variables to analyse relationships between system components and explore and explain these relationships through increasingly complex representations. |
| **Syllabus outcomes addressed** |
| • Change to an object’s motion is caused by unbalanced forces, including Earth’s gravitational attraction, acting on the object ACSSU117  • Scientific knowledge has changed peoples’ understanding of the world and is refined as new evidence becomes available ACSHE119  • Science knowledge can develop through collaboration across the disciplines of science and the contributions of people from a range of cultures ACSHE223  • People use science understanding and skills in their occupations and these have influenced the development of practices in areas of human activity ACSHE121  • Identify questions and problems that can be investigated scientifically and make predictions based on scientific knowledge ACSIS124  • Construct and use a range of representations, including graphs, keys and models to represent and analyse patterns or relationships in data using digital technologies as appropriate ACSIS129  • Summarise data, from students’ own investigations and secondary sources, and use scientific understanding to identify relationships and draw conclusions based on evidence ACSIS130  • Communicate ideas, findings and evidence based solutions to problems using scientific language, and representations, using digital technologies as appropriate ACSIS133 |
| **Achievement standards** |
| Students represent and predict the effects of unbalanced forces, including Earth’s gravity, on motion. They explain how the relative positions of the Earth, sun and moon affect phenomena on Earth. Students identify questions that can be investigated scientifically. They plan fair experimental methods, identifying variables to be changed and measured. They select equipment that improves fairness and accuracy and describe how they considered safety. Students draw on evidence to support their conclusions. They summarise data from different sources, describe trends and refer to the quality of their data when suggesting improvements to their methods. They communicate their ideas, methods and findings using scientific language and appropriate representations. |

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| **Student book section** | **WA Syllabus links** | **Suggested indicators of learning and understanding** | **Suggested teaching and learning activities** | **Resources** |
| **8.1 Earth’s gravity pulls objects to the centre of the Earth**  **(pages 144–145)** | *Science Understanding*  ACSSU117  *Science Inquiry Skills*  ACSIS129  ACSIS130  ACSIS133 | By the end of this unit, students should be able to:  • define gravity, gravitational field, weight and mass  • describe the difference between weight and mass  • calculate weight given the mass of on object and the gravitational force  • explain why the weight of an object does not affect its acceleration during a fall. | **Skills Lab 8.1**  *Calculate weights in the solar system*  Students use the formula W = mg to calculate the difference weights of the same person in different locations in the solar system.  **Free falling**  Punch a small hole in the side of a foam cup, near the bottom. Cover the hole and fill with water. Students can predict what will happen to the water when the hole is uncovered. Repeat but drop the cup at the same time. Gravity acts on the cup and water when they are fall and so the water stays in the cup during the fall.  **Felix Baumgartner’s jump**  Student could investigate Felix Baumgartner’s jump from 39 km above the Earth. They could discuss the effects of gravity and air resistance through the fall. | **Oxford Science 7 WA resources**  • Check your learning, page 145  • Skills Lab 8.1, page 210 |

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| **8.2 Gravity keeps planets in orbit around the Sun**  **(pages 146–147)** | *Science Understanding*  ACSSU117  *Science as a Human Endeavour*  ACSHE119  *Science Inquiry Skills*  ACSIS133 | By the end of this unit, students should be able to:  • define star, astronomer and orbit  • describe the evidence that supports the idea that the earth orbits the Sun and not other way around  • explain the interaction of forces that results in an orbit. | **Challenge 8.2**  *Modelling gravity in the solar system*  Students compare the motion of a marble across a plastic sheet before and after a mass (source of gravitational force) is added to the centre.  **Man-made satellites orbit Earth**  Students can investigate how satellites orbit Earth and how their purposes depend on the type of orbit they have. The NASA website is a good place to start. | **Oxford Science 7 WA resources**  • Check your learning, page 147  • Challenge 8.2, page 211 |
| **Additional resources**  This NASA website explains different types of orbits used for satellites around Earth.  <http://spaceplace.nasa.gov/geo-orbits/en/> |
| **8.3 The Moon’s gravity causes tidal movements**  **(pages 148–149)** | *Science Understanding*  ACSSU117  *Science as a Human Endeavour*  ACSHE121  *Science Inquiry Skills*  ACSIS133 | By the end of this unit, students should be able to:  • define high tide, low tide, spring tide and neap tide  • describe how the positions of the moon and Sun affect the size of the tide on Earth  • explain how gravity controls the tides. | **Comparing tides**  Students can investigate the influence of the moon, Sun and the Earth’s own rotation on the size of the tides with the animation found at the University of Nebraska–Lincoln website.  **Horizontal Falls**  Students can investigate the Horizontal Falls near Broome, WA and relate this phenomenon to the tides. | **Oxford Science 7 WA resources**  • Check your learning, page 149 |
| **Additional resources**  The University of Nebraska–Lincoln website has a great tidal animation:  <http://astro.unl.edu/classaction/animations/lunarcycles/tidesim.html> |

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| **8.4 Scientists work collaboratively to explore microgravity**  **(pages 150–151)** | *Science Understanding*  ACSSU117  *Science as a Human Endeavour*  ACSHE223  ACSHE121  *Science Inquiry Skills*  ACSIS124  ACSIS133 | By the end of this unit, students should be able to:  • define microgravity  • describe the purpose of the ISS  • provide examples of the effects of microgravity on the human body. | **The ISS in real time**  Students can track the path of the ISS in real time and see its view of Earth using the N2YO website.  **Experiments in microgravity**  Students can watch a number of experiments conducted on the ISS in microgravity. | **Oxford Science 7 WA resources**  • Extend your understanding, page 151 |
| **Additional resources**  N2YO.com has a live feed from the ISS  <http://www.n2yo.com/space-station/> |
| **8 Review**  **(pages 152–154)** | *Science Understanding*  ACSSU117  *Science as a Human Endeavour*  ACSHE223  ACSHE121  *Science Inquiry Skills*  ACSIS124  ACSIS133 | By the end of this unit, students should be able to:  • define all Key Words listed on page 154  • explain that gravity is a non–contact force that pulls objects towards the centre of the Earth  • identify areas of personal strengths and weaknesses in their knowledge and understanding of the topic. | **Revision activities**  • Students could play celebrity heads with the Key Words list.  • Students can make dominoes with Key Words on one end and definitions/diagrams/examples on the other end.  • Students can create mind maps, Venn diagrams or other graphic organisers to summarise the key concepts of this chapter.  • Peer teaching: students can work in groups to reteach the content of the unit to the class for the purpose of revision. Each group could be allocated a double-page spread to summarise. | **Oxford Science 7 WA resources**  • Review questions, pages 152–153  • Research topics, page 153  • Key Words list, page 154 |