VERSION 1 CAPS

GRADE 12
PHYSICAL SCIENCES

WRITTEN BY VOLUNTEERS

EVERYTHING SCIENCE BY

SIYAVULA
TECHNOLOGY-POWERED LEARNING

basic education
Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

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GRADE 12 PHYSICAL SCIENCES

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When we look outside at everything in nature, look around us at everything manufactured or look up at everything in space we cannot but be struck by the incredible diversity and complexity of life; so many things, that look so different, operating in such unique ways. The physical universe really contains incredible complexity.

Yet, what is even more remarkable than this seeming complexity is the fact that things in the physical universe are knowable. We can investigate them, analyse them and understand them. It is this ability to understand the physical universe that allows us to transform elements and make technological progress possible.

If we look back at some of the things that developed over the last century ñ space travel, advances in medicine, wireless communication (from television to mobile phones) and materials a thousand times stronger than steel we see they are not the consequence of magic or some inexplicable phenomena. They were all developed through the study and systematic application of the physical sciences. So as we look forward at the 21st century and some of the problems of poverty, disease and pollution that face us, it is partly to the physical sciences we need to turn.

For however great these challenges seem, we know that the physical universe is knowable and that the dedicated study thereof can lead to the most remarkable advances. There can hardly be a more exciting challenge than laying bare the seeming complexity of the physical universe and working with the incredible diversity therein to develop products and services that add real quality to peopleís lives.

Physical sciences is far more wonderful, exciting and beautiful than magic! It is everywhere.

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The merger between Metropolitan and Momentum was lauded for the complementary fit between two companies. This complementary fit is also evident in the focus areas of CSI programmes where Metropolitan and Momentum together cover and support the most important sectors and where the greatest need is in terms of social participation.

HIV/AIDS is becoming a manageable disease in many developed countries but in a country such as ours, it remains a disease where people are still dying of this scourge unnecessarily. Metropolitan continues to make a difference in making sure that HIV AIDS moves away from being a death sentence to a manageable disease. Metropolitan's other focus area is education which remains the key to economic prosperity for our country.

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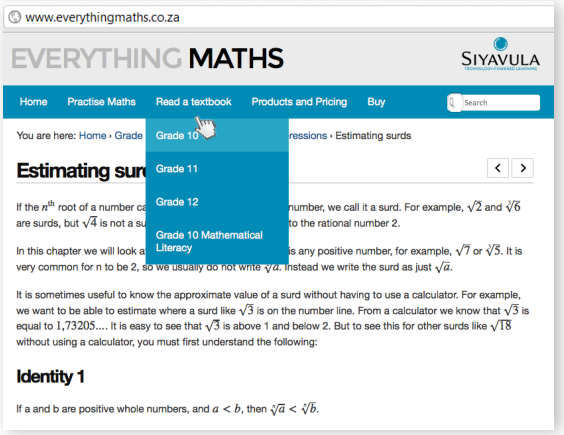

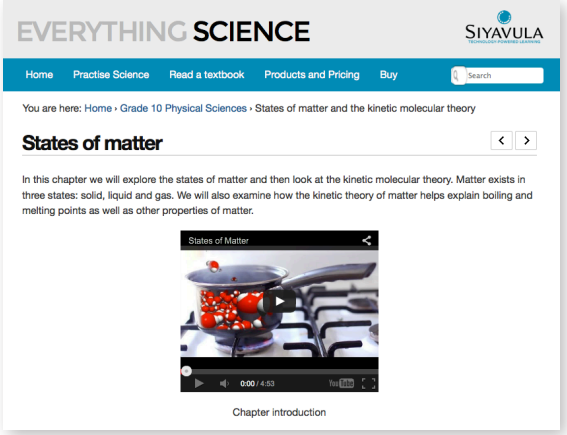

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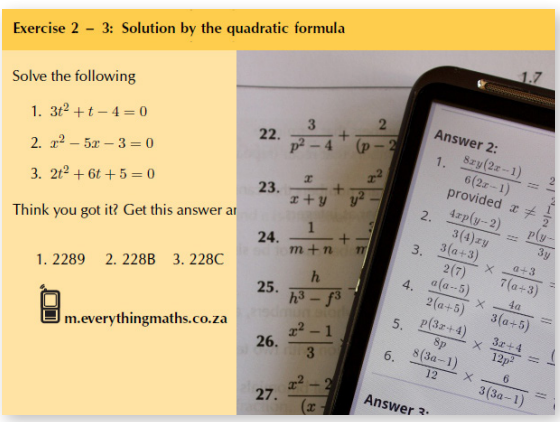

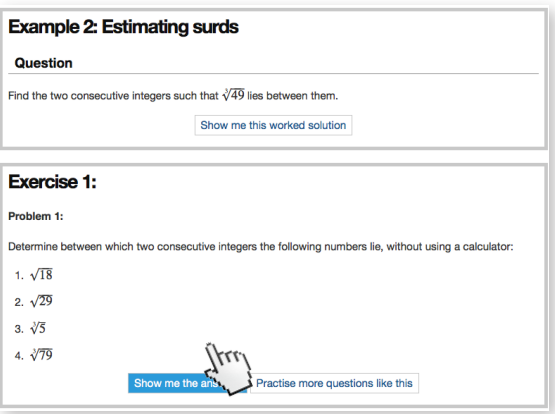

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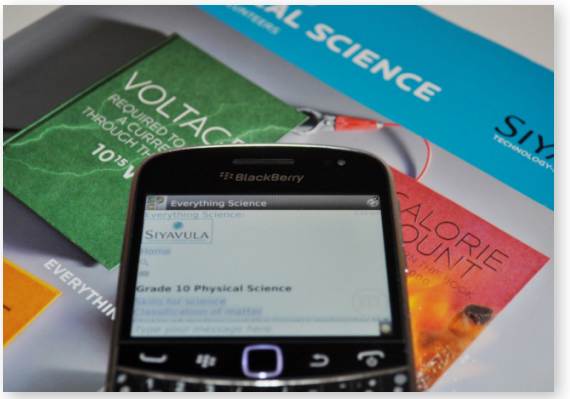

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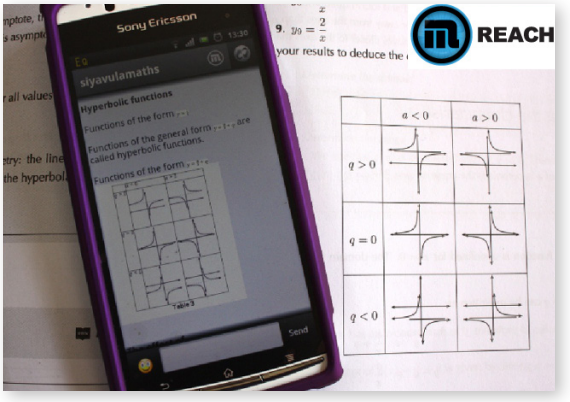

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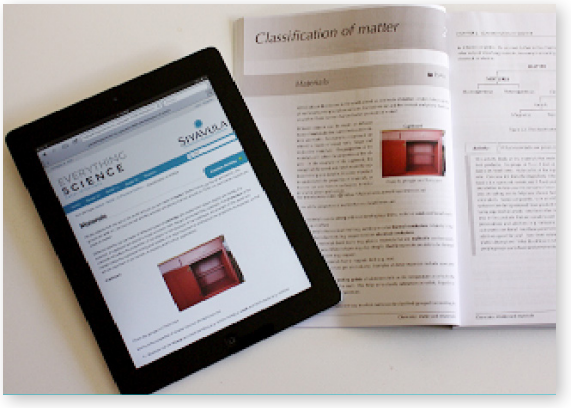

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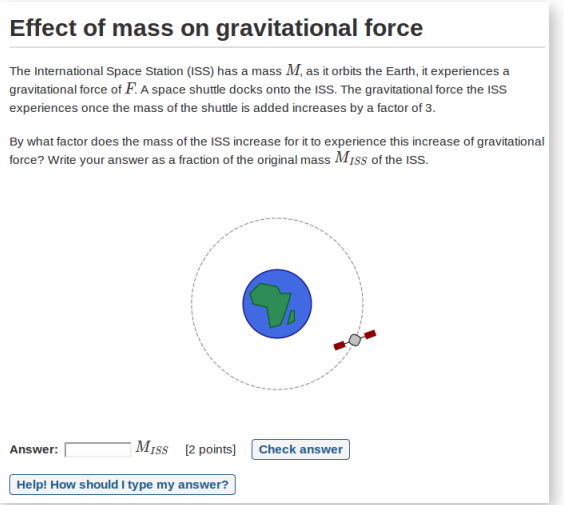

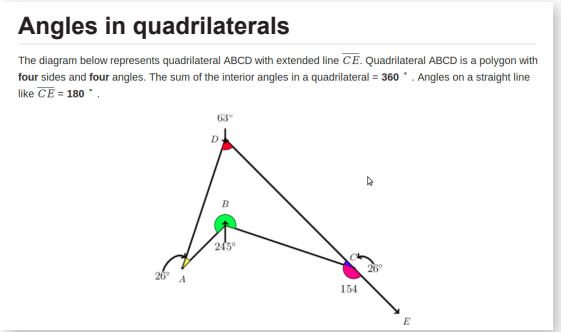

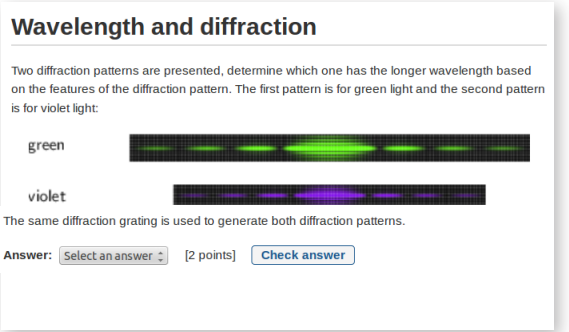

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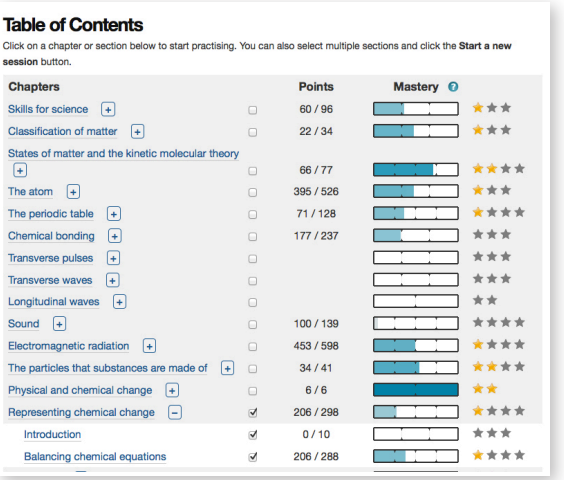

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CHAPTER 1

Skills for science

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1 Skills for science

This book deals with the physical sciences - physics and chemistry. All the sciences are based in the use of experiment and testing to understand the world around us better. The scientific method requires us to constantly re-examine our understanding, by testing new evidence with our current theories and making changes to those theories if the evidence does not meet the test. The scientific method therefore is the powerful tool you will use throughout the physical sciences.

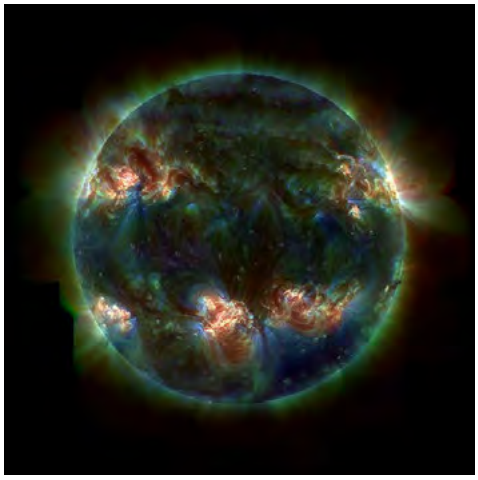

Figure 1.1: An ultraviolet image of the Sun.

In this chapter you will learn how to gather evidence using the scientific method.

These skills will then be used throughout this textbook to test scientific theories and practices.

1.1 The development of a scientific theory ESCHQ

The most important, and most exciting, thing about science and scientific theories is that they are not fixed. Hypotheses are formed and carefully tested, leading to scientific theories that explain those observations and predict results. **The results are not made to fit the hypotheses**. If new information comes to light with the use of better equipment, or the results of other experiments, this new information is used to improve and expand current theories. If a theory is found to have been incorrect it is changed to fit this new information. The data should never be made to fit the theory, if the data does not fit the theory then the theory is reworked or discarded. Although this changing of opinion is often taken for inconsistency, it is this very willingness to adapt that makes science useful, and allows new discoveries to be made.

Remember that the term theory has a different meaning in science. A **scientific theory** is not like your theory of about why you can only ever find one sock. A scientific theory is one that has been tested and proven through repeated experiment and data. Scientists are constantly testing the data available, as well as commonly held beliefs, and it is this constant testing that allows progress, and improved theories.

Gravity ESCHR

The theory of gravity has been slowly developing since the beginning of the 16th century. Galileo Galilei is credited with some of the earliest work. At the time it was widely believed that heavier objects accelerated faster toward the earth than light objects did. Galileo had a hypothesis that this was not true, and performed experiments to prove this.

Galileo's work allowed Sir Isaac Newton to hypothesise not only a theory of gravity on earth, but that gravity is what held the planets in their orbits. Newton's theory was used by John Couch Adams and Urbain Le Verrier to predict the planet Neptune in the solar system and this prediction was proved experimentally when Neptune was discovered by Johann Gottfried Galle.

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