



Free-Standing Mathematics Qualification
Advanced Level
June 2013

Working with Algebraic and Graphical Techniques **6991/2PM**

Unit 11

Preliminary Material

Data Sheet

To be opened and issued to candidates between
Monday 6 May 2013 and Monday 13 May 2013

REMINDER TO CANDIDATES

YOU MUST **NOT** BRING THIS DATA SHEET
WITH YOU WHEN YOU SIT THE EXAMINATION.
A CLEAN COPY WILL BE MADE AVAILABLE.

Bridges

The vertical cross-section of a road as it goes over a small bridge can be modelled as a parabola.



Savings accounts

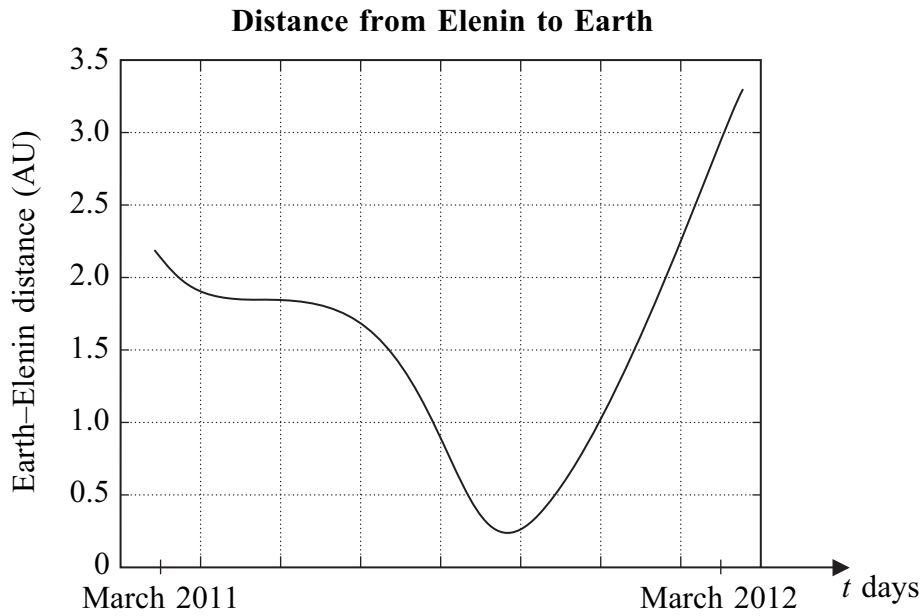
The Annual Equivalent Rate (AER) is used to compare the interest paid by different savings accounts. The AER is the percentage by which a sum of money invested in an account increases in one year.

Comet

The graph shows the distance of the comet Elenin from Earth between March 2011 and March 2012.

The distance is measured in Astronomical Units (AU).

1 AU is approximately 150 million kilometres, and is the mean distance between the Earth and the Sun.



Decibels

The decibel (dB) is used to measure sound level, but it is also widely used in electronics, signals and communication. The dB is a logarithmic unit used to describe a ratio.

For instance, suppose that a loudspeaker is playing a sound with power P_1 . A second loudspeaker is playing the same sound more loudly with power P_2 .

The **difference** in decibels, D , between the sound powers of the two loudspeakers is defined to be

$$D = 10 \log_{10} \left(\frac{P_2}{P_1} \right)$$

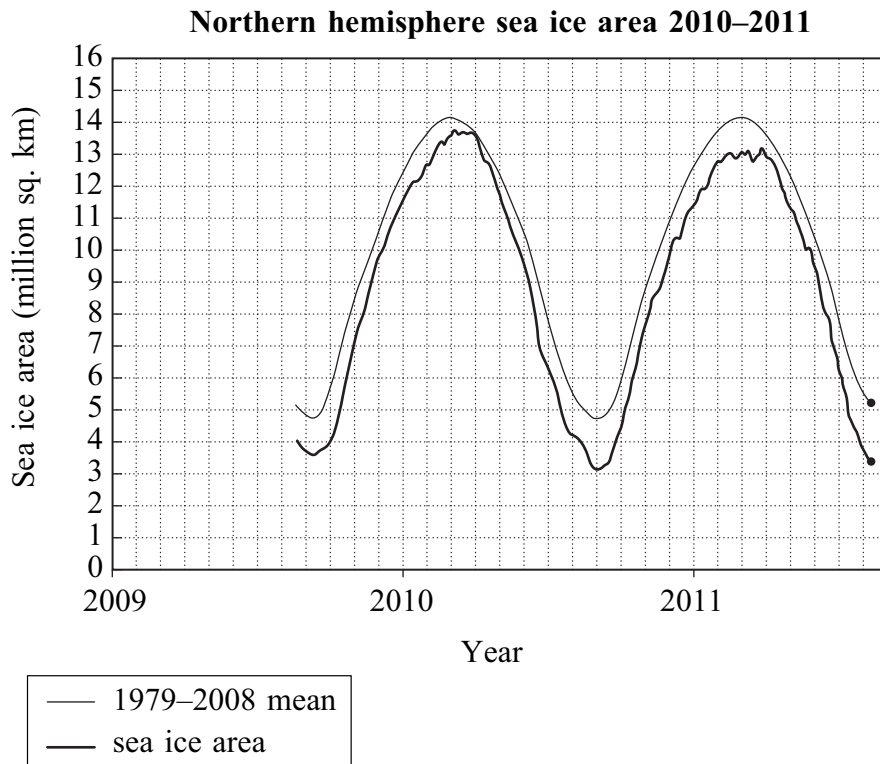
This definition holds for any 'power quantity' such as sound power or electrical power.

Turn over ►

Sea Ice

Scientists are investigating the reduction in sea ice over recent years, and the possible connection between this reduction and climate change.

The graph shows the area of sea ice in the northern hemisphere for 2010 and 2011. For comparison purposes, the mean area of sea ice for the years 1979 to 2008, as it varies over the course of a year, is also shown.



END OF DATA SHEET

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Bridges: © Thinkstock

Decibels: <http://www.animations.physics.unsw.edu.au/jw/dB.htm>

Sea ice: Cryosphere science at University of Illinois at Urbana-Champaign

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