



General Certificate of Education
Advanced Subsidiary Examination
June 2014

Use of Mathematics (Pilot) USE1/PM

Algebra

Preliminary Material

Data Sheet

To be opened and issued to candidates between
Monday 28 April 2014 and Monday 12 May 2014

REMINDER TO CANDIDATES

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

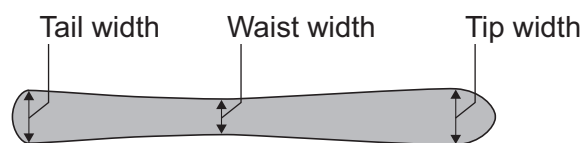
Shaped skis

Traditionally, skis were made with straight edges. Then in the 1990s, the ski manufacturer Elan made the first mass-market skis with curved edges. These were known as shaped skis or *parabolic skis* because the sidecut (the shape of a long edge when viewed from above) was parabolic in shape.

Shaped skis make it much easier to turn when skiing, and now account for the majority of skis sold. However, the parabolic shape is less common now because other shapes, such as circular arcs, have come into use.

The 'statistics' of a ski are the width in millimetres of the widest part at the front (the 'tip width'), the narrowest part in the middle (the 'waist width'), and the widest part at the back (the 'tail width'). The tip width is typically more than the tail width.

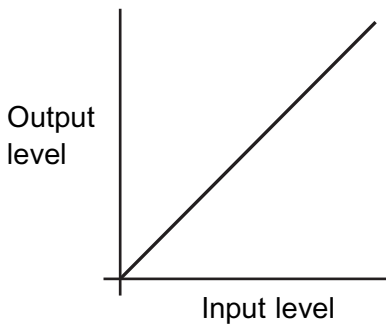
So a ski with statistics 140, 90, 120 would have a tip width of 140 mm, a waist width of 90 mm and a tail width of 120 mm.



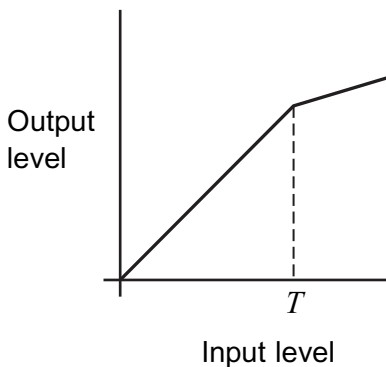
Audio compression

Compression is used to even out dynamic variation in music: that is, to reduce the difference in volume between the loudest and quietest parts of a piece of music. Most recordings of popular music have been compressed, some quite heavily, unlike classical music which typically has a greater dynamic contrast between loud and quiet sections.

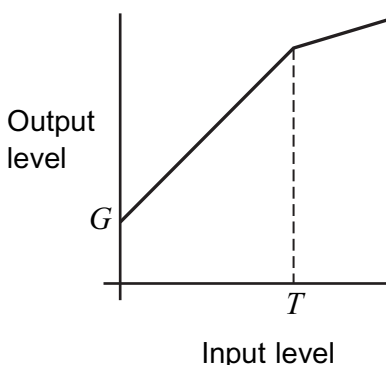
A compressor is either a separate piece of electronic audio equipment or, increasingly, a software application which processes digital sounds in a computer. The graphs below show how a compressor can modify its output level for a given input level.



The horizontal axis shows the input level as a percentage of the maximum possible level. The vertical axis shows the output level as a percentage of the maximum possible level. In this graph the signal has not yet been processed, so the output from the compressor is equal to the input.



In the first stage of processing, the level of all signals above a level called the *threshold* is reduced. The amount by which the input level exceeds the threshold, T , is reduced to a fixed fraction of the excess. In this case, the fraction is $\frac{1}{4}$; this is known as a *compression ratio* of 4:1. Signals with an input level less than T are unaffected.



In the second stage of processing, the level of all signals is increased by a fixed amount, G , called the *gain*.

The overall effect of these two processes is that the quieter sounds become louder than they were, and the difference in level between the louder sounds and the quieter sounds is less than it was initially.

The threshold, compression ratio and gain can all be adjusted independently to give a wide range of acoustic effects.

Turn over ►

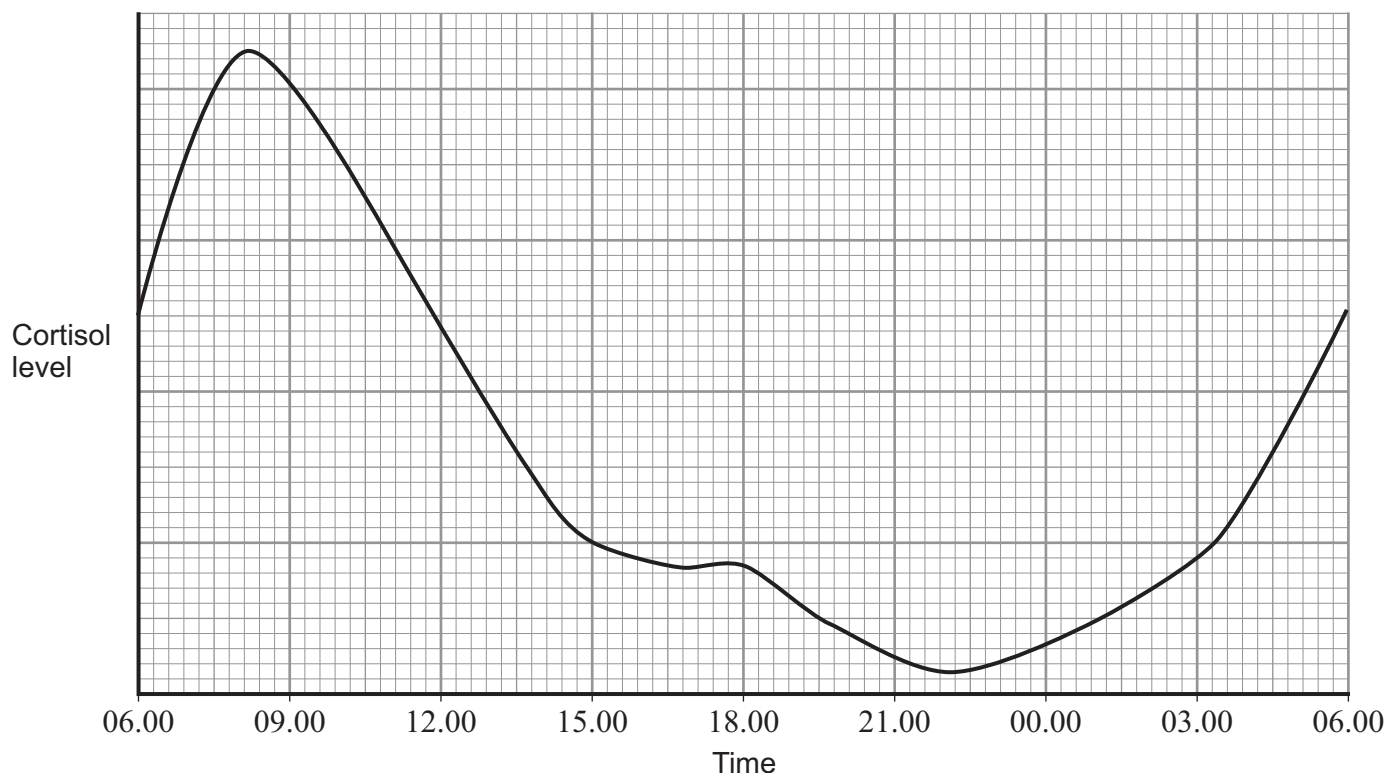
App downloads

The number of downloads of apps (applications) for the iPhone increased dramatically in the months after its launch in January 2007. The table below shows the figures.

Time after launch, t months	5	7	9	13	18	22
Downloads, N millions	240	480	790	1500	2900	4000

Cortisol levels

Cortisol is a hormone that needs to be present at normal levels in the human bloodstream in order to maintain good health. The level of cortisol varies throughout the day and is highest in the morning. It usually varies between 0 and $15 \mu\text{g}/\text{cl}$ (micrograms per centilitre of blood).



END OF DATA SHEET

ACKNOWLEDGEMENT OF COPYRIGHT-HOLDERS AND PUBLISHERS

Shaped skis: © Getty Images

Copyright © 2014 AQA and its licensors. All rights reserved.

P/Jun14/USE1/PM