Maxwell’s creation of colour science at Aberdeen

- Maxwell made 3 fundamental discoveries in colour science while at Aberdeen
  - he showed how to measure colour
  - he showed how to measure ‘colour blindness’
  - he showed how a colour photograph could be made from 3 black and white images and 3 colour filters

- Colour vision is a product of Physics, Physiology and Psychology, making it difficult to study
- Maxwell explored how colours are not unique but can be matched by a combination of 3 primary colours
- He investigated this while still a youngster, with his colour tops and colour wheels

- His main paper ‘on the theory of compound colours’ won him the Rumford medal of the Royal Society of London
- Maxwell devised the concept of a 3-dimensional mathematical colour space. Each colour had a coordinate in this space
- He showed how all colours of a constant brightness could be represented on a triangle, now called Maxwell’s colour triangle
- His paper on the theory of compound colours won him the Rumford medal of the Royal Society of London

- Maxwell realised that ‘colour blindness’ could be measured by the results of his colour mixing experiments with his colour box
- He measured the details of a Marischal College student in 1859
- The Ishihara colour test uses abnormal colour perception to classify colour blindness, though not to measure it precisely
- In controlled lighting, people with ‘normal’ colour vision can see the number 74 in the above image

- Not quite Maxwell’s spinning top but a similar idea from blog.mprintables.com
- Variable colour sectors can be put on top and when the top is spun the colours mix
- Maxwell turned this into a quantitative tool for measuring colour mixing

- The top circle is printed with just the green and red colours shown to the left of it
- Move away until the detail blurs and as a result the colours mix
- For most people the top circle will appear the same colour as the lower circle
- This is additive colour mixing

- Maxwell’s colour box, made by Smith & Ramage of Aberdeen, that he used to determine how spectral colours could be matched by 3 primaries. Courtesy Cavendish Laboratory, Cambridge

- Maxwell’s colour triangle. The corners are the primary colours red, green and blue.

- Maxwell’s concept was correct but the technology of his day wasn’t up to it. It took over 4 decades before Autochrome and Dufay colour made Maxwell’s idea work commercially