What is a Transit?

◊ A transit is when a planet passes directly between the Earth and the Sun
◊ The solar eclipse is when the Moon passes between Earth and Sun and partially to totally blocks out Sun
◊ Venus and Mercury are the only planets between Earth and the Sun so the only ones that can Transit
Transit of Venus 8 June 2004
What is the Transit of Venus?

- Venus passes directly between Earth and the Sun during its orbit.
- Appears as a black disc, or silhouette moving across the Sun.
- Takes around 6 hours.
- Path of an upside down “U” because the Sun appears to rotate across sky.
History of Transits

- Come in pairs separated by over a century
- Earliest recorded in 1639
- 1769 Transit observed by Lieutenant James Cook
  - Sent by Britain to Tahiti
  - Took measurements using traditional Surveying, Mapping & Astronomical principles
  - After the Transit he explored & mapped south-east Australia
- 1761 and 1769 observations calculated the size of the Solar System applying Kepler’s 3rd law of planetary motion
Spherical Trigonometry used to plot & map the Universe

Astronomical Unit (AU) is used to measure the distance from Earth to the Sun

Calculated by measuring how long it takes Venus to transit across the Sun

- Two different locations
- Measure distance between locations ie Latitude & longitude
- Time the contacts 1 & 3
Observing the Transit - THEN

◊ Historical observations required Surveying and Astronomy skills
◊ Surveyors used stars to help identify positions on the earth
◊ Surveying skills were needed to make maps for navigation and exploration
◊ Most explorers were also Surveyors:
  • Captain James Cook
  • Matthew Flinders
  • Will (from Burke & Wills)
What is Surveying?

◊ Surveying is the measurement & mapping of the environment
◊ Use specialised tools and equipment
◊ Principles of
  • Maths
  • Geography
  • IT
  • Science
Modern technology now uses Global Positioning Systems (GPS), satellite remote sensing and other space-based measuring techniques.

- Still based on early Surveying, Astronomy and Mathematics principles to fix positions and take measurements.
- Tools are faster, more economical and provide more precise results.
- Specialist field called Spatial Science
You will experience a rare Astronomical event

◊ Last transit was in 2004
◊ Next Transit will happen in 2117
◊ 6 June 2012 – the last in your lifetime
Observing the Transit – 2012

◊ Never look directly at the Sun – serious damage can occur
◊ Safe viewing
  • SolarScope
  • Webcast
  • iPhone App
◊ Using the SolarScope
  • Simple but sophisticated tool
  • Look inside the SolarScope
  • View a large size projection
  • Take time measurements
Observing the Transit – 2012

◊ Never look directly at the Sun – serious damage can occur

◊ Safe viewing
  • SolarScope
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◊ Using the Solarscope
  • Simple but sophisticated tool
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  • View a large size projection

SolarScope for safe viewing

SolarScope for safe viewing
Acknowledgements

◊ Donated on behalf of Surveying and Spatial Science Industry, and Astronomical Association of Queensland

◊ Student education
  • about the Transit of Venus
  • how Surveying was integral to early Astronomy
  • consider career opportunities

◊ More information
  • Transit of Venus: www.transitofvenus.com.au
  • Surveying: www.alifewithoutlimits.com.au
  • Spatial Science: www.destinationspatial.com.au

Sources:
• Surveyors & Astronomy & Future (Peter Swan, Bob Ross, Connie Beadell, Graham Tweedie 2012)
• National Aeronautics and Space Administration (NASA)
• Bill Kitson (ABC Radio interview Adelaide Mar 2012)