 MM6 Spherical geometry

Outcomes

MG2H-4 analyses two-dimensional and three-dimensional models to solve practical problems, including those involving spheres and non-right-angled triangles

MG2H-5 interprets the results of measurements and calculations and makes judgements about reasonableness, including the degree of accuracy of measurements and calculations and the conversion to appropriate units MG2H-10 uses mathematical argument and reasoning to evaluate conclusions drawn from other sources, communicating a position clearly to others, and justifies a response.

New South Wales Board of Studies (2012), Mathematics General Stage 6 Syllabus, pp13-14.

| Content | Teaching strategies and activities |
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| Calculate arc length of a circle using the formula  L equals theta over 360 times by 2 pie R.  Distinguish between great and small circles. |  |
| Use the equator and the Greenwich Meridian as lines of reference for locations on the Earth’s surface. |  |
| Locate positions on the surface of the Earth using latitude and longitude. | Find the coordinates of the point on the Earth’s surface that is at maximum distance from the school’s location.  Find the coordinates of the point on the Earth’s surface that is at maximum distance from the school’s location. |
| Calculate distances, in kilometres, between two points on the same great circle. | Teachers should note that it is not intended that nautical miles be used. The radius of the Earth is to be taken as 6400 km. |
| Use time zones and the International Date Line in solving problems. | Calculate the present time in all the capital cities of Australia.  For each of the states in Australia, investigate whether or not the state has daylight saving and, if so, when it starts and finishes.  Students find three cities with the same time, for both a given number of hours earlier and a given number of hours later than local time. These could be marked on a world map and displayed to reinforce the concept of time zones. |
| Calculate time differences between locations on the Earth given the difference in longitude. | For the calculation of time differences using longitude, apply 15° = 1 hour time difference and 1° = 4 minutes time difference. Daylight-saving time is to be considered.  Plotting longitude on a number line can provide a visual stimulus when calculating time differences. From a number line, students can readily determine whether to add or subtract time. |
| Determine the times in cities in different countries in travel questions. | Cassie flew from London (52°N, 0°E) to Manila (15°N, 120°E). Her plane left London at 9:30 am Monday (London time), stopped for five hours in Singapore, and arrived in Manila at 4 pm Tuesday (Manila time). What was the total flying time? |