

MATHEMATICS

ANSWERS

Level Two

Degrees° minutes' seconds''

Task A

1)

- a. 51°56'04"
- b. 21°13'07"
- c. 219°21'10"
- d. 35°57'27"
- e. 109°20'27"
- f. 21°26'15"

2)

- a. 51.93444
- b. 21.21861
- c. 219.35278
- d. 35.95750
- e. 109.34083
- f. 21.43750

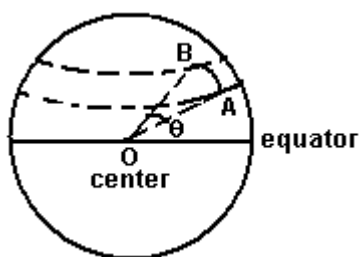
3)

Let s be the distance between the two cities

Then $s = r\theta$ (radians)

Where r is the radius of the earth.

Therefore the distance(s) between the two cities is obtained by solving the equation.



$$s = r \left(\frac{\theta\pi}{180} \right)^\circ$$

A, B are the two places different latitudes such that AOB is a sector of a circle whose centre is O. All latitudes are measured with reference to the zero latitude - the equator.

- 4) If the radius of the earth is = 6374km and the distance between the two cities is 4000km, then $R = 6374$ and $s = 4000\text{km}$

$$s = r \left(\frac{\theta \pi}{180} \right)^\circ \quad \Rightarrow \quad \theta = \frac{180s}{r\pi}$$

$$= 35.95593$$

35°57'21" difference in latitude

Task B

- 1)
 - a. 106°
 - b. 53°
 - c. 37°
- 2)
 - a. 122°
 - b. 61°
 - c. 29°
- 3) Right angled triangles, supplementary angles, Angle of deflection $-180 = \theta$
Isosceles triangles have two angles the same, sum of a triangle added to 180°
- 4) $\beta = \theta/2$
- 5) $s = R\theta \Rightarrow s = \frac{60 \times 106 \times \pi}{180} \Rightarrow s = 111.003\text{m (3.d.p)}$
- 6) Firstly, calculate the number of 10 metres intervals around the curve.

$$\frac{111.003}{10} = 11.1$$

NB this number needs to be rounded up to 12 intervals, because otherwise the interval sizes would be bigger than 10m.

Pegs A and B are already there, so only need 11 pegs more to form 12 intervals of 9.25 m long.

(NB. Need one more peg than there are intervals)

WELL DONE