

PH108 : Electricity & Magnetism

Weekly Quiz 1 - Mercator Charts and Flat Maps

24 January, 2018

Answer

$$\cos(\Lambda)$$

$[\frac{1}{2} \text{ mark}]$

$$\Lambda \rightarrow 90^\circ - \Lambda \text{ or } \Lambda \rightarrow \Lambda - 90^\circ$$

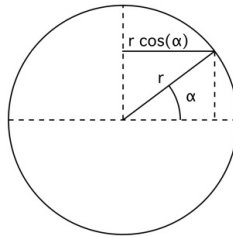
$[\frac{1}{2} \text{ mark}]$

Solution

Let radius of Earth be R .

Arc length, $s = r\theta$.

Here, distance at latitude $\Lambda = r\Delta\Phi$, where r is radius of latitude Λ



Thus the distance becomes $R \cos(\Lambda) \Delta\Phi$.

distance at equator $= R \Delta\Phi \implies \text{ratio} = \cos(\Lambda)$

Now, mapping the poles will be an issue.

Hint 1: switch from current front view to top view, and repeat the same process.

Hint 2: $\sin(\Lambda)$ instead of \cos ...

both are in effect, redefining Λ by 90° , keeping in mind the factor should be positive.