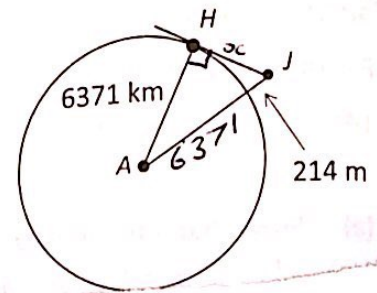


Question 6

(25 marks)

- (a) Take the earth as a sphere with radius 6371 km. Jack is standing on the Cliffs of Moher at the point J which is 214 metres above sea level. He is looking out to sea at a point H on the horizon. Taking A as the centre of the earth, find $|JH|$, the distance from Jack to the horizon. Give your answer correct to the nearest km.

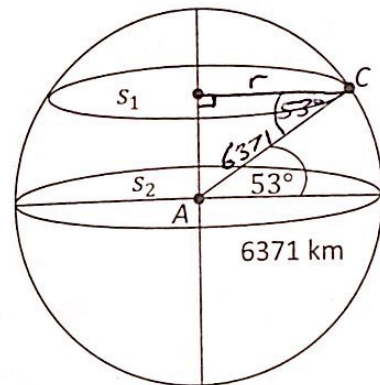


$$x^2 = (6371 + 0.214)^2 - (6371)^2$$

$$x^2 = 2726.83$$

$$x = \boxed{52 \text{ km}}$$

- (b) The Cliffs of Moher, at point C , are at latitude 53° north of the equator. On the diagram, s_1 represents the circle that is at latitude 53° . s_2 represents the equator (which is at latitude 0°). A is the centre of the earth. s_1 and s_2 are on parallel planes. Find the length of the circle s_1 . Give your answer correct to the nearest km.



$$\cos 53^\circ = \frac{r}{6371}$$

$$r = 3834$$

$$\text{Length circle} = 2\pi r$$

$$= 2\pi (3834)$$

$$= 24090.76$$

$$\approx \boxed{24091 \text{ km}}$$

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