

DISTANCE CALCULATIONS

Remember, the first step is to work out whether it involves a Great Circle or a Small Circle.

Same longitude \longrightarrow Great circle $\longrightarrow R = 6400$

Equator \longrightarrow Great circle

Same latitude \longrightarrow Small circle $\longrightarrow r = 6400\cos(\theta)$

Same Hemisphere: Subtract angles

Opposite Hemispheres: Add angles

Question 2 (5 marks)

Daniel lives in Mildura (34° S, 142° E). He will fly to Sydney (34° S, 151° E) and then fly on to Rome (42° N, 12° E) to compete in the discus event at an international athletics competition.

In this question, assume that the radius of Earth is 6400 km.

- a. Find the shortest great circle distance to the South Pole from Mildura (34° S, 142° E).

Round your answer to the nearest kilometre.

1 mark

- b. The flight from Mildura (34° S, 142° E) to Sydney (34° S, 151° E) travels along a small circle.

- i. Find the radius of this small circle.

Round your answer to two decimal places.

1 mark

- ii. Find the distance the plane travels between Mildura (34° S, 142° E) and Sydney (34° S, 151° E).

Round your answer to the nearest kilometre.

1 mark

Question 1

Calculate the shortest great circle distance between Washington DC USA (39°N , 77°W) and Lima, Peru (12°S , 77°W). Give your answer to the nearest km.

Question 2

Calculate the shortest great circle distance between Melbourne (38°S , 145°E) and the **North** pole.

Question 2

A cruise boat travels from King George Island (60°S , 60°W) due west along a small circle to visit a penguin colony on the South Shetland Island (60°S , 64.25°W). Calculate how far the ship travelled, correct to the nearest km.

Question 3

Calculate the shortest distance, to the nearest km between Macapa, Brazil (0° , 52°W) and Kismayo, Somalia (0° , 43°E)

Question 4

A ship sails due South from Channel-Port-aux-Basques, Canada, $47^{\circ}\text{N } 59^{\circ}\text{W}$ to Barbados, $13^{\circ}\text{N } 59^{\circ}\text{W}$. 2

How far did the ship sail, to the nearest kilometre? Assume that the radius of Earth is 6400 km.

Question 5

A light aircraft is scheduled to fly directly from Wagga Wagga to Sydney. Due to bad weather, the aircraft must fly another route.

- a. The first leg of the journey has the aircraft flying from Wagga Wagga ($35^{\circ}\text{S}, 147.4^{\circ}\text{E}$) to point A ($33.9^{\circ}\text{S}, 147.4^{\circ}\text{E}$).

Calculate the great circle distance from Wagga Wagga to point A, correct to the nearest km.

- b. The second leg of the journey has the aircraft flying **due east** along a small circle from point A ($33.9^{\circ}\text{S}, 147.4^{\circ}\text{E}$) to Sydney ($33.9^{\circ}\text{S}, 151.2^{\circ}\text{E}$). Calculate the distance from A to Sydney, to the nearest km.

Question 6

- (b) Pontianak has a longitude of 109°E , and Jarvis Island has a longitude of 160°W . Both places lie on the Equator.
- (i) Find the shortest distance between these two places, to the nearest kilometre. You may assume that the radius of the Earth is 6400 km. 2
- (ii) The position of Rabaul is 4° to the south and 48° to the west of Jarvis Island. What is the latitude and longitude of Rabaul? 2

Question 7

Neville departs San Diego (32°N , 117°W) flies **due east** to Dallas (32°N , 97°W).

Determine the distance he flies east, to the nearest km.

Question 8

A plane departed Brisbane (27.5°S , 153°E) and first headed **due north** from Brisbane until it reached the position (20°S , 153°E).

- a. Calculate this distance, to the nearest km.

- b. The plane then headed **due west** from $(20^{\circ}\text{S}, 153^{\circ}\text{E})$ to Hamilton Island, $(20^{\circ}\text{S}, 151^{\circ}\text{E})$. Calculate this distance to the nearest km.

Question 9

- (c) Two cities lie on the same meridian of longitude. One is 40° north of the other. **2**

What is the distance between the two cities, correct to the nearest kilometre?

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Question 10

Damascus is located at $(33^{\circ}\text{N}, 36^{\circ}\text{E})$. The great circle distance along the meridian from Damascus to Nairobi is 3798 km. Nairobi is due south of Damascus. Determine the co-ordinates of Nairobi.