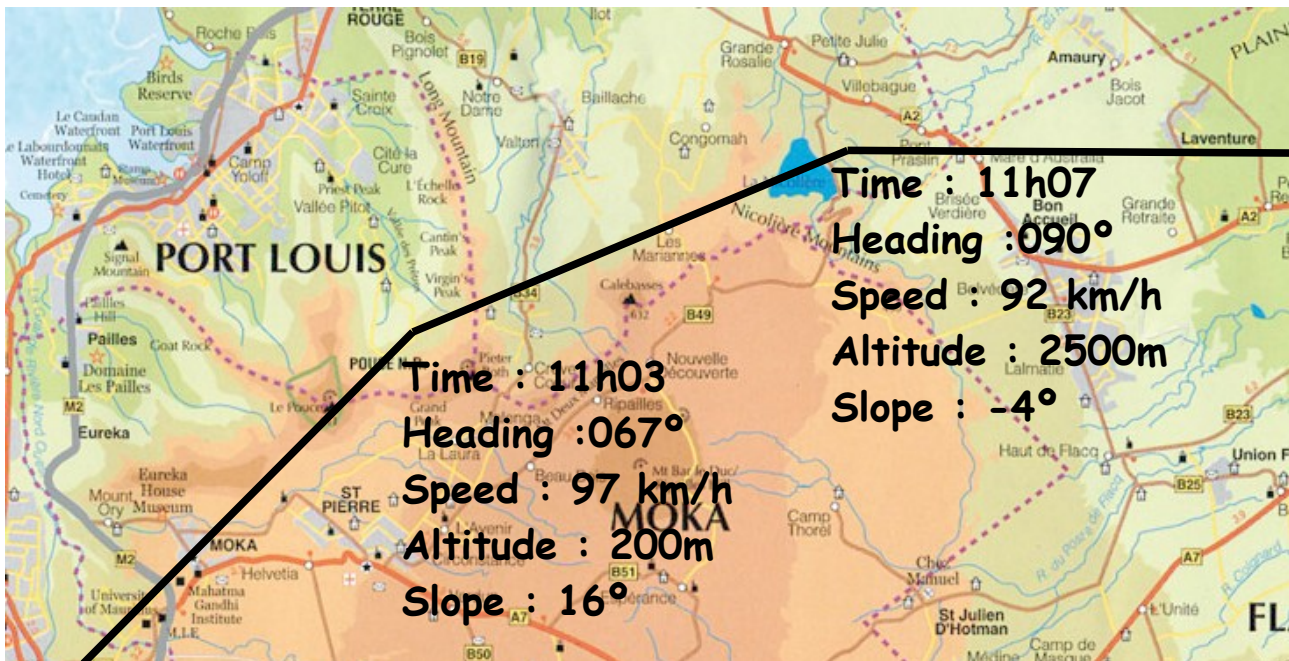



DESIGNING THE FLIGHT PLAN



The plane

The Flying Dodo is a 100% Mauritian aircraft.

General characteristics	Performance	
Crew: 5 Capacity: 10 passengers Length: 25 ft 3 in Wingspan: 36 ft 3 in Height: 9 ft 12 in Wing area: 174 sq ft Aspect ratio: 7:32	Cruise speed (best average speed) : 150 km/h Stall speed (minimum speed) : 75 km/h Never exceed speed: 220 km/h Service ceiling (highest altitude): 5,000 m	

Flight data

Airport	Sir Seewoosagur Ramgoolam International Airport (MUR)
Departure time	10:42 am.
Flight Number	EDN2014

Weather forecast

Remaining showers should gradually die away overnight to leave the region dry, however some mist and fog patches may follow towards dawn.

Wind: 30 km/h (ESE)

Humidity: 89%

Temperature: 86°F

Visibility: Good

Pressure: 1010mb, Rising

1. Ground Track

(a) Draw the take-off on the map

Airport : Mahebourg
 Heading : 117°
 Length : 3 km

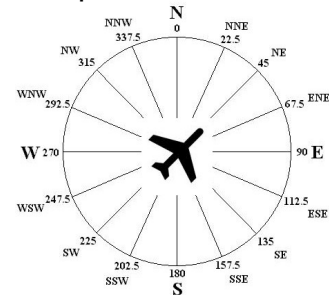
(b) Draw the landing on the map

Airport : Mahebourg
 Heading : 117°
 Length : 6 km

The *heading* (or *bearing*) is the angle measured from facing North and turning clockwise. It is a three-figure number.

Example:

On this compass, the bearing of the plane is 045°



(c) Place your 4 selected locations on the map and link together : the end of the take-off, the 4 locations and the beginning of the landing.

(d) Write the heading at the beginning of each line. (see the image on the top of the previous page)

2. Calculating Time

(a) Take-off

Departure time : 10h42 am
 Length : 3km
 Speed : 90km/h

- Write 10h42 at the beginning of the take-off line
- Work out the time at the end of the take-off and write it on the map (at the end of the take-off line)

(b) Other locations

Because of the wind, the speed depends on the heading, it can be worked out using this formula:

$$s = 30[\cos(h + 67.5) + \sqrt{(\cos(h + 67.5))^2 + 15}]$$

s is for speed and h for heading

For example, if the heading is 112,5° the speed is equal to:

$$s = 30[\cos(112.5 + 67.5) + \sqrt{(\cos(112.5 + 67.5))^2 + 15}]$$

$$s = 30[\cos(180) + \sqrt{(\cos(180))^2 + 15}]$$

$$s = 30[-1 + \sqrt{(-1)^2 + 15}]$$

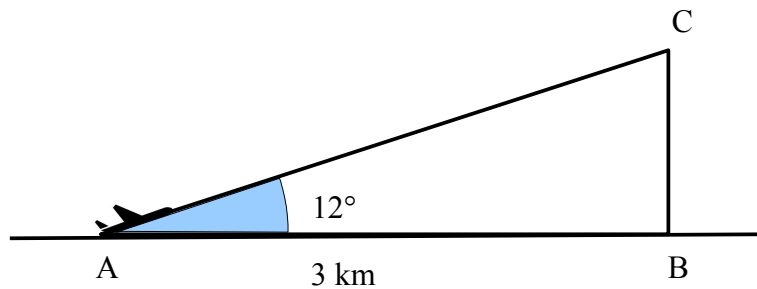
$$s = 30[-1 + \sqrt{16}]$$

$$s = 30[-1 + 4] = 30 \times 3 = 90 \text{ km/h} \quad \text{round the answer to the nearest whole number}$$

- Using this formula, work out the speed and the time at each selected location and write it on the map. (see the image on the top of the previous page).

3. Altitude and slopes

(a) Take-off



The *slope* is the angle of climb, It is equal to 12°

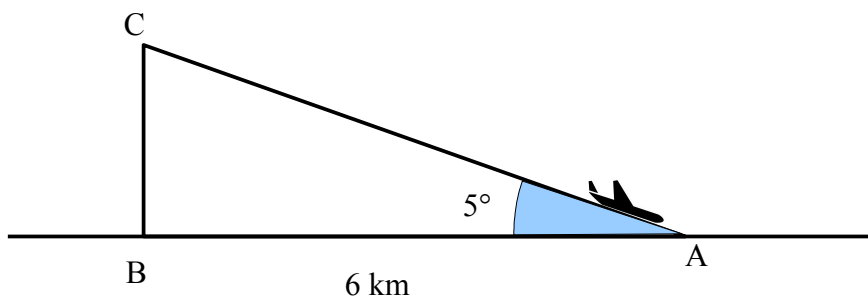
The *ground track* (line AB) is what you drew on the map, $AB = 3 \text{ km}$

The *flight path* (line AC) is the path followed by the aircraft

The *altitude* at the end of the take-off is BC

Work out the altitude at the end of the take-off and write it on the map.

(b) Landing



The *slope* is -5° , it is a negative number since the aircraft is flying down,

The *ground track* (line AB) is what you drew on the map, $AB = 6 \text{ km}$

The *flight path* (line AC) is the path followed by the aircraft

The *altitude* at the beginning of the take-off is BC

Work out the altitude at the beginning of the landing and write it on the map.

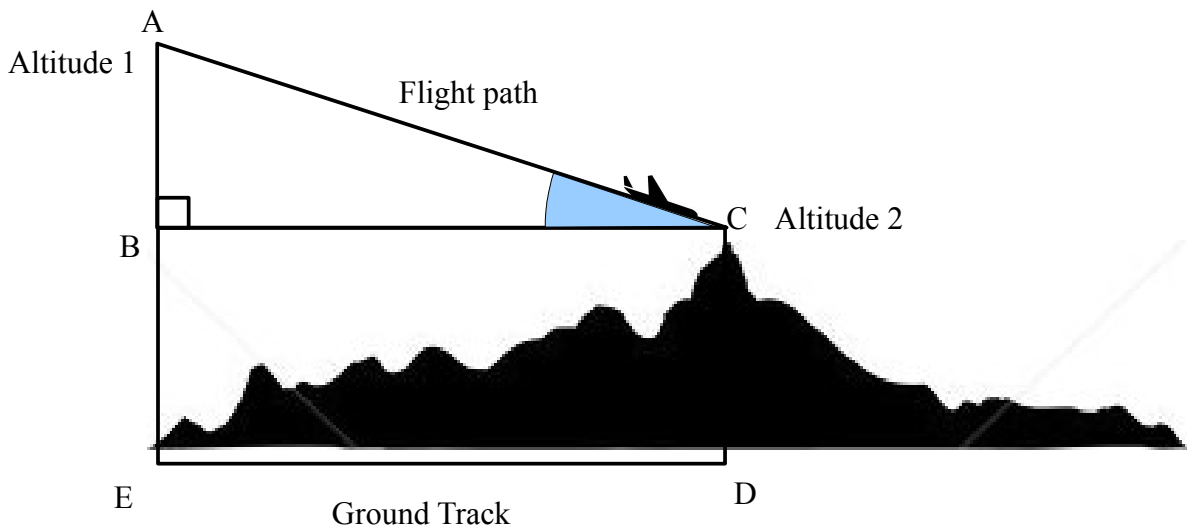
(c) Other points

Here are the altitudes of the 4 points:

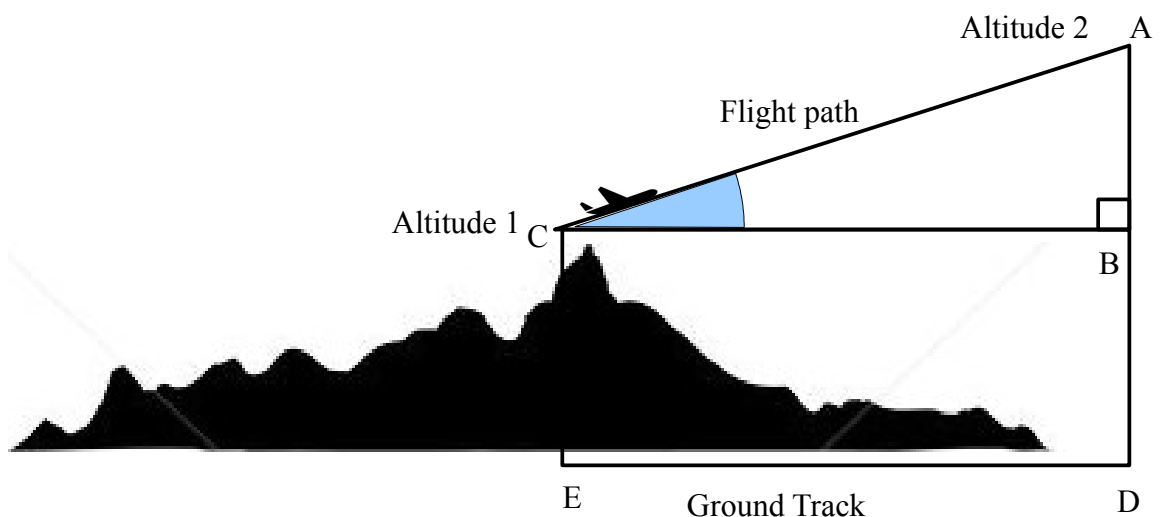
- first point: 2500m
- second point : 200m
- third point : 2500m
- fourth point 200m

Write the altitude at each point. (see the image on the top of the first page).

Flying Down



Flying Up



The *ground track* is the line ED (what you drew on the map), the *flight path* is the line AC

- Use altitudes to work out AB
- Use AB and BC(=ED) to work out AC
- Use AC and BC to work out the slope

Write the slope on the map at the beginning of each line (see the image on the top of the first page). Notice that the slopes are positive when the plane is flying up and negative when the plane is flying down.

The job is over. Call the teacher. You are now going to check your calculations by using the spreadsheet “Flight Plan”.