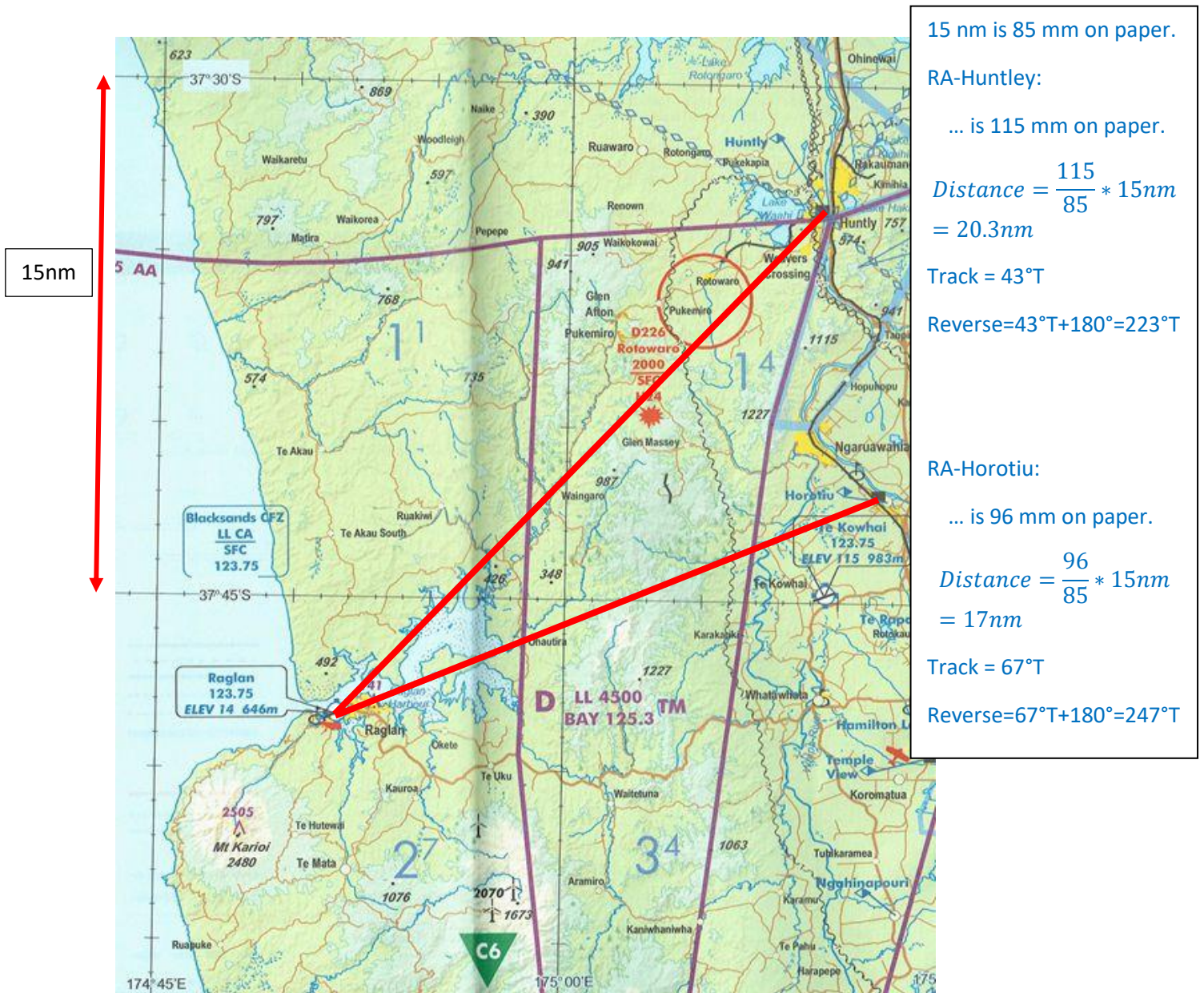




## 2. Map reading task

2.1. Using a protractor and ruler, measure the true track (distance and angle) from Raglan AF to Huntley VRP, Huntley to Raglan;  
Raglan AF to Horotiu VRP, Horotiu to Raglan.



## 2.2. Coordinates

Read the coordinates for Te Kowhai airfield as good as you can.

What is at 37 53 49.92S 175 12 20.27E ?

37°44.700'S 175° 09.517'E

Ngahinapouri VRP

### 3. Graphical wind solution

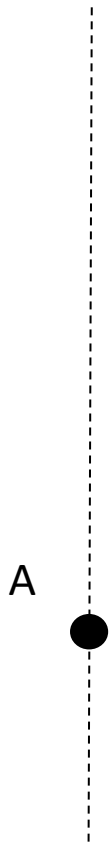
#### 3.1. Repeat lesson

Given: Track A to B =  $71^\circ$   
Wind = 34 kn ;  $24^\circ$   
TAS = 110 kn

Determine: Wind correction angle incl. left/ right (+/-)  
True heading  
Ground speed

WCA =  $-13^\circ$   
Heading =  $58^\circ\text{T}$   
GSpeed = 84 kn

True North



### 3.2. New problem

#### 3.2.1. Graphical

Given: Track Horotiu VRP to Raglan AF

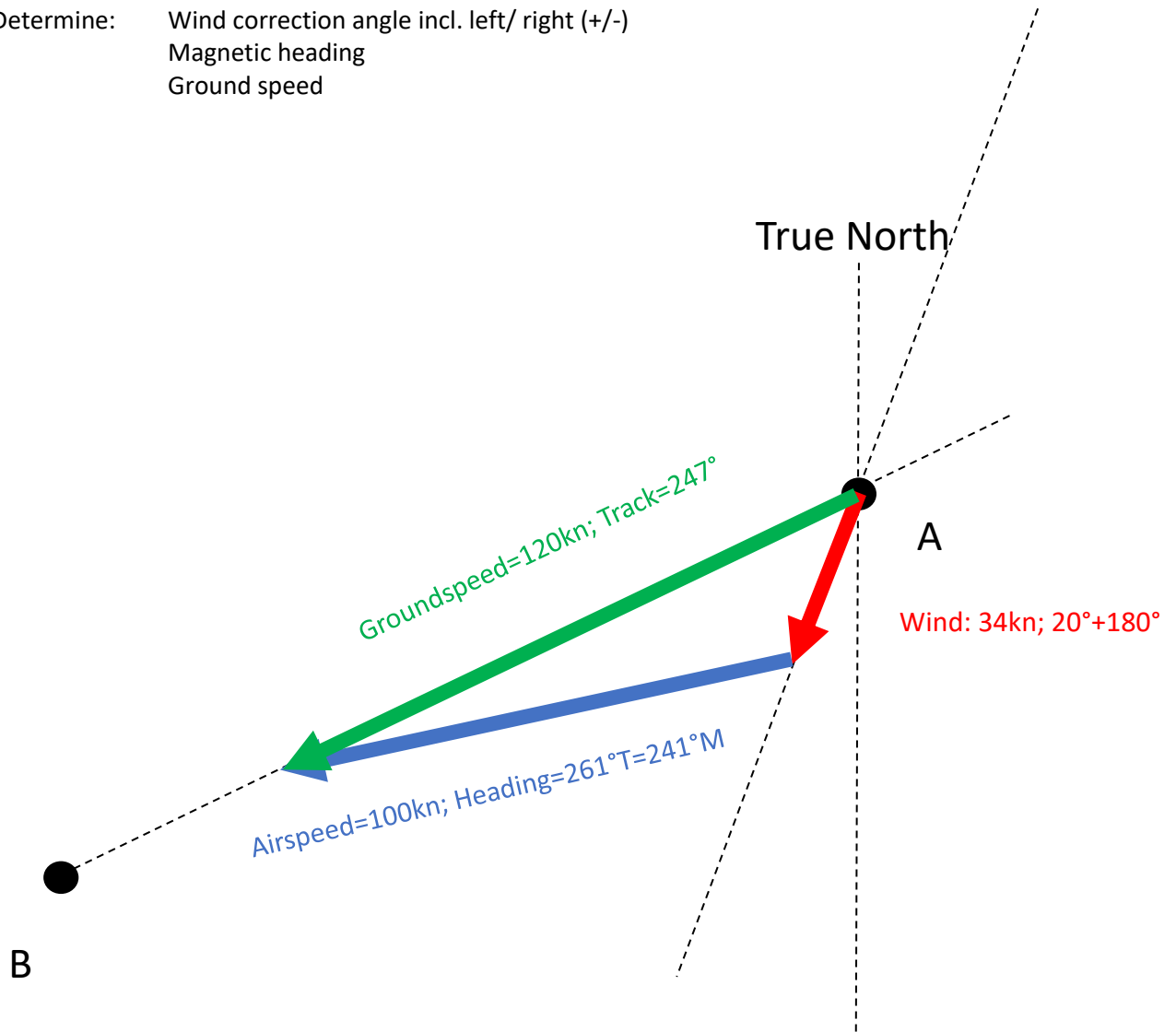
Wind = 34 kn, 20°T

TAS = 100 kn

Determine: Wind correction angle incl. left/ right (+/-)

Magnetic heading

Ground speed



### 3.2.2. Repeat with calculator

$$\text{WindDir} = \text{MetWindDirection} + 180^\circ = 20^\circ + 180^\circ = 200^\circ$$

$$\text{WTA} = \text{Track} - \text{WindDir} = 247^\circ - 200^\circ = +47^\circ$$

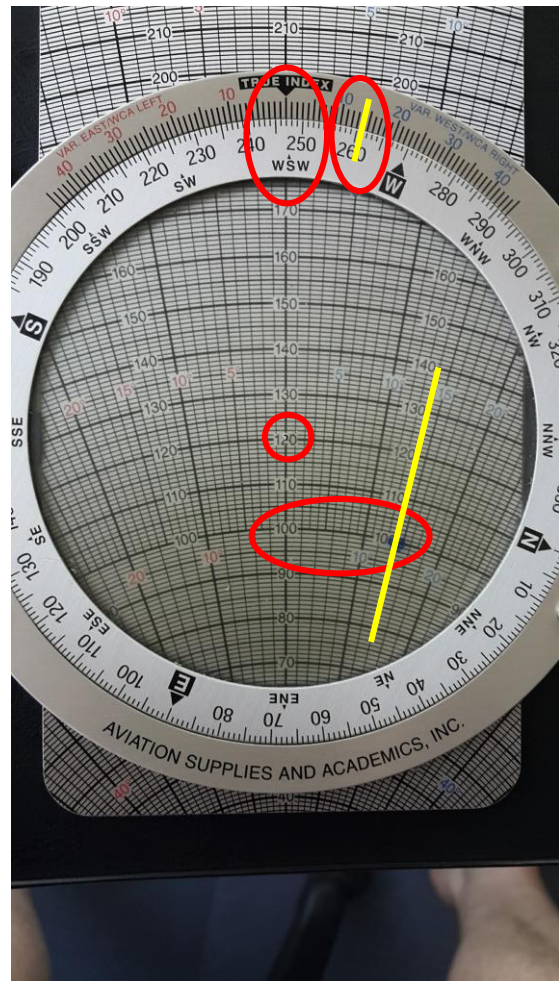
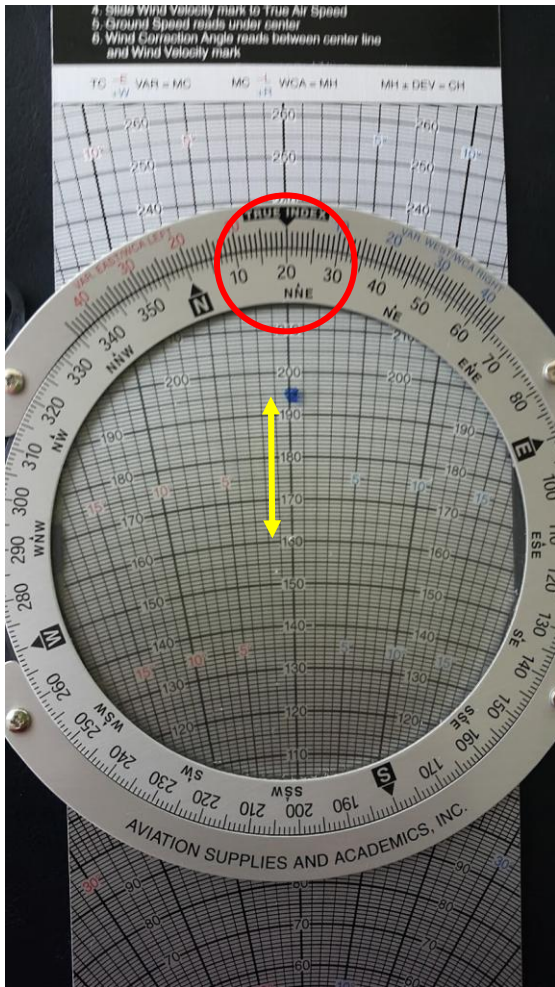
$$\sin(\text{WCA}) = \frac{\text{Windspeed}}{\text{Airspeed}} * \sin(\text{WTA}) = 34/100 * \sin(47^\circ) = 0.2487$$

$$\text{WCA} = \arcsin(\sin(\text{WCA})) = \arcsin(0.2487) = +14^\circ$$

$$\text{Heading} = \text{Track} + \text{WCA} = 247^\circ + (14^\circ) = 261^\circ\text{T} = 241^\circ\text{M}$$

$$\begin{aligned} \text{Groundspeed} &= \text{Airspeed} * \cos(\text{WCA}) + \text{Windspeed} * \cos(\text{WTA}) \\ &= 100kn * \cos(14^\circ) + 34kn * \cos(47^\circ) \\ &= 100kn * 0.9703 + 34kn * 0.682 \\ &= 120kn \end{aligned}$$

### 3.2.3. Repeat with E6B



## 4. Planning practice

Plan a flight in a Zenith CH601XL using maps, ruler, protractor, and calculator (no flight planning app)

From Te Kowhai via

Kawakawa Bay,  
Orewa,  
NZSL (Springhill)

to Dargaville (and back if time allows). Generate a VFR flight log for that flight.

Area forecast: TA	1000	30015
	3000	31020
	5000	32015
FN	1000	27005
	3000	28010
	5000	25005

Zenith: cruise 90kts at 18L/hr, climb 60kts at 25L/hr.



## 5. Aircraft loading

Is this aircraft within its weight and balance limits for full end empty tanks?

	ltr	weight [kg]	arm [m]	moment [kg m]
empty		305	1.723	
pilot & passenger		190	1.760	
fuel	90		1.660	
luggage		20	2.210	
TOTAL				
Limits	min		1.727	
	max	544	1.769	

Full tanks: weight-NO, balance-Yes

	ltr	weight [kg]	arm [m]	moment [kg m]
empty		305	1.723	526
pilot & passenger		190	1.760	334
fuel	90	65	1.660	108
luggage		20	2.210	44
TOTAL		<b>580</b>	<b>1.745</b>	1012

Empty tanks: weight-Yes, balance-Yes

	ltr	weight [kg]	arm [m]	moment [kg m]
empty		305	1.723	526
pilot & passenger		190	1.760	334
fuel	0	0	1.660	0
luggage		20	2.210	44
TOTAL		<b>515</b>	<b>1.756</b>	904



### 6.1. Basics

Determine: Wind correction angle incl. left/ right (+/-)  
Magnetic heading  
Ground speed

Track = 20°T

WCA = -13.5°

Groundspeed = 106kn

Heading = 20°T - 13.5° = 6.5°T = 360°T + 6.5°T - 20° = 346.5°M

### 6.2. Return to base

Determine return magnetic heading using the quick method.

Track = 20°T, WCA = -13.5°

Return = 346°M + 180° - 2\*(-13.5°) = 526° + 27° = 553°, 553°M - 360° = 193°M

### 6.3. Course correction, 1 : 60

You find yourself over Rangiri township. What closing angle and magnetic heading is required to get to Orere Point?

Track = 20°T, Heading = 346°M, 88mm paper is 30nm.

75mm to Rangiri is 26nm to right, 12mm off track or 4nm.

$$TE = \frac{60}{26} * 4° = 9°$$

83mm from Rangiri to Orere is 28nm.

$$CA = \frac{60}{28} * 4° = 8.5°$$

Total correction required is 18° to left – magnetic heading 328°M.

#### 6.4. Modified standard closing angle

What is the modified standard closing angle for this aircraft?

Mod SCA = 17°

You find yourself over Glen Murray township. Using the mod. standard closing angle, what magnetic heading do you fly for how long to get back onto your planned track?

Heading = 346°M

88mm paper is 30nm.

9mm on paper off track is 3nm. Off to left.

Turn right 17° onto 363°M=3°M for 6 minutes then turn back to 346°M.

## 7. Navigation (landmarks)

Check out [Google Earth](#)