

ENSM Le Havre	LE SEXTANT	V1.1 –07/19
A. Charbonnel	<i>CORRECTION – CORRECTION DE HAUTEUR- NA</i>	1/5

Recommandation :

- 1) Revoir votre cours sur ce sujet.
- 2) Noter dans votre carnet du marin les éléments qui vous sont nécessaires pour réaliser ces exercices AVANT de commencer les exercices.
- 3) Connaître les notations et abréviations anglo saxonnes

Matériel nécessaire : Nautical Almanac 1981 et calculatrice

Atelier 1 : Miscallenus



Exerice 1.1 Abbreviations

Explain the following abreviations :

- UL : *Upper limb – bord supérieur*
- LL : *Lower limb – bord inférieur*
- DR : *Dead Reckoning*

Exercice 1.2 On/Off the arc and error versus correction

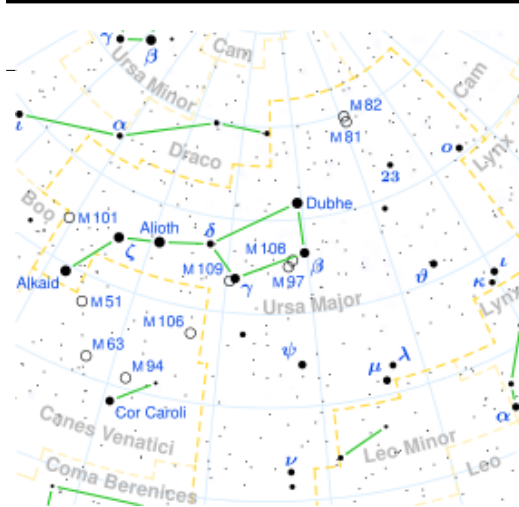
1) Choose the right answer(s) for each picture

 <p>(a)</p>	 <p>(b)</p>
<input checked="" type="checkbox"/> Index error is on the arc <input type="checkbox"/> Index error is off the arc <input checked="" type="checkbox"/> Index error is positive <input type="checkbox"/> Index error is negative <input type="checkbox"/> Index correction is positive <input checked="" type="checkbox"/> Index correction is negative	<input type="checkbox"/> Index error is on the arc <input checked="" type="checkbox"/> Index error is off the arc <input type="checkbox"/> Index error is positive <input checked="" type="checkbox"/> Index error is negative <input checked="" type="checkbox"/> Index correction is positive <input type="checkbox"/> Index correction is negative

2) Determine the relation between the index error (IE) and the index correction(IC) .

$$IE = -IC$$

Atelier 2 : Altitude of Stars



Exercice 2.1 : Altitude of Dubhe

On 23th july 1981, the sextant altitude of Duhbe 50°20,2 was taken at 20h 53min 39s UT.
 Your DR position was 40° 25' N / 32° 40'W.
 The index error is 2' on the arc ; height of eye 9,7m meter;
 temperature 29°C pressure 1030 mb

Find the true altitude of Duhbe.

*Dubhe is also name Apha Ursae Majoris.
 Dubhe is, despite being designated « alpha, the second-brightest star in the constellation of Ursa Major*

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<i>hs</i>	<i>50°20,2'</i>	
<i>+ IC</i>	<i>-2'</i>	<i>error on(+) the arc=> correction off(-) the arc</i>
<i>+ Dip</i>	<i>-5,5'</i>	<i>(height.9,7m)</i>
<i>ha</i>	<i>50° 12,7'</i>	
<i>+Alt. Main correction</i>	<i>-0,8'</i>	
<i>+Additional refraction correction (non standard Temp/pression)</i>	<i>+0,0'</i>	<i>Colonne J (au delà de 50° par d'erreur de refraction à rajouter</i>
<i>ho</i>	<i>50° 11,9'</i>	

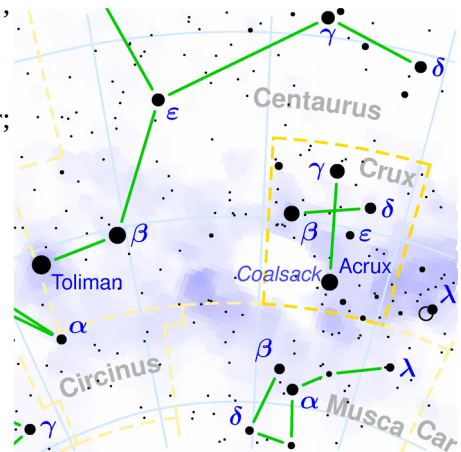
Exercice 2.1 : $ho = 50^\circ 11,9'$

Exercise 2.2 : Altitude of Acrux

On 12th october 1981, the sextant altitude of Acrux $64^\circ 35,2'$ was taken at 20h 53min 39s UT.
Your DR position was $40^\circ 25' S / 32^\circ 40' W$.
The index error is $2'$ off the arc ; height of eye 6.0 meter; temperature $20^\circ C$ and pressure 1030 hPa.

Is there a correction for the temperature/pressure ? Why ?
Find the true altitude of Acrux.

Acrux is the brightest star in the constellation Southern Crux



<i>hs</i>	<i>64°35,2'</i>	
<i>+ IC</i>	<i>+2'</i>	<i>(error off the arc)</i>
<i>+ Dip</i>	<i>-4,3'</i>	<i>(height.6,0m)</i>
<i>ha</i>	<i>64° 32,9'</i>	
<i>+Alt. Main correction</i>	<i>-0,5'</i>	
<i>+Additional refraction correction (non standard Temp/pression)</i>	<i>+0,0'</i>	<i>1030 hPa /20°C pas de correction car pas de refraction supplémentaire après 50° d'altitude apparente</i>
<i>ho</i>	<i>64° 32,4'</i>	

Exercice 2.2 : $ho = 64^\circ 32,4'$

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Atelier 3 : Altitude of the Sun

Exercice 3.1 [050150]

On 2 January 1981, you observe the lower limb of the Sun at a sextant altitude (h_s) of $35^{\circ}50.4'$. The index error is $0.8'$ on the arc. The height of eye is 24 feet (7.3 meters). What is the observed altitude (H_o)?

<i>hs</i>	$35^{\circ}50,4''=$	
	<i>+ IC</i>	$-0,8'$ (<i>error on the arc</i>)
	<i>+ Dip</i>	$-4,8'$ (<i>h.e.7,3m</i>)
<i>ha</i>	$35^{\circ}44,8'$	
	<i>+Alt. Main correction</i>	$+14,9'$ LL
	<i>+Additional refraction correction (non standard Temp/pression)</i>	$+0,0'$
<i>ho</i>	$35^{\circ}59,7'$	

Exercice 3.1 : $h_o = 35^{\circ}59.7'$

Exercice 3.2 (050168)

You observe the lower limb of the Sun at a sextant altitude (h_s) of $45^{\circ}49.7'$ on 13 November . The index error is $1.0'$ on the arc. The height of eye is 61 feet (18.6 meters). What is the observed altitude (H_o)?

<i>hs</i>	$45^{\circ}49,7'$	
	<i>+ IC</i>	$-1'$
	<i>+ Dip</i>	$-7,6'$ '
<i>ha</i>	$45^{\circ}41,1'$	
	<i>+Alt. Main correction</i>	$+15,3'$ LL
	<i>+Additional refraction correction (non standard Temp/pression)</i>	
<i>ho</i>	$45^{\circ}56,4'$	

Exercice 3.2: $h_o = 45^{\circ}56.4'$

Atelier 4 : Altitude of planet

Exercice 4.1 050173

You observe the planet Jupiter at a sextant altitude (h_s) of $66^{\circ}27.6'$ on 26 May 1981. The index error is $5.2'$ on the arc. The height of eye is 52 feet. What is the observed altitude (H_o)?

<i>hs</i>	$66^{\circ}27,6'$	
	<i>+ IC</i>	$-5,2'$ (<i>error on the arc</i>)
	<i>+ Dip</i>	$-7'$ (<i>h.e. 52 feet</i>)
<i>ha</i>	$66^{\circ}15,4'$	
	<i>+Alt. Main correction</i>	$-0,4'$
	<i>+Additional refraction correction (non standard Temp/pression)</i>	$+0,0'$
<i>ho</i>	$66^{\circ}15,0'$	

Exercice 4.1 : $h_o = 66^{\circ}15.0'$

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Exercice 4.2 050174

During the evening twilight on 28 December 1981, the sextant altitude (hs) of the planet Venus was $29^{\circ}43,2'$. The height of eye was 40 feet. The index error was $2.0'$ on the arc. What is the observed altitude (Ho)?

<i>hs</i>	<i>29° 43,2'</i>	
<i>+ IC</i>	<i>- 2,0'</i>	
<i>+ Dip</i>	<i>- 6,1'</i>	
<i>ha</i>	<i>29° 35,1'</i>	
<i>+Alt. Main correction</i>	<i>-1,7'</i>	<i>40 feets</i>
<i>+Additionnal correction for Venus</i>	<i>+0,7'</i>	<i>28 december</i>
<i>+Additional refraction correction (non standard Temp/pression)</i>		
<i>ho</i>	<i>29° 34,1'</i>	

Exercice 4.2 : ho=:29°34,1'

Atelier 5 : Altitude of the Moon

Exercice 5.1 Altitude of the moon (LL)

At 18h 38min 11s UT, March 23, 1981, the navigator obtains a sight of the Moon's lower limb. The azimuth is 043° and the altitude on the sextant is $hs=32^{\circ} 37,1'$.
 At 18h30, the dead reckoned position was $60^{\circ} 12,6'N / 80^{\circ} 49,8'E$.
 The height of eye is 68 feet, pression is 1030 hPa, temperature $20^{\circ}C$.
 The index correction is $+0.2'$.
 Determine ho.

<i>hs</i>	<i>32° 37,1'</i>	
<i>+ IC</i>	<i>+ 0,2'</i>	
<i>+ Dip</i>	<i>-8,0'</i>	
<i>ha</i>	<i>32° 29,3'</i>	
<i>+Alt. Main correction</i>	<i>+ 57,8'</i>	
<i>-30' for upper limb (Moon)</i>		
<i>+U,L, correction for Moon</i>	<i>+ 0,9'</i>	<i>HP=54,1' / NA p71 (65)</i>
<i>+Additional refraction correction (non standard Temp/pression)</i>	<i>- 0,3'</i>	
<i>ho</i>	<i>32° 21,9'</i>	

Exercice 5.1: ho = 32° 21,9'

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Exercice 5.2 Altitude of the moon (UL)

At 02h 38min 11s UT, May 23, 1981, the navigator obtains a sight of the Moon's lower limb. The bearing is 100° and the altitude on the sextant is $hs = 18^\circ 15,3'$.

At 02h 30min, the dead reckoned position was $60^\circ 12,6'S / 80^\circ 49,8'W$

The height of eye is 15m, pression 1030 hPa, temperature $20^\circ C$.

The index error is 2' on the arc..

Determine ho.

<i>hs</i>	<i>18° 15,3'</i>	
<i>+ IC</i>	<i>-2'</i>	
<i>+ Dip</i>	<i>-6,8'</i>	<i>Height of eye 15m</i>
<i>ha</i>	<i>18° 09,4'</i>	
<i>+Alt. Main correction</i>	<i>+ 61,3'</i>	
<i>-30' for upper limb (Moon)</i>	<i>-30'</i>	
<i>+U,L, correction for Moon</i>	<i>+ 1,9'</i>	<i>HP = 55,2' / NA p111 (105)</i>
<i>+Additional refraction correction (non standard Temp/pression)</i>		
<i>ho</i>	<i>18° 42.6'</i>	

Exercice 5.2: $ho = 18^\circ 42,6'$

The screenshot shows the TeaCup Navigation software interface. On the left is a star chart with the Moon highlighted. On the right is the control panel with the following settings:

- Observer's Position: Latitude $60^\circ 12,6'$ S, Longitude $80^\circ 49,8'$ W
- Date and UT Time: Year 1981, Month 03, Day 23, UT hour 18, minute 38, second 11
- Settings: How many stars? 67, Time zone, hrs (W +) 5

At the bottom right, a table shows the Azimuth and Elevation for several celestial objects:

	Azimuth	Elevation	Fullness
MOON	$42,8^\circ$	$32^\circ 37,1'$	91 %
JUPITER	$5,1^\circ$	$30^\circ 32,1'$	
SATURN	$6,5^\circ$	$29^\circ 51,3'$	

