

NAV-ASTRO	DROITES DE HAUTEUR	V2.1– 02/22
A. Charbonnel	EXERCICES - DROITES DE HAUTEUR -NA	1/4

Pré-requis :

- Avoir revu son cours sur les droites de hauteur
- Avoir noter toutes les formules / procédures nécessaires dans son carnet du marin pour les exploiter sur les exercices

Conseils

- Lister vos erreurs (à noter dans le carnet du marin pour ne pas refaire le mêmes
- Faire attention à l'heure qui est donné. (UT, LMT, ZT)

Materiel nécessaire :

- Ephémérides 1981
- Calculatrice
- Plotting sheets
- Extraits des éphémérides 2024 et 2025

ATELIER 1 : CALCUL ET TRACÉ ELEMENTAIRE DE DROITES DE HAUTEUR

Exercice 1.1 - Drawing Line of position on plotting sheet

At 05h 13min your DR position is $19^{\circ}20'N$, $116^{\circ}50'E$., two observations of stars were taken as follows :

- Star 1 : Bearing $110^{\circ} T$, intercept $4'$ away.
- Star 2 : Bearing $030^{\circ} T$, intercept $5'$ toward.

Find the ship's position.

Exercice 1.2 – Sight seeing reduction/ LOP with stars

In the evening, 17th July 1981, at DR position $40^{\circ} 25'$, $32^{\circ} 40'W$, the chronometer showed 10h 21min 07s, chronometer error 4min 09s fast.

Observed Star Dubhe with sextant altitude $43^{\circ} 32'$ and star Deneb with sextant altitude $38^{\circ} 12,3'$; index error $2,3'$ on the arc ; height of eye 15 m.

Find intercepts and positions lines.

Solution partielle exercice 1.2 : pour Dubhe $ho=43^{\circ}21,9'$ / $hc= 43^{\circ} 14,7'$ / $i= 7,2M$ / $Zc= 322^{\circ}$

Exercice 1.3 – Sight seeing reduction / LOP with the SUN

At 0900 LMT, 25th October 1981, DR position $43^{\circ}15'N$, $38^{\circ}25'W$, the chronometer shows 11h 40min 32s, chronometer error is 2m 20s slow.

Sextant altitude of the sun's lower limb is $24^{\circ}02,3'$; index error $1.5'$ off the arc; height of eye 12 m.

Find intercept and position line.

NAV-ASTRO	DROITES DE HAUTEUR	V2.1– 02/22
A. Charbonnel	EXERCICES - DROITES DE HAUTEUR -NA	2/4

ATELIER 2 : TRANSPORT DE DROITES

Exercice 2.1 : Canevas de Mercator & UPS

(AST-RF001)

DR : 40° 05,0'N / 131°45,0'W

Two celestial observations of stars were taken simultaneous as follows:

- star 1 - Bearing 110° T, intercept 4 away.
- Star 2 Bearing 030° T, intercept 5 toward.

Plot the line of position and define the position

Exercice 2.2 : Sight reduction for stars

(AST-RF002)

Un navire suit une route fond au 235° à la vitesse surface $V_s = 14$ nds, le courant est nul.

A 07:38 ZT, $\phi_e = 45^\circ 44'$ N et $G_e = 012^\circ 00'$ W.

On a trouvé pour les observations de 3 étoiles :

- Alkaid ZT = 07h 32min 15s : $Z_c = 300^\circ / Ho - H_c = 0,5'$
- Arcturus ZT = 07h 38min 03s : $Z_c = 261^\circ / Ho - H_c = 2,2'$
- Schedar ZT = 07h 44min 07s : $Z_c = 041^\circ / Ho - H_c = -3.7'$

Tracer le point d'étoiles pour 07h38 min ZT

Exercice 2.3 : Sight reduction and running fix for the Sun

(AST-RF003)

At 0900 zone time, on 23 September 1981, your DR position is LAT 28°48.0'N, LONG 153°11.5'W.

You are steering course over ground 257°T at a speed of 18.0 knots.

You observed 3 following morning sun lines (lower limb).

Zone Time	Sextant Altitude
09h 15min 14s	39° 50,4'
09h 50min 04s	46° 11,2'
10h 20min 17s	51° 09,8'

The height of the eye is about 10,5 m.

The index error (IE) is -2,1'

Determine the latitude and longitude of your 10 h 20min running fix.

Exercice 2.4 : Sight reduction & running fix for stars

(AST-RF004)

On May 16th 1981, the navigator takes and records the following sights :

	Sextant altitude Hs	Observation Time (ZT)	Estimated position
Kochab	47°19,1'	20h 07min 43s	39° 05,1' N, 157° 08,0' W
Spica	32°34,8'	20h 11min 26s	39° 06,3 N, 157° 10,0' W

Height of eye is 48 feet and index correction (IC) is +2,1'

Determine the position at 20h 11min ZT

NAV-ASTRO	DROITES DE HAUTEUR	V2.1– 02/22
A. Charbonnel	EXERCICES - DROITES DE HAUTEUR -NA	3/4

ATELIER 3 : PROBLÈMES DIVERS

Pour cet atelier, vous trouverez les données quotidiennes soit après cette fiche en pièces jointes soit en ligne ;

- <http://www.tecepe.com.br/scripts/AlmanacPagesISAPI.dll/>
- <http://www.nauticalalmanac.net/pdf/almanac2025.pdf>

Exercice 3.1 Sight reduction Sun/Sun

(S2)

On June 30th 2025, you are sailing in Mediterranean Sea.
 You are steering course over ground 120°T at a speed of 10 knots
 Your sextant have an index correction 1,4' on the arc.
 You make the following sight at the eight of 9,5m

Time sight (UT)	Hs	Position	
09h 59 min 05s	62° 37,5'	40° 01' N	05° 43' E
11h 58min 31s	72° 43,2'	39° 51' N	06° 05,5' E

- Plot the first line of position at 09h 59 min UT.
- Plot the second line of position at 11h 58min UT.
- Make a fix at 11h 59 min UT.

Solution partielle exercice 3.1 : 39° 43,7'N / 006°10,2'E

Exercice 3.2 – Sight reduction Sun/Sun – Read Sea

(S7)

On June 30th 2025, you are sailing in Mediterranean Sea.
 You are steering course over ground 152°T at a speed of 10 knots
 Your dead reckoned position is 20° 02,0' N / 38° 45,0' E at 08 h 35min UT
 Your sextant have an index correction 1' on the arc.
 You make the following sight at the eight of 6 m

Time sight (UT)	Hs	Position	
08h 35min 35s	76° 59,8'	20° 02,0' N	38° 45,0' E
09h 35min.30s	86° 6,5'	19° 53,0' N	38° 50,0 E

Make a fix at 09h 35min UT

Solution partielle exercice 3.2 : 19° 49,2'N / 38° 46,8'E

NAV-ASTRO	DROITES DE HAUTEUR	V2.1- 02/22
A. Charbonnel	EXERCICES - DROITES DE HAUTEUR -NA	4/4

Exercice 3.3 Sight reduction Stars and Planets

(ST-P1)

On June 28th 2024, you are sailing in Indian Ocean.
 You are steering course over ground 208°T at a speed of 16,0 knots.
 Your dead reckoned position is 10° 00,0' S / 44° 36,0' E at 02 h 40min UT.
 Your sextant have an index correction 1,2' on the arc.
 The watch correction is +5s
 You make the following sight at the eight of 15 m

	Watch time	Hs
Achernar	02h 40min 10s	39° 45,0'
Enif	02h 43min 02s	49° 16,7'
Mars	02h 47min 10s	44° 21,9'

Make a fix at 02.40 U.T. / 05.40 Local Time

Solution partielle exercice 3.3 :10° 02,7' S / 44° 39,4' E

Exercice 3.4 Sight reduction stars

(ST7)

On June 28th 2024, you are sailing in North Atlantic Ocean.
 You are steering course over ground 143°T at a speed of 13,0 knots.
 Your dead reckoned position is 50° 3,0' N / 009° 02,2' W at 03 h 25min UT.
 Your sextant have an index correction 1,5' off the arc.
 The watch correction is -4 s.
 You make the following sight at the eight of 24 m

	Watch time	Hs
Capella	03h 20min 08s	18° 45,1'
Alpheratz	03h 22min 12s	51° 6,1'
Altair	03h 25min 04s	45° 23,4'
Vega	03h 27min 15s	59° 47,7'
Kochab	03h 30min.24s	45° 46,8'

Make a fix at 03.25 U.T. / 03.25 Local Time

Solution partielle exercice 3.4: 50° 09,7' N / 008° 55,7' W

