

ENSM Le Havre	DROITES DE HAUTEUR	V2.0 – 01/19
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 ELEMENTAIRES 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.

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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 Tcf, $\phi_e = 45^\circ 44'$ N et $G_e = 012^\circ 00'$ W.

On a trouvé pour les observations de 3 étoiles :

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

Tracer le point d'étoiles pour 07h38 min Tcf

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

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ATELIER 3 : PROBLEMES DIVERS

Pour cet atelier, vous trouverez les données quotidiennes soit après cette fiche en pièce jointe 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 6th 2025, you are sailing in Mediterranean Sea.
 You are steering course over ground $120^{\circ}T$ at a speed of 10 knots
 Your dead reckoned position is $40^{\circ} 01,0' N / 005^{\circ} 43,0' E$ at 12h 10min UT
 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	$62^{\circ} 37,5'$	$40^{\circ} 01' N$	$05^{\circ} 43' E$
11h 58min 31s	$72^{\circ} 43,2'$	$39^{\circ} 51' N$	$06^{\circ} 05,5' E$

- 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 : $39^{\circ} 43,7' N / 006^{\circ} 10,2' E$

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 $152^{\circ}T$ at a speed of 10 knots
 Your dead reckoned position is $20^{\circ} 02,0' N / 38^{\circ} 45,0' E$ 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	$76^{\circ} 59,8'$	$20^{\circ} 02,0' N$	$38^{\circ} 45,0' E$
09h 35min.30s	$86^{\circ} 6,5'$	$19^{\circ} 53,0' N$	$38^{\circ} 50,0 E$

Make a fix at 09h 35min UT

Solution partielle exercice 3.2 : $19^{\circ} 49,2' N / 38^{\circ} 46,8' E$

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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

