DIRECTORATE OF MERCHANT SHIPPING
GOVERNMENT OF SRI LANKA
CERTIFICATE OF COMPETENCY EXAMINATION

GRADE　　　: CHIEF MATE ON SHIPS OF 500 GT OR MORE (UNLIMITED)
SUBJECT　　: NAVIGATION
DATE　　　 : 08th February 2016

Time allowed THREE hours	Total marks　: 180
ANSWER ALL QUESTIONS	Pass marks　: 70%

Formulae and all intermediate steps taken in reaching your answer should be clearly shown. You may draw sketches wherever required. Electronic devices capable of storing and retrieving are **not** allowed.

1) A vessel departs Numea, New Caledonia bound for Concepcion, Chile. The charterer wishes the master to take full advantage of the shortest possible route to Coquimbo. But an ordinary great circle track enters the Winter Load Line Zone whose northern limit is 33^0 S.

   After completion of loading at Numea, the vessel's Winter load line marks are overloaded by 390 tonnes of fuel and water which must be consumed before entering the Winter Zone. The vessel consumes 32 tonnes of fuel and water per day, at her service speed of 14.7 knots

   Departure position off Numea:　　　　　22º 54' S　167º 06' E
   Landfall position off Concepcion:　　　　36º 48' S　073º 12' W

   Calculate the shortest legal route.

   (35 marks)

2) A vessel is making good a course of 120° (T) at a speed of 12 knots. The DR position at 0630 hrs was 32° 14' S 128° 17' E. Four stars were observed at different times, which gave the following azimuths and intercepts:

Time	Star	Azimuth	Intercept
0618	A	022°	2.2'　away
0624	B	127°	2.1'　towards
0639	C	185°	3.8'　towards
0645	D	333^0	6.5'　away

   The same DR was used for all intercepts. Find, by plotting, the vessel's most probable position at 0630 hrs.

   (30 marks)

3) Blind pilotage means the navigation of a ship through restricted waters in low visibility with little or no recourse to the visual observation of objects outside the ship. Answer the following questions with reference to blind pilotage:
   a) Briefly describe the general principals of planning and execution of blind pilotage.

   (08 marks)
   b) Outline the Blind Pilotage **planning** guidelines.

   (15 marks)
   c) Outline the Blind Pilotage **execution** guidelines.

   (12 marks)

4) A vessel trades regularly to the Baltic, where, in the winter months, sea ice and ice accretion may be experienced.
   a) Explain the preparation required for a ship to navigate in Baltic Sea in ice conditions.

   (15 marks)
   b) List the sources from which a master may gain information about ice conditions in the Baltic.

   (05 marks)
   c) Describe five operational problems with regard to navigation in High latitudes.

   (10 marks)

5) Answer the following questions with regard to search and rescue operations:
   a) List the factors to be considered when establishing the search datum

   (12 marks)
   b) What are the factors that will be considered in appointing an On Scene Coordinator (OSC)?

   (08 marks)
   c) Describe the duties of the OSC at the end of a successful SAR operation

   (05 marks)

6) Answer the following questions with regard to TRS:

   a) Explain the method of long range avoidance of a Tropical revolving storm with the aid of a sketch showing the Imminent Danger area and Probable Danger Area.

            (10 marks)

   b) A vessel in position 24° 00' S 042° 47' E and on a Northwesterly course in to the Mozambique channel receives a radio report that a tropical cyclone is in position 15° 00' S 046° 00' E has re-curved and is now heading SSW'ly at 15 kts.

     i)   On the worksheet (Worksheet – 3) provided, plot the position of both the storm and the vessel, show the usual path for such a storm.

            (05 marks)

     ii)   Describe the alternative routes that could be taken by the master to keep the vessel safe and explain how each could keep the vessel clear of the worst of storm.

            (10 marks)

WORKSHEET Q.3 (Mercator chartlet of SW Indian Ocean)

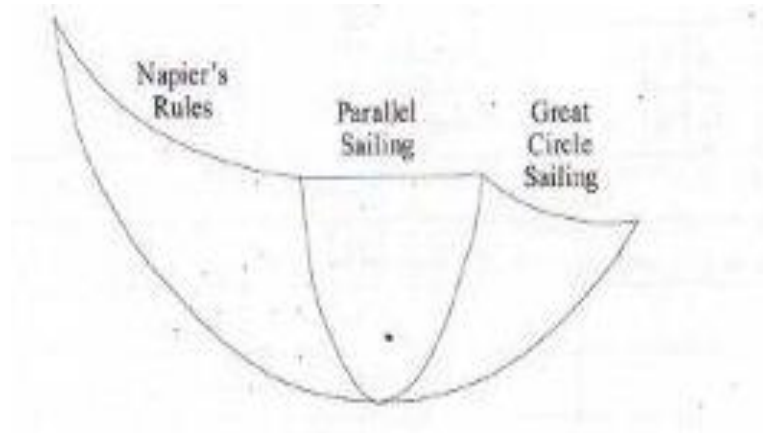*(N.B. This Worksheet must be returned with your answer book)*

0

10°

20°

30°

40°

30°   40°   50°
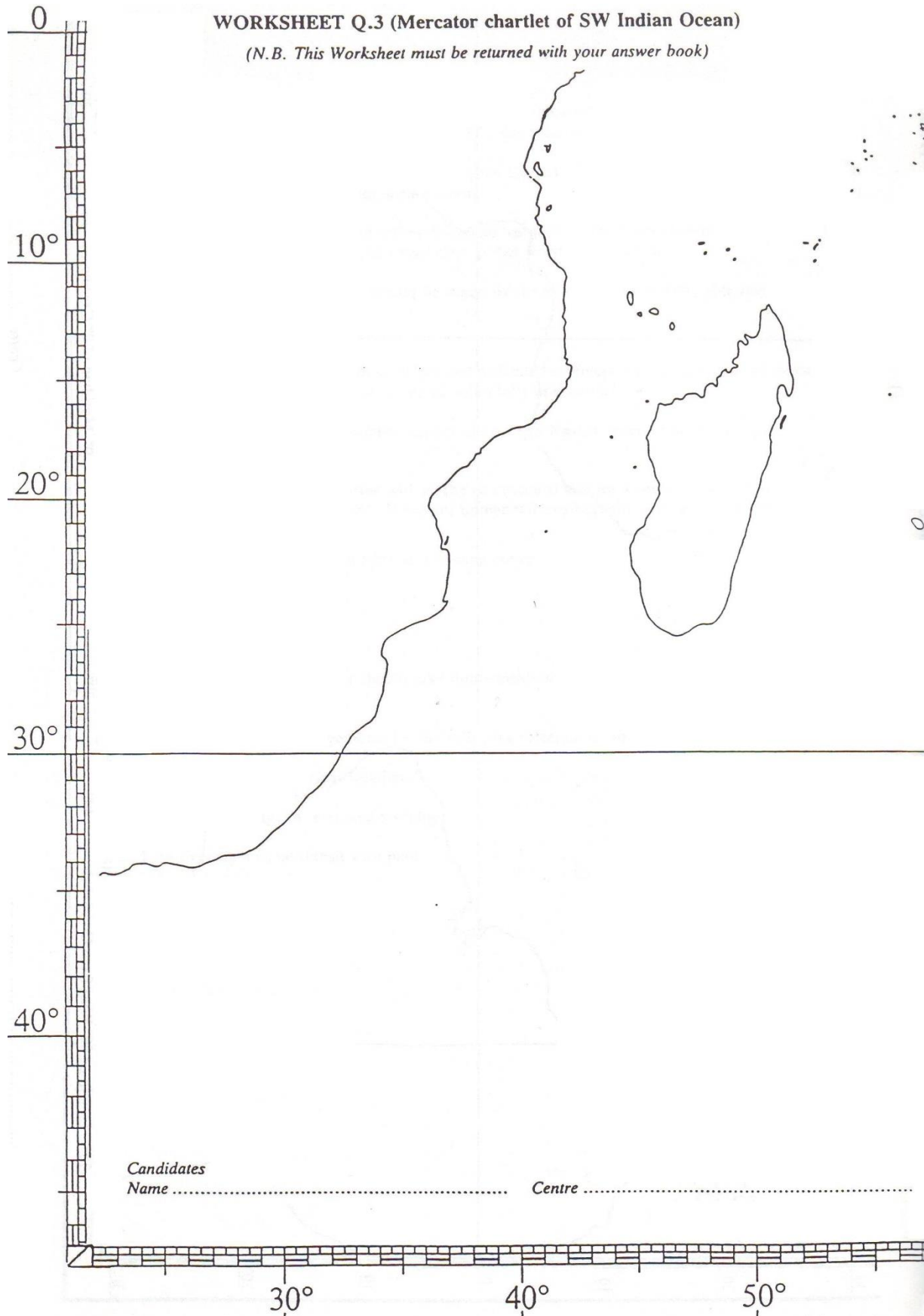
Candidates
Name ....   Centre ....

Answer – 1

Departure position off Charleston	22º 54′ S167º 06′ E	
Arrival position off Vigo	36º 48′ S	073º 12′ W
d′long(P)=119º 42′ E		

Diagram

Dist AVW= (390/32) x 24 x 14.7 =4299.75′

Napier's Rule for PAV;

To Finddist AV
Cos AV = Cos AP/ Cos PV = Cos 67º06′/Cos 57º 00′
$\qquad$ AV = 2664.05′

To find P_2
Cos P_1 $\quad$ = Tan PV/Tan AP
$\qquad\qquad$ = Tan 57º / Tan 67º06′
$\qquad$ P_1 $\quad$ = 49º 25.4′

Dist VW = 4299.75′– 2664.05′
$\qquad\qquad$ = 1635.7′

To find P_2
d′long = dep/coslat = 1635.7′/cos 33º
P_2 =32º 30.35′

To find P_3

P=P_1+P_2+P_3

119^0 42′=49^0 25.4′ + 32^0 30.35′+P_3

P_3= 37^0 46.25′

To find dist WB

Cos WB= Cos P_3 x Cos lat W x Cos lat B + Sin lat W x Sin lat B

= Cos 37^0 46.25′ x Cos 33^0 x Cos 36° 48′ + Sin 33^0 x Sin 36° 48′

WB=31^0 00.52′

WB=1860.52′

Total dist AB = 4299.75′ + 1860.52′

= 6160.27′

Answer – 2

As the position is required for 0630:

Star A 0618 to 0630 12 minutes run on 2.4′

Star B 0624 to 0630 6 minutes run on 1.2′

Star C 0639 to 0630 9 minutes run back 1.8′

Star D 0645 to 0630 15minutes run back 3.0′
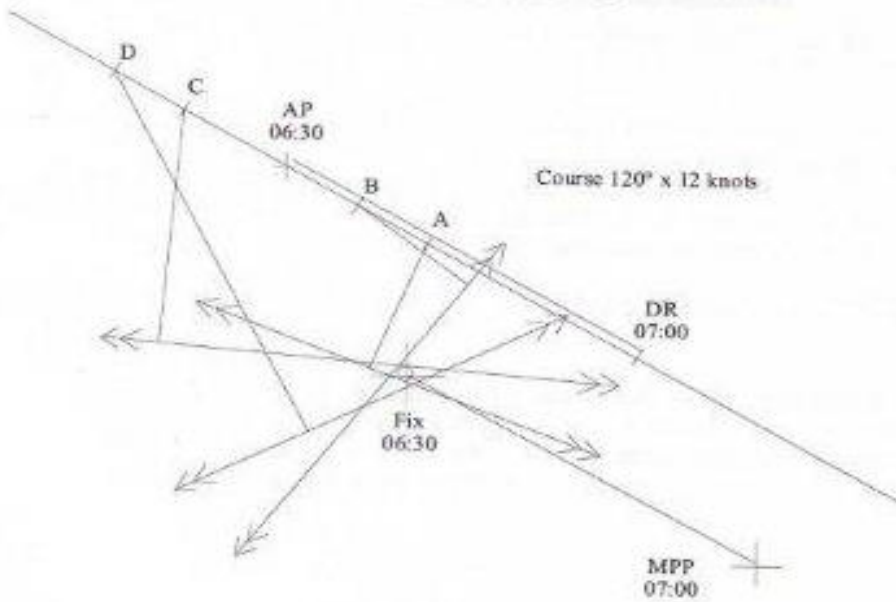
d' lat = 3.3'S, dep =1.8' E

DR Lat= 32° 14.0' S
d'lat= 0^0 03.3' S
Fix Lat= 32^0 17.3' S

dep   = d'long x Cos (m' lat)
d'long = 1.8' / Cos 32.3^0
       = 2.1'' E

DRLong =128° 17.0 'W
d'long= $0^0$02.1' E
FixLong =128^0 14.9' W

Vessel's Most Probable Position at 1830= 32^0 17.3' S 128^0 14.9' W