Section B (36 marks)

10 **(i)**

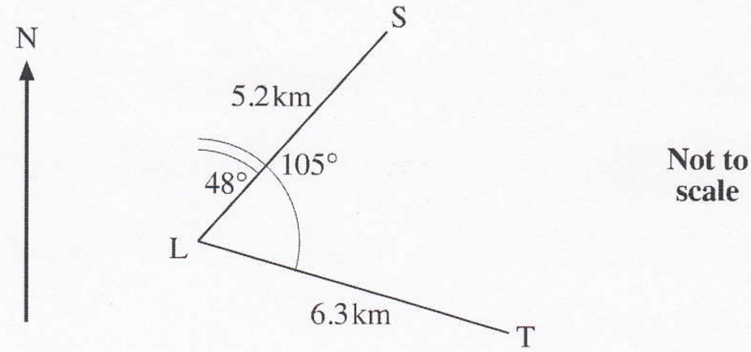


Fig. 10.1

At a certain time, ship S is 5.2 km from lighthouse L on a bearing of 048°. At the same time, ship T is 6.3 km from L on a bearing of 105°, as shown in Fig. 10.1.

For these positions, calculate

(*A*) the distance between ships S and T, [3]

(*B*) the bearing of S from T. [3]

(ii)

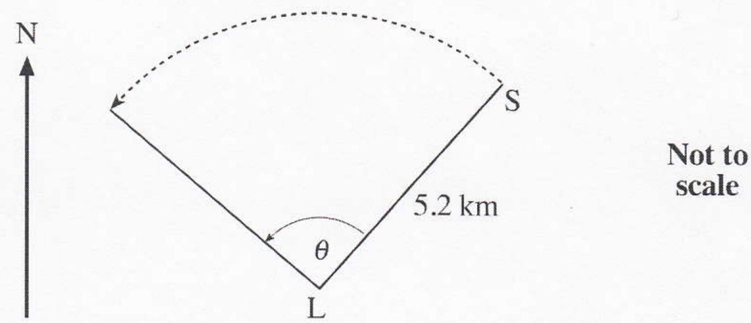


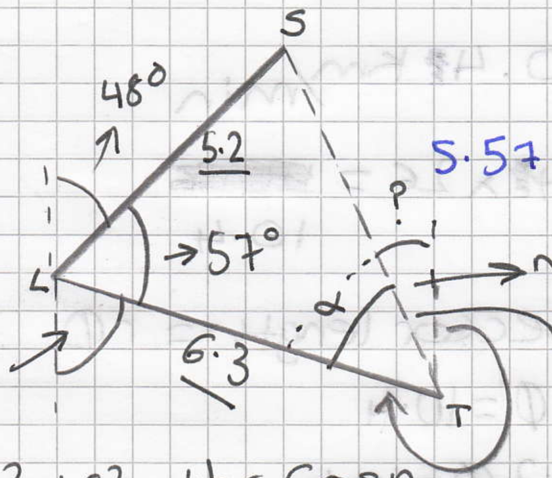
Fig. 10.2

Ship S then travels at 24 km h^{-1} anticlockwise along the arc of a circle, keeping 5.2 km from the lighthouse L, as shown in Fig. 10.2.

Find, in radians, the angle θ that the line LS has turned through in 26 minutes.

Hence find, in degrees, the bearing of ship S from the lighthouse at this time. [5]

10i.



$180 - 48 - 57$
$= 75°$

→ must also be 75°
(Alternate angle).

→ ~~52~~ $75 - 52 = \underline{\underline{23}}$

A. $a^2 = b^2 + c^2 - 4bc \cos A$

$a^2 = 6.3^2 + 5.2^2 - (\overset{2}{\cancel{4}} \times 6.3 \times 5.2) \times \cos(57)$

$a^2 = 31.045$

$a = \sqrt{31.042} \simeq 5.57 \text{km}$

B.

$a^2 = b^2 + c^2 - 2bc \cos A$

find angle α

$\frac{a^2 - b^2 - c^2}{-2bc} = \cos A = \frac{(5.2^2) - (5.57^2) - (6.3^2)}{(-2 \times 5.57 \times 6.63)}$

$\cos A = 0.622309\ldots$

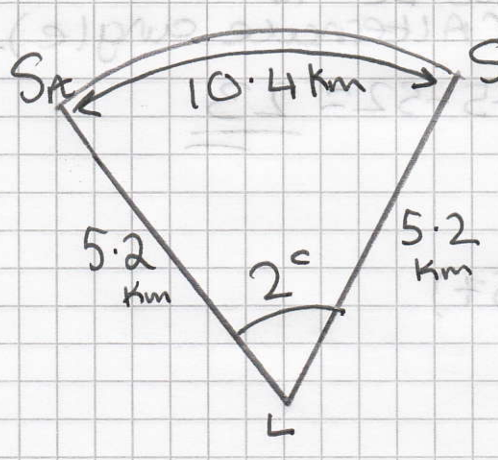
$A = \cos^{-1}(0.623\ldots) \simeq 51.515° \simeq \underline{51.5°}$

Bearing $= 360 - 23° = \underline{337°}$

10ii.

$(24\ \text{Km/h}) \div 60 = 0.4\ \text{Km/min}$

26 minutes so... $0.4 \times 26 =$ 10.4



Sector length $= r\theta$

$r\theta = 10.4$

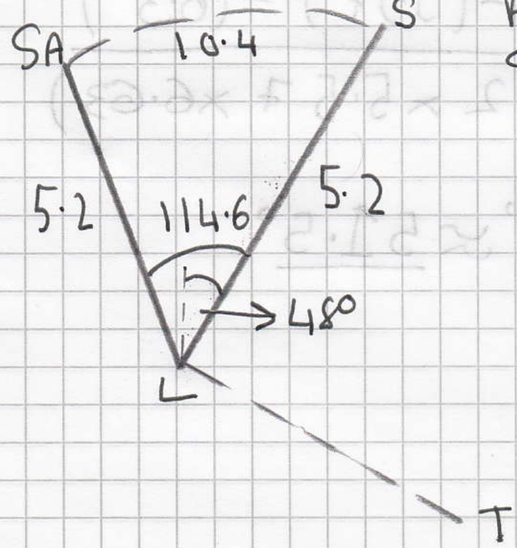
$5.2\theta = 10.4$

$\theta = \frac{10.4}{5.2}$

$\theta = 2^c$

Then Convert to degrees for bearing

$\frac{180}{\pi} \times 2 = 114.6^\circ$



At this time so Ship is at SA

$114.6 - 48 = 66.6$

$360 - 66.6 = \underline{293.4^\circ}$