Night Observation Q1 – Little Dolphin

Marking scheme :

On Drawing 1 :

Draw as the view of the constellation Delfinus (Del) through the finder scope.

all 4 stars of the parallelogram	(1)
the 'tail'	(1)
correct scale	(1)
correct shape	(1)
additional field stars	(1)

With an arrow, mark the apparent direction of motion of the stars across the field of view of the finder scope caused by the rotation of the Earth. (2)

Label the stars with the Bayer designations given on the map (α, β, γ, δ and ε). (1)

Also label the brightest of these 5 stars "m_{max}". (1)

Also label the faintest of these 5 stars "m_{min}". (1)

On Drawing 2 :

Draw the view of the Little Dolphin through the larger telescope.

all 4 stars of the parallelogram	(4)
the 'tail'	(1)
correct scale	(1)
correct shape	(1)
additional field stars	(1)

With an arrow, mark the apparent direction of motion of the stars across the field of view of the finder scope caused by the rotation of the Earth. (2)

Label the stars of the Little Dolphin α′, β′, γ′, δ′ and ε′ such that they match the labels of the stars in the constellation Delfinus as given on the map. (3)

Label the brightest of these stars "m_{max}". (2)

Total 25

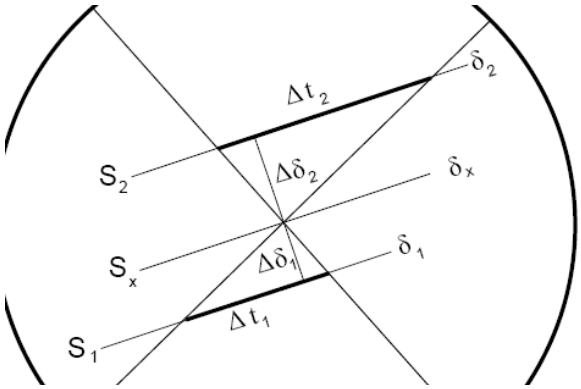
Night Observation – Q2 Measuring Declination

Solution: $\delta(Sx) = +19^{o}\ 55' \pm 1'$

Method 1:

Sx should pass exactly through the centre of cross

$$\delta_x = \delta_1 + (\delta_2 - \delta_1)\frac{\Delta t_1}{\Delta t_1 + \Delta t_2}$$

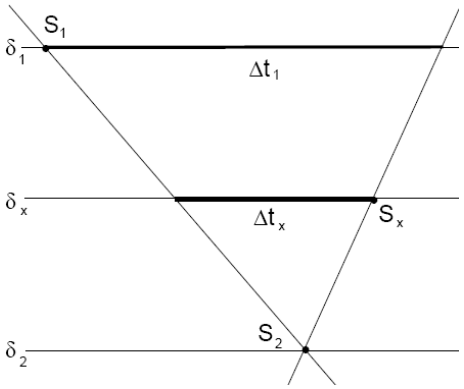


Method 2:

During Δt_X **a**rm is parallel to S_1-S_2

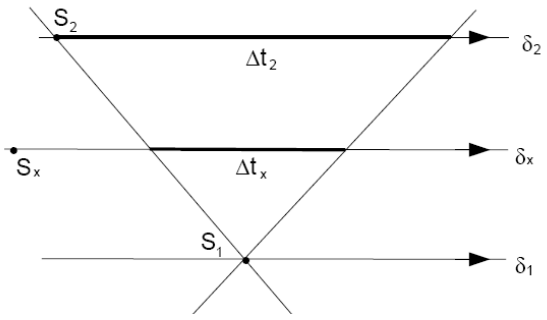
During Δt_1 **a**rm is parallel to S_2-S_X

$$\frac{\Delta t_1}{\Delta t_x} = \frac{\delta_2 - \delta_1}{\delta_2 - \delta_x},$$



Method 3:

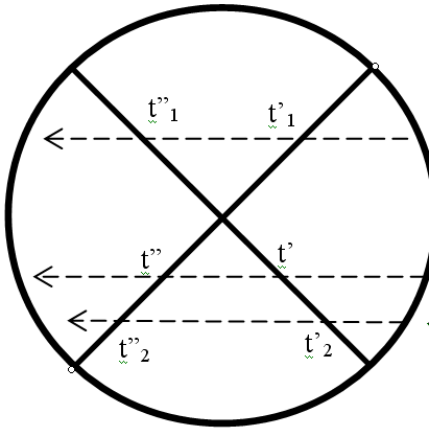
One arm of cross is parallel to S_1-S_2.
Start measuring time when S_1 is
in the centre of the cross
Δt_X is the transit time of Sx transit
between the two arms of cross
Δt_2 is the time of travel of S_2 from one arm
to the second arm of cross



$$\frac{\Delta t_2}{\Delta t_x} = \frac{\delta_2 - \delta_1}{\delta_x - \delta_1}$$

Method 4:

Cross arms are inclined by 45º to the drift direction.
It is necessary to measure six moments
of time.



Night Observation – Q2 Measuring Declination

Marking scheme:

Draw of field of view (any stars)
- if picture present position of S1, S2, Sx stars 3
- if there is more stars presented on attached maps 1
- mark North directions on picture of FoV 1
- mark East directions on picture of FoV 1

Proper method of observations:
- if cross is parallel to N-S and E-W 0
and total score will be calculated from previous points

- cross twisted from N-S and E-W direction 2
- proper position angle of cross corresponding to formula used for calculations 4

If student will need make a measurements in two or more different position angle they will receive 4 points if all of them will be corrected

- Proper formula for δ_X calculation 6

- several repetitions of stopwatch measuring, 3
or
- if student will give any subjective estimation of time measuring 2
(from watching the transit of star under cross etc.)

- Proper calculation for δ_X calculation 2

- proper estimations of final error 2