(6) Plot ($D_n^2 - D_m^2$) with (n-m) and get the slope.

(7) Also Plot D_n^2 with n and compare the result.

OBSERVATIONS:

(a) Spherometer readings (Calculation for R)

Pitch of the Spherometer = ... cm

Least Count of the Spherometer = ... cm

Table 1: Determination of R of the lens

SN	Spherometer reading		h = a ~ b	*l*	$R=l^2/6h + h/2$
	convex surface (a)	Plan surface (b)			
1.					
2.					
3.					
4.					
5.					

l is the distance between any two outer legs of the spherometer

(b) Microscope reading

R = 120 cm
= 1200 mm

Vernier Constant of microscope = 0.01 cm

Table 2: Determination of the diameter of rings.

SN of rings	Microscope reading (Left)			Microscope reading (Right)			Diameter
	M.S.	V.S.	MS.+ (V.S.xV.C.)	M.S.	V.S.	MS.+ (V.S.xV.C.)	D = a ~ b
4th	47	67	47.65	43	83	43.83	3.86
8th	48	45	48.45	43	00	43	5.45
12th	48	91	48.91	42	43	42.43	6.48
16th	49	67	49.67	42	02	42.02	7.65
20th	49	99	49.99	41	61	41.61	8.38

DATA ANALYSIS:

Slope of the plot = ... 3.75 ... , λ (from graph) = ... 7812.5 Å

Error calculation

SN	n − m	$Dn^2 - Dm^2$	λ	$\bar{\lambda}$	$\delta\lambda_i = \lambda_i - \bar{\lambda}$	$\delta\lambda_i^2$	σ_λ
1.	20 - 16	11.7019	0.0006094		1.1598×10^{-4}	1.34×10^{-8}	
2.	20 - 12	28.234	0.00073526		-7.18×10^{-6}	5.15×10^{-11}	
3	20 8	40.194	0.00070350		2.1575×10^{-5}	4.78×10^{-10}	
4	20 4	55.632	0.00072437		1.005×10^{-6}	1.01×10^{-12}	
5	16 - 12	16.5321	0.00086104	7.2538×10^{-4} mm	-1.3566×10^{-4}	1.840×10^{-8}	1.2355×10^{-4}
6	16 - 8	28.4921	0.00075052		-2.514×10^{-5}	6.32×10^{-10}	
7	16 - 4	43.9301	0.0007626		-3.722×10^{-5}	1.385×10^{-9}	
8	12 - 8	11.96	0.00062291		1.0247×10^{-4}	1.05×10^{-8}	
9	12 - 4	27.398	0.0007134		1.19×10^{-5}	1.4161×10^{-10}	
10	8 - 4	15.436	0.00078		-5.462×10^{-5}	2.983×10^{-9}	
		$\Sigma\lambda_i = 7.253896 \times 10^{-3}$			$\Sigma\delta\lambda_i^2 = 1.374 \times 10^{-6}$		

■ RESULTS & CONCLUSION

(i) The wave length of sodium light = $\bar{\lambda} \pm \sigma_\lambda = 7.2538 \times 10^{-4} \pm 1.2355 \times 10^{-4}$

(v) Standard value of λ = 5893 Å = 5.893×10^{-4} mm

(vi) % error = 23.09%

■ DISCUSSION

In lab we used the apparatus to find Newton's ring. We used the travelling microscope to see the rings and used main and circular scale for determining the diameter of the rings.

■ PRECAUTIONS:

(I) Instruments must be handled with care.

(II) Experiment should be done in dark room.

(III) The light must fall sufficiently on the microscope

(IV) .....

■ ANSWER THE FOLLOWING QUESTIONS:

A. Before performing Experiment.

(1) What are Newton's rings ? How are they formed ?

=> Newton's rings are the phenomena in which an interference pattern is created by the reflection of light between two surfaces.

They are formed by the interference between light waves reflected from top bottom surface of air film form between lens and glass-sheet.

(2) Give working formula to light.

= The working formula to light is;

$$\lambda = \frac{D_n^2 - D_m^2}{4(n-m)R}$$

(3) What is interference ? What are essential conditions to produce interference fringes ?

= The net effect of the combination of two or more waves moving on intersecting or coincident paths.

Conditions to produce interference fringes are:-

(a) Source should be coherent and mono-chromatic.

(b) Source should be of same intensity.

(c) Distance between screen should be small.

(4) How circular interference fringes are formed ?

= This is due to use of plano-convex lens in Newton's ring experiment, Newton's rings are circular because the air film in between the glass and lens at the point of contact are of equal thickness about a point in a circular way.

(5) What will happen to the rings if the glass plate of the combination is replaced by a plane mirror ?

= If the glass plate of the combination is replaced by a plane mirror then, the interference fringes will not be visible as plane mirror reflects light uniformly.

B: After Performing Experiment

(1) What would be your observation in transmitted light ?

=> In case of transmitted light, center of Newton's ring appears to be bright.

(2) Why is the central spot dark in your experiment ?

=> It is because the light suffers a phase of inverse upon reflecting from a medium with high refraction index.

(3) Why should you use a convex lens of large radius of curvature ? Why does the fringes get closer and thinner as we move away from the centre ?

= we should use convex lens of large radius of curvatu so that when it is placed in air film, the observess will have then a large diameter and the error in the measurement will be less.

The fringes get closer and thinner as we move away from center as moving from center increases the air gap which lowers the radius thus making them closer and thinner.

Date: **Name of teacher:** **Teacher's Signature**

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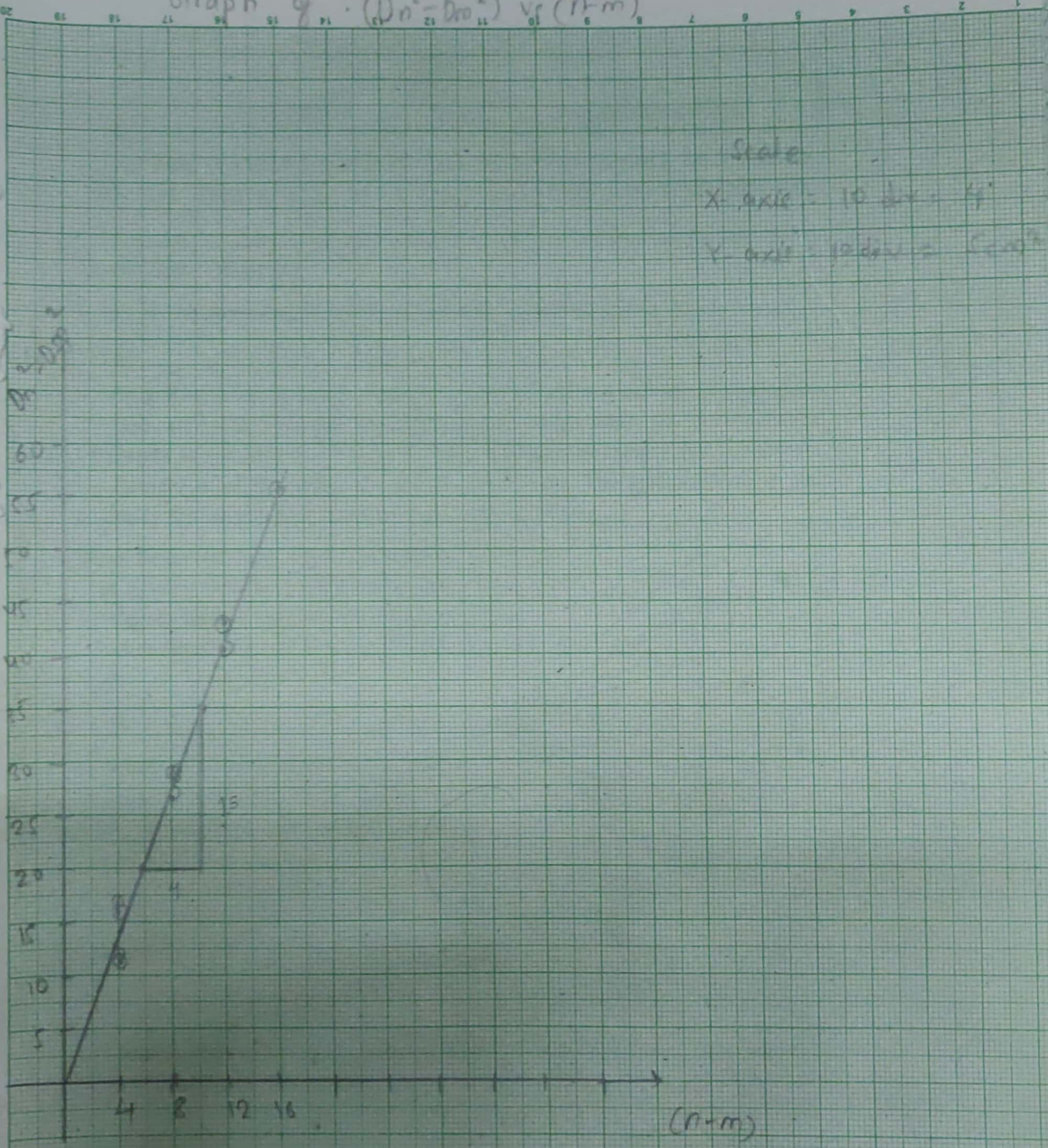
Graph of $(D_n^2 - D_{n0}^2)$ Vs $(n+m)$



$$\text{Slope} = \frac{35 - 15}{10 - 6} = 5$$