PHOTOMETRY

A. THE INVERSE SQUARE LAW

Name: .....

Group:.....

Date: .....

Goal of the experiment: .....

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1. Analysis of experimental errors:

   accuracy of the luxmeter (type KEW 5202; following the producer manual: $\Delta E = \pm 4\%$ of reading ±5 digits),

   accuracy of the light source and the luxmeter position on the optical bench:

   $\Delta x_s = \Delta x_L =$ .....

2. Results of measurements of the illuminance as a function of the distance *R* from the point light source:

   position of the point light source $x_s \pm \Delta x_s =$ .....

	1	2	3	4	5	6	7	8	9	10	11	12
x_L , ... unit												
E , ... unit												
$\Delta E \xrightarrow{values}$												
$R = x_L - x_s$, ... unit												
$\Delta R = \pm$..... value and unit												
$\frac{1}{R^2}$, ... unit												

   Make graphs:

   a) $E = f(R)$ - the illuminance as a function of the distance from the light source,

   b) $E = f\left(\frac{1}{R^2}\right)$ - the illuminance as a function of the inverse of the square of the distance from the light source.

Conclusions: .....

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B. Determination of the Luminous Intensity by the Comparative Photometry Method

1. Analysis of experimental errors - accuracy of the light sources and the photometer position on the optical bench:

   $\Delta x_S = \Delta x_U =$ .....

   Position of the standard source: $x_S \pm \Delta x_S =$ .....

   Position of the unknown source: $x_U \pm \Delta x_U =$ .....

   Position x_{Ph} of the Joly photometer on the optical bench where the wax boxes are equally bright:

	x_{Ph}
	..... *unit*
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
Sum	
Mean $\overline{x}_{Ph}$	

Standard deviation: $s_{x_{Ph}} =$ .....

Standard deviation of the mean: $s_{\overline{x}_{Ph}} =$ .....

Maximal error of the mean: $3 \cdot s_{\overline{x}_{Ph}} =$ .....

Final result:

$$\overline{x}_{Ph} \pm \Delta\overline{x}_{Ph} = ...$$

The error of the measurement is classified as *systematic / accidental* (cross the invalid off).

$R_S = \overline{x}_{Ph} - x_S =$ ..... $R_U = x_U - \overline{x}_{Ph} =$ .....

$\Delta R_S = \Delta\overline{x}_{Ph} + \Delta x_S =$ ..... $\Delta R_U = \Delta\overline{x}_{Ph} + \Delta x_U =$ .....

Wattage of the reference source: $P_S =$ ....., wattage of the unknown source: $P_U =$ .....

2. Calculated relative luminous intensity $\frac{I_U}{I_S}$ of the unknown source against the standard source:

   ..... (formula and value)

Conclusions: .....

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